

## Louvain School of Management

*«Transition to functional service economy: The  
case of household appliances in Belgium, Canada  
and the Philippines. »*

Research Master's Thesis submitted by  
**Elise Tilmans & Clarisse Bulpa**

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Supervisor  
**Pr. Benoit Gailly**  
**Pr. Christophe Lejeune**  
**Pr. Karine Cerrada Cristia**

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## **Abstract**

The objective of this thesis is to analyse a concept called the functional service economy (FSE) and how it could be implemented in the household appliance sector particularly in Belgium, Canada and the Philippines.

The functional service economy is studied as a business model innovation for sustainability. After examining various sources, the definition of Stahel was chosen for this thesis: « *The Functional Service Economy, which optimises the use or function of goods and services, focuses on the management of existing wealth in the form of goods, knowledge and natural capital* ».

Following the definition and the principles of the FSE, several related concepts are exposed. Some are very similar such as the product service system, particularly the use-oriented PSS and result-oriented PSS. The notions of eco-conception, eco-socio-conception and eco-efficiency are considered as tools used to implement the FSE. Then, the circular economy shares characteristics with the FSE while remaining a different model. We also note that the functional and cooperation economy takes the concept further than the FSE by insisting on the use of immaterial resources, the integration of three pillars of the sustainable development and the stakeholders' involvement. Subsequently, the limits and recommendations for the implementation of the model are given. To conclude the theoretical part, the leverages and obstacles are summarised and the main key success factors are explained. These refer to the inclusion of stakeholders involved in the value chain, a progressive implementation of the model, the development of immaterial resources, cooperation and partnerships, the establishment of feedback loops for continuous improvement and a clear marketing message to enhance the acceptance of the offer.

The practical part aims at answering the following question: « *Are the consumers interested in changing their consumption habits towards a functional service economical model in the household appliance sector?* ».

To answer this research problem, key insights are developed and five experts are interviewed to ultimately create a viable offer following this model, exemplified with a washing machine. Then, once the offer is improved after having taken into account the experts' advice, consumers' opinions are analysed. For this, a qualitative analysis is conducted by interviewing 60 respondents from three countries, with the aim of answer the following question: « *Are there any obstacles or leverages toward the implementation of this new model that are more present in certain cultures rather than others?* ». Indeed, it seems that the majority of the customers interviewed in Belgium, Canada and the Philippines were interested in this type of offer for washing machines, even if they valued different features depending on their culture.

Finally, the key success factor established in the theoretical part can be applied to the specific case of a washing machine with an emphasis on: a good certification of an energy efficiency appliance or eco products, incentives to enhance the consumers' participation in the feedback loop and a marketing message accentuating the added value of the services and their price justification. Nevertheless, this thesis has its limitations such as the choice of its sustainable perspective. Further research could be conducted, for instance, to extend the scope of our analysis to other sectors.

**Keywords:** Business model innovation for sustainability, Functional service economy, Product-Service System, Circular economy, Eco-conception.



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## Table of contents

|                                                                                 |          |
|---------------------------------------------------------------------------------|----------|
| INTRODUCTION                                                                    | 1        |
| <b>Part 1: Theoretical approach</b>                                             | <b>4</b> |
| Chapter I: Business model innovation for sustainability                         | 5        |
| Chapter II: Functional service economy                                          | 7        |
| 1) <i>Origins</i>                                                               | 7        |
| 2) <i>Definitions</i>                                                           | 8        |
| 3) <i>Principles</i>                                                            | 3        |
| A) Value proposition                                                            | 3        |
| B) Value creation                                                               | 4        |
| C) Value capture                                                                | 5        |
| D) Application scope                                                            | 6        |
| 4) <i>Kotler Marketing mix analysis</i>                                         | 7        |
| A) Traditional/ Industrial model                                                | 7        |
| B) Model of the functional service economy                                      | 8        |
| 5) <i>Various concepts generally linked with the functional service economy</i> | 8        |
| A) Product-service system                                                       | 8        |
| A.1. Product-oriented PSS                                                       | 9        |
| A.2. Use-oriented PSS                                                           | 9        |
| A.3. Result-oriented PSS                                                        | 12       |
| B) Eco-conception, eco-socio-conception and eco-efficiency                      | 14       |
| C) Link with the circular economy                                               | 15       |
| D) Functional and cooperation economy                                           | 19       |
| D.1. Introduction and justification                                             | 19       |
| D.2. Concepts                                                                   | 20       |
| D.3. Advantages of functional and cooperation economy                           | 23       |
| E) Conclusion                                                                   | 23       |
| 6) <i>Limits and obstacles</i>                                                  | 24       |
| Chapter III : Recommendations and conclusion                                    | 27       |
| 1) <i>Recommendations for the implementation of the model</i>                   | 27       |
| A) For companies                                                                | 27       |
| B) For other stakeholders                                                       | 29       |
| 2) <i>Conclusion &amp; summary table of the theory</i>                          | 30       |

|                                                                                 |    |
|---------------------------------------------------------------------------------|----|
| <b>Part 2: Practical approach</b>                                               | 33 |
| Chapter I: Overview of the practical part                                       | 34 |
| Chapter II: Household appliances market                                         | 35 |
| 1) <i>Consumer behavior</i>                                                     | 35 |
| A) Choice determinants                                                          | 35 |
| B) Target group                                                                 | 37 |
| Chapter III: Elaboration of key insights and an offer based on experts opinions | 38 |
| 2) <i>Methodology for experts interviews</i>                                    | 42 |
| 3) <i>Results on the key insights</i>                                           | 44 |
| 4) <i>Explanation of the offer based on insights from experts</i>               | 45 |
| A) General presentation of the offer                                            | 45 |
| B) Clarification of the dimensions                                              | 46 |
| B.1 Rental contract                                                             | 46 |
| B.2. Innovation updates                                                         | 47 |
| B.3. Application for smartphone                                                 | 49 |
| B.4. Partnerships                                                               | 50 |
| C) Positive externalities for the client                                        | 51 |
| Chapter IV : Consumer qualitative analysis                                      | 51 |
| 1) <i>Methodology</i>                                                           | 51 |
| 2) <i>Analysis of axes per nationality</i>                                      | 54 |
| A) Belgium                                                                      | 55 |
| A.1. General state                                                              | 55 |
| A.2. Analysis of the 9 axis                                                     | 56 |
| B) Canada                                                                       | 67 |
| B.1. General state                                                              | 67 |
| B.2. Analysis of the 9 axis                                                     | 68 |
| C) Philippines                                                                  | 79 |
| C.1. General state                                                              | 79 |
| C.2. Analysis of the 9 axis                                                     | 79 |
| 3) <i>Cross-nationalities analysis</i>                                          | 87 |
| 4) <i>Synthesis &amp; recommendations</i>                                       | 92 |
| CONCLUSION                                                                      | 97 |
| Contributions                                                                   | 97 |

|                        |     |
|------------------------|-----|
| Limits of our analysis | 102 |
| Further researches     | 103 |
| BIBLIOGRAPHY           | 106 |

## Table of illustrations

### List of figures

|                                                                                                |    |
|------------------------------------------------------------------------------------------------|----|
| Figure 1: The sustainable business model archetypes (Bocken et al., 2014)                      | 6  |
| Figure 2: The reuse loop and the recycle loop (Stahel, 1994, p.179)                            | 16 |
| Figure 3: The self-replenishing system of product reuse and recycling services (Stahel, 1994 ) | 18 |
| Figure 4: The process of reverse logic (Xu & Wang, 2011)                                       | 18 |
| Figure 5: Scissor effect (Sempels, 2016, p.17)                                                 | 20 |
| Figure 6: Factors affecting the consumers' choice of household appliances (Lin et al., 2000)   | 35 |

### List of tables

|                                                                                                                                                                                               |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <i>Table 1: Summary table of the obstacles, leverages and key success factors to implement the functional service economy</i>                                                                 | 31  |
| <i>Table 2: Interviewees' profiles</i>                                                                                                                                                        | 42  |
| <i>Table 3: Statistical table from customers interviews</i>                                                                                                                                   | 53  |
| <i>Table 4: Cross-nationalities analysis</i>                                                                                                                                                  | 93  |
| <i>Table 5: Summary table of the obstacles and leverages for an economical and functional offer in the household appliance sector: the specific case of the washing machine</i>               | 99  |
| <i>Tableau 6: Summary table of the obstacles, leverages and key success factors to implement the functional service economy updated with specific remarks for an offer of washing machine</i> | 100 |



## INTRODUCTION

« To maximize your profit, you must maximize the number of products sold », this is an assumption on which are based many industrial companies. However, this business model is currently showing its limits as we have to face numerous problems such as planned obsolescence, negative environmental externalities, saturated markets, ...

Achieving sustainable production processes is a challenge faced by many international companies (Mont, 2002). Indeed, they must permanently renew their offers to conciliate value creation and sustainability which may question and reconsider their business model (ADEME, 2018). In that context, the European Union insists on her strategy « Europe 2020 » for the efficient use of resources, which implies a change in the way we produce and consume to better respond to economic, environmental and social challenges. The Belgian government, for its part, pushes companies to pursue opportunities such as the functional service economy<sup>1</sup> (SPF Economie, 2014).

But what is exactly the functional service economy? How is it different from the other concepts?

We would like to apply this new model to the household appliances sector as it is accused of intentionally reducing the shelf life of their products as an incentive for consumers to buy more (Seydtaghia, 2012). In addition, even if the sector is expanding, the repair option is less considered among customers as shown by the French Agency for the Environment on the flows of technological goods. « *From 1990 to 2007 compared to an exponential increase in sales of new products, the expense for their repair has decreased of 40%. And, above all, about 45% of obsolete equipment is thrown without the slightest attempt to restore them* » (Home Appliances World, 2014).

We want to focus on B2C services for big appliances as these affect many countries worldwide and have an incidence on people's daily life.

Therefore, our research aims at analyzing how the concept of functional service economy could be implemented in the sector and give insights to companies that would like to develop this service in Belgium, Canada or the Philippines. As a matter of fact, we chose to study

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<sup>1</sup> For this thesis, the functional service economy will sometimes abbreviated as FSE

those countries because we both had the opportunity to do a 6 months internship in Canada and the Philippines.

First, we will make an analysis of the model and its implications. We will start by identifying different points of view in literature and compare them to choose the most appropriate definition for our thesis. We used scientific sources as well as some science popularization as we had the opportunity to receive documents from experts that we met. Second, the theoretical part will help us to develop a fictional offer that we will test later on a customer sample from the three countries. To pre-test our offer and get the preliminary opinions, we will ask advice from 5 experts.

The goal will be to get an overview of the customers' points of view depending on their culture, to ultimately help companies that would like to develop a functional service economy offer in the household appliances in those countries.

The thesis is divided into 2 parts. The first one consists of an exploration of what has already been written on the subject. We will start by explaining what is a business model innovation for sustainability, which highlights the perspective chosen for our study. Then, we will trace back the origins of the concept and choose the most appropriate definition. A classification of the different concepts related to the functional service economy will be made showing the implications for the producer, the consumer and the other stakeholders.

It seems that the functional service economy could be a good alternative but only a few companies apply the model. Indeed, the implementation requires many changes in the company and the model also has his limits, which we will analyze.

Finally, some recommendations on different steps that could help the transition towards this new model will be given.

The second part consists of an exploratory research. We will start by studying the drivers affecting the consumer's choice in the household appliance sector and the target groups that could be interested in a functional service economy offer. The intermediate goal is to set up key insights that will serve as a basis for our qualitative interviews. In contrast with quantitative research, the aim is not to test them as hypothesis, but to deeply understand the «Why» and «How» (Yin, 2011) and what drives customers in their purchase decision. These key insights will be used for the elaboration of a questionnaire that will be completed by five experts. Through the interviews, the experts will give their advice on a fictional offer for a

washing machine. After this, once the offer is fully elaborated and approved by the experts, it will be submitted to the sample group of customers to get their feedback and understand deeply what they think about it. The aim is to generate learning points and compare the differences and common trends that exist among the three countries.

Then, in the conclusion, we will sum up the contribution of the theoretical part, the experts and the consumers. Finally, we will end by explaining the limits of our work and give suggestions for future research.

## **Part 1: *Theoretical approach***

## Chapter I: Business model innovation for sustainability

As the functional service economy changes the business model of a company, it is important to remember what is a business model innovation and especially a business model innovation for sustainability.

The business model of a company is a way to capture value through a mix of different coherent elements. It must describe at least the value proposition, which explains how the company is able to connect the producer to the consumer, the configuration of value creation and the revenue model, also called value capture, which depicts what are the costs and the revenue split (Boons et al., 2013).

Business model innovation is different from product or process innovations. It is: « *a phenomena that follow disruptions or enactment of new opportunities* ». Literature usually relates it to crisis or external shocks such as globalization, deregulations or increasing interests for sustainable development (Spieth & Schneider, 2016).

In the 1970s, some authors already started to question the existing models. The club of Rome (1972) published « The limits to growth » which intended to solve the issues that the society had to face at the time such as overpopulation, hunger crisis and limited environmental resources (Meadows et al., 1972). Stahel already wrote in 1997 that functioning with that kind of economy wasn't creating a sustainable society. The Brundtland report, published in 1987 by the World Commission on Environment and Development of the UN addresses the role of international economy in enabling sustainable development (World Commission on Environment and Development, 1987). It examines the environmental and developments issues worldwide and offers solutions through an action plan. In this report, sustainable development is defined as « meeting the needs of the present without compromising the ability of future generation to meet their own needs ». A chapter is also written on « Industry: producing more with less » in which they realized that there is an opportunity with new business models in which we optimize the use of raw materials.

Therefore, new forms of economic organizations appeared (Vaileanu-Paun & Boutillier, 2012). Indeed, they are pioneering with eco-innovation « innovation that improves

environmental performances » and sustainable innovation « innovation that improves sustainability performance » which refers to social, economic and environmental aspects. Effectively, these new models aim at improving economic performance while caring about sustainable development (Boons, Montalvo, Quist & Wagner, 2013). These are business models innovation for sustainability which are defined as: « *Innovations that create significant positive and/or significantly reduced negative impacts for the environment and/or society, through changes in the way the organization and its value-network create, deliver value and capture value (i.e. create economic value) or change their value propositions* » (Bocken et al., 2014).

More precisely, Bocken et al. (2014) have created a categorization of different sustainable business model archetypes (see figure 1 below) based on a literature review and practical studied cases.

| Groupings | Technological                                                                                                                                                                                               |                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                              | Social                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                        | Organisational                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                        |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | Archetypes                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                              | Archetypes                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                        | Archetypes                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                        |
| Examples  | Maximise material and energy efficiency                                                                                                                                                                     | Create value from waste                                                                                                                                                                                                                                          | Substitute with renewables and natural processes                                                                                                                                                                             | Deliver functionality rather than ownership                                                                                                                                                                                                              | Adopt a stewardship role                                                                                                                                                                                                             | Encourage sufficiency                                                                                                                                                                                                                                  | Repurpose for society/ environment                                                                                                                                                                                                                                                         | Develop scale up solutions                                                                                                                                                                                                             |
|           | Low carbon manufacturing/ solutions<br>Lean manufacturing<br>Additive manufacturing<br>De-materialisation (of products/ packaging)<br>Increased functionality (to reduce total number of products required) | Circular economy, closed loop<br>Cradle-2-Cradle<br>Industrial symbiosis<br>Reuse, recycle, re-manufacture<br>Take back management<br>Use excess capacity<br>Sharing assets (shared ownership and collaborative consumption)<br>Extended producer responsibility | Move from non-renewable to renewable energy sources<br>Solar and wind-power based energy innovations<br>Zero emissions initiative<br>Blue Economy<br>Biomimicry<br>The Natural Step<br>Slow manufacturing<br>Green chemistry | Product-oriented PSS - maintenance, extended warranty<br>Use oriented PSS- Rental, lease, shared<br>Result-oriented PSS- Pay per use<br>Private Finance Initiative (PFI)<br>Design, Build, Finance, Operate (DBFO)<br>Chemical Management Services (CMS) | Biodiversity protection<br>Consumer care - promote consumer health and well-being<br>Ethical trade (fair trade)<br>Choice editing by retailers<br>Radical transparency about environmental/ societal impacts<br>Resource stewardship | Consumer Education (models); communication and awareness<br>Demand management (including cap & trade)<br>Slow fashion<br>Product longevity<br>Premium branding/ limited availability<br>Frugal business<br>Responsible product distribution/ promotion | Not for profit<br>Hybrid businesses, Social enterprise (for profit)<br>Alternative ownership: cooperative, mutual, (farmers) collectives<br>Social and biodiversity regeneration initiatives ('net positive')<br>Base of pyramid solutions<br>Localisation<br>Home based, flexible working | Collaborative approaches (sourcing, production, lobbying)<br>Incubators and Entrepreneur support models<br>Licensing, Franchising<br>Open innovation (platforms)<br>Crowd sourcing/ funding<br>"Patient / slow capital" collaborations |

Figure 1: The sustainable business model archetypes (Bocken et al., 2014)

The archetypes are gathered in three groups which represent the main type of business model innovation: technological, social or organizational. Even if they are presented as separated perspectives, they are often mixed in practice. All of them have in common that they may

reduce the risks related to environmental or social issues, improve their reputation and add value through win-win approach (Baumgatner & Rauter, 2017). The archetype « Delivering the functionality rather than the ownership » is categorized in the social group and illustrates one of the core principles of the functional service economy that we will explain later in chapter II.3).

## **Chapter II: Functional service economy**

### ***1) Origins***

Before the 1800s, the service companies were separated from manufacturing companies. Then, step by step, companies started to add services to their offers which reduced the gap between manufacture and services (Schmenner, 2009). In that context, servitization started to be used as a competitive manufacturing strategy (Baines et al., 2009). The term was first used by Vandermerwe and Rada (1988) who defined it as « the process of creating value by adding services to products ». There are several incentives for companies to use servitization as a strategy. First, the offer is less-sensitive to cost competition which can lead to a higher profit margin and a better stability of the income flow (Baines, 2009). Second, it allows to differentiate from one's competitors and to develop new competitive advantages (Mathieu, 2001). Finally, it increases the loyalty of the consumers who could, in the end, become dependent of the supplier (Baines, 2009).

Following this trend, the origin of the functional service economy can be traced back to the 1980s when Walter Stahel and Orio Giarini wanted to optimize the eco-efficiency of products and the flow of matter and energy. They wanted to focus on their lifecycle to prevent waste and foster material recycling. Their approach consisted in taking care of the product from its birth to its new life, « from cradle to cradle » (Van Niel, 2007). Due to the work of Stahel and Giarini, the functional service economy grew and spread itself through the scientific community (Boutillier et al., 2013).

## 2) Definitions

The terminology of the concept has been through several evolutions brought by Stahel. First, the concept was named « New Service Economy », therefore the distinction with the service economy wasn't very clear. Then, this term evolved to « Utilization-Focused Service Economy », « Functional Economy » to « Functional Service Economy » (Van Niel, 2014) . The latest seems to be the most relevant because it highlights the idea of usage and function. That is why we have chosen it.

Moreover, the functional service economy, in French: « Économie de la Fonctionnalité », has been involved in many research programs in Europe and in the USA, explaining many definitions appeared through the years (Van Niel, 2014, p.4).

The functional service economy was developed through different movements that approach the same thematic of productive system evolution but with different logics.

One focuses on the company with the objective of lowering the production costs (by reducing raw materials and energy production), another puts the sustainable development at the center of the model and the last one put the emphasis on the services as an innovation that generates an economic growth while taking care of the environment and the society (Boutiller et al., 2013).

The definition of the concept varies depending on the authors and on their approach of the concept.

First, for Bourg & Buclet (2005) « *the functional service economy consists in the substitution of the selling of a product by the selling of a service or usage function* ».

<sup>1</sup> This simple definition insists on the value-in-use of the service, the core of the concept.

Then, Stahel (1997b) defines: « *The Functional Service Economy, which optimises the use or function of goods and services, focuses on the management of existing wealth in the form of goods, knowledge and natural capital* ». He indicates that: « *The economic objective of the Functional Service Economy is to create the highest possible use value for the longest possible time while consuming as few material resources and energy as possible* ». According

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<sup>1</sup> « L'économie de fonctionnalité consiste en la substitution de la vente d'une fonction d'usage - un service - à celle d'un produit. » (Van Niel, 2014).

to him, it is « *considerably more sustainable, or dematerialized, than the present economy, which is focused on production as its principal mean to create wealth and resources flow* ».

Stahel strongly links functional service economy with sustainability. He insists on the optimization of the use and the externalities generated by the product. His thinking evolves with his new book « The performance economy » in which he connects the concept with the circular economy, sustainable development and the functional service economy (Boutillier et al., 2013).

The performance economy is therefore a broader concept that surrounds the functional service economy (Stahel, 2008).

Furthermore for Christian du Tertre (2011), the model is based on « *the conception and realization of solutions that integrate goods and services in a way that those lead to a systemic change of the functional and institutional dimensions of the productive action* ». This definition focuses on the change throughout the whole value chain.

Aside from the variations in their definitions, Dominique Bourg and Christian du Tertre don't use exactly the same term as the former uses « Economie de Fonctionnalité » and the latter uses « Economie de la Fonctionnalité ». Indeed, Bourg is an environmentalist philosopher who focuses on the potential of technology and he shares his work through organizations such as l'Institut de l'Économie Circulaire, while Christian du Tertre is a heterodox economist who insists on the role of institutions while sharing the model through his intervention-research firm (Sidoli, 2017).

Finally, Bocken, Short, Rana & Evans, (2014) use their own definition. For them, the functional service economy is to « *Provide services that satisfy users' needs without having to own physical products* ». From the definition, the concept is more customer-oriented by focusing on the understanding of the customer's needs.

We didn't find many scientific definitions on this topic, therefore we decided to use the definition of Stahel as it seems to be the most detailed by being focusing on three aspects : the optimization of use, the stock of existing goods, the creation of a more sustainable or dematerialised economy.

As we will see in the chapter II.5), it is also important to note that the functional service economy and terms like eco-conception share characteristics with the circular economy (Van Niel, 2014), which refers to conceiving the whole lifecycle of a product, from cradle-to-cradle, by using the waste of one as resources for others (du Tertre, s.d.).

### **3) Principles**

As we explained earlier, the switch towards a new model implies change in the whole organization of a company and in its business model. If we examine the definition of Boons et al. (2013), we can describe the value proposition, value creation and revenue model of the functional service economy, which is considered a business model innovation for sustainability, as follows:

#### **A) Value proposition**

According to Boons et al., (2013), the value proposition of a sustainable business model consists of redefining the exchange of value between the consumers and providers. It focuses on the particular needs of consumers, the function of the product and the services provided by the producer.

In this case, there is a shift from a product-oriented view to a performance economy (Stahel 2008). Indeed, the company offers services to respond to the customer's needs without selling the product itself. The conception of ownership evolves from the consumer to the producer (Van Niel, 2007). As the producer becomes the only real owner of the product, its turnover is directly related to the functional use made by the customers (Bourg & Buclet, 2005). Therefore, it incites him to take care of his products, as much as possible and with responsibility, efficiency and earnestness (Van Niel, 2014; Vaileanu-Paun & Boutillier, 2012). Stahel (2010) calls the producer an asset manager where the performance provided is a key success factor.

This creates an opportunity for a closer relationship between the producer and end-user (Bocken et al., 2014). The producer becomes a « value provider » and the consumer is a « value user » (Van Niel, 2007). Instead of having opposite interests, they will tend to converge (Van Niel, 2014, p.3). Indeed, consumers and producers have a common interest: the continuous delivery of value for the longest time possible (Van Niel, 2007). The producer wants to optimize the use of the product while the consumer will look at the cost of use of the products in his decision-making process (Van Niel, 2007). There is a shift from a relationship

based on exchange to a relationship based on cooperation between consumers and producers (Vaileanu-Paun & Boutillier, 2012).

There is also an evolution concerning the relationship with the territory. When implementing the functional service economy, the company must have a good understanding of the customers' needs as they tend to be in a cooperation relationship. Therefore, the companies tend to heighten their responsibility towards the development of the territory by being involved in many sustainable urban projects. It leads to a better knowledge of the environment of the offer and an assessment of the social impact. But this comprehension of the customers' needs requires the development of new measuring instruments (Vaileanu-Paun & Boutillier, 2012).

Finally, the functional service economy gathers the three pillars of sustainable development because the company tries to maximize the understanding of the customers' functional needs by paying attention to environmental and social issues linked to the concerned territory. As a result, it allows the enterprise to strengthen its economic sustainability (Dallemagne, 2015a).

#### B) Value creation

Value creation explains how a company acts in a larger system, how they manage their production, organization and supply chain (Boons et al., 2013).

The functional service economy suggests a change in the whole strategy of the company. Indeed, sustainable innovation implies change in the production and in the mode of consumption at the organizational, sectoral and business level (Boons et al., 2013).

It starts with a change in the whole value chain (Boutillier et al., 2013). Since companies are the owners of the products, they tend to integrate vertically every step from its conception to its end of life (Vaileanu-Paun & Boutillier, 2012). Indeed, the supply chain evolves into a cradle-to-cradle approach, as the company takes care of the whole lifecycle of the product (Bocken et al., 2014). The purpose is to facilitate remanufacturing and recycling to be able to extend the lives of the items by developing products easily removable and modular (Van Niel, 2014). It creates incentives to eco-design, improve the reparability and upgradability of the

product (which contributes to reduce waste and resources consumption) and induces more contacts between the provider and the recipient (Bocken et al., 2014).

Regarding the strategies to implement the model, Stahel (1997b) and Vuidel & Pasquelin (2017) identify two different logics inside the functional service economy:

The first one is the « Service logic ». Its goal is to increase the quality and the value created by offering innovative solutions and dematerialized products. This logic is often linked with the selling of a result.

The second one is the « Lifecycle logic » which optimizes the management of goods and matter during their entire lifespan and is often linked with the selling of the use.

Enterprises make use of both logic or have a preponderance for one of them.

Then, the model can also allow greater regionalization because the usage demand has to be developed regarding the customer expectations (Stahel, 1997a). Moreover, the product-life extensions will most of the time save on resource consumption and replace highly mechanized production units by local employment. This will create a need for experienced and skilled labor (Stahel, 2008, p.133). As a matter of fact, the regionalization process leads to the creation of local jobs (Vaileanu-Paun & Boutillier, 2012) and the decentralized structure appears to be the most appropriate configuration for Stahel (1997a, p.1305).

### C) Value capture

The value capture highlights the costs and revenues streams from the functional service economy.

From a classic microeconomic point of view, firms produce a quantity which implies a cost and sell it at a certain price in order to maximise their profits, which is the total revenues minus the total costs (Mankiw & Taylor, 2013). Therefore, the profitability depends on the numbers of products sold and their price. That is why Stahel (1997) talks about « River economy » meaning that the economy follows a linear approach and the success is directly linked with the resources flows between the consumer and the producer. Whereas in the functional service economy, the performance coming from the usage of the goods determines the profitability (Vaileanu-Paun & Boutillier 2012). Thus, the economic value is assessed through the « usage

value of a product and the wealth presented by the stock of existing goods » (Stahel, 1997b, p.125)

Therefore, the consumers pay a price for the functioning of the good and not for the good itself (Stahel, 1994). Stahel wrote also that producers have an incentive to lower the resource flow: « *If customers pay an agreed amount per unit of service (and service equals customer satisfaction), service providers have an economic incentive to reduce resource flows, as this will increase their profits doubly: by reducing procurement costs for materials and energy and by reducing waste elimination costs* » (Giarini cited in Stahel, 1997a, p.1314) .

Concerning the cost, the performance is assessed through an evaluation of all costs generated to achieve the result, meaning that all types of costs related to the use of a good are taken into account (Stahel, 1994). The producer wants to minimize the costs linked with the management of their assets like maintenance and functioning of the product (Van Niel, 2007). Moreover, the relationship with time evolves, the profitability is determined through the entire life of the products therefore the lifespan of the products becomes a source of competitiveness (Stahel, 2010). The goal is to create the “*highest possible use value for the longest possible time*” (Stahel, 1997b). This system may allow customers to access a service that was previously considered too expensive (Bocken et al., 2014).

Bourg & Buclet (2005) show that by applying this model and selling less, the company can increase its revenue through the outsourcing. Indeed, for B2B companies, the functional service economy can be useful to provide maintenance and services to other companies which wouldn't have the time to take care of these services. However, in this thesis, we decided to focus only on B2C.

#### D) Application scope

The functional service economy isn't limited to the tertiary economy but is also applicable for the primary and secondary economy (Sempels, 2016, p.4).

The scope will depend on the ratio of immaterial and material resources of the company and on the perspective chosen to implement the functional service economy. The leader can decide to implement the concept for a competitive, financial or sustainable purpose.

Moreover, according to Stahel, the functional service economy isn't applicable for goods that increases in value with time because people want to keep the ownership of their product: « *Ownership therefore only makes economic sense when durable goods increase in value, normally through an increase in rarity, such as antique furniture, vintage cars, real estate.* » (Stahel, 1997, p.1315). Therefore, ownership makes sense if people are interested in asset management.

In conclusion, according to the literature, the application scope for this concept seems to be very broad even if it is harder to implement in some sectors than others. Everything depends on the willingness of the leader of the company and the perspective used.

To conclude, the value proposition, value creation and value capture retrace the change that happen in the offer, in the relationship between the consumer and the producer, in the organization and supply chain and in the costs and revenue stream of a company applying the functional service economy. But how does its marketing strategy differentiate itself from that of traditional model ?

#### **4) Kotler Marketing mix analysis**

We have chosen to do a « marketing mix » analysis to compare the traditional model to the functional service economy. It could also be called the 4P of Kotler as we analyze the product, place, price and promotion (Lambin & de Moerloose, 2012).

##### A) Traditional/ Industrial model

**Product:** Something (experience, services, products) that is exchanged at a certain price.

**Price:** In this case, the price will be the amount that will be exchanged when the producer sells the product to the consumer. It is linked with the costing, the perceived value of the product and the competitors (Lambin & de Moerloose, 2012).

**Place:** It refers to the distribution network and the intermediary used to link the producer to the consumer. The choice of the distribution network needs to be compatible with the targeted customer-segment and with the objectives of the company (Lambin & de Moerloose, 2012).

**Promotion:** It consists in stimulating the demand by an appropriate communication strategy. It could be through advertising, sales promotions, sales force or external relations (Lambin & de Moerloose, 2012).

#### B) Model of the functional service economy

**Product:** In this case, the product switches to a service provided to the customers. The emphasis is put on the utilization and the performance of the product (Sempels, 2016).

**Price:** The customer pays an agreed amount per unit of service (Stahel, 1997a). He could pay a fixed amount per period or a variable amount based on usage of the service.

**Place:** The objective of the functional service economy is to reduce the number of intermediaries to get more insights from the customers. Indeed, the solutions are focused on territorial performances, enhancing local jobs and partnerships (Dallemagne, 2015a).

**Promotion:** The communication strategy will be individualized and customised according to the customers needs. Indeed, as explained before, the relationship between companies and consumers evolves to a territorial logic where the understanding of the customer's needs is at the core of value creation strategy of firms (Vaileanu-Paun & Boutillier, 2012).

### 5) *Various concepts generally linked with the functional service economy*

The functional service economy is spread through different schools internationally. The various models overlap each other but they all have their own perspective and benchmarks (Vuidel & Pasquelin, 2017).

For this thesis, we decided to use Johan van Niel's and Arnold Tukker's typologies to be able to classify different concepts quoted many times in literature. This clarification will be useful for a good understanding of the next parts of our thesis.

#### A) Product-service system

Mont (2002, p. 238) has defined the term « product-service system » (PSS) as « *a marketable set of products and services capable of jointly fulfilling a user's need. The product/service ratio in this set can vary, either in terms of function fulfilment or economic value* ». This concept was initiated by researchers from the north of Europe and Italy, joined later by

English teams as well as other countries (Vuidel & Pasquelin, 2017). Currently, the PSS model is becoming more frequent in consumers and business habits (Sundin, Lindhal & Ijomah, 2009). Indeed, it is a good way to enhance the competitiveness because it aims at fulfilling the customer's needs by increasing his loyalty with customized offers and by being innovative (Tukker, 2004). To provide the service, a contract must be signed between all parties included integrating stakeholders in a more formal way (Sundin et al., 2009).

In addition, one of its goals is to have more positive environmental externalities than the classical, industrial model (Van Niel, 2007). The PSS model also allows them to analyze their product across its whole lifecycle and to imagine possible improvements. Moreover, the product must be ecodesigned to ease maintenance and repairs, and to lower costs (Sundin et al., 2009). Nevertheless, this must be nuanced because this concept is very broad including different types of PSS that have economic and environmental divergences (Tukker, 2004). Therefore, reaching sustainable goals isn't systematic and can have side effects (Tukker, 2004).

According to Tukker (2004), there exists a typology of different types of PSS based on the reliance on the product, the tangibility of the client's needs and the risk and responsibility supported by the provider. We will describe each of them and show the differences and similarities with the functional service economy.

#### A.1. Product-oriented PSS

The product-oriented PSS provides an additional service to the good needed when consumers use the product. The provider can offer advice, provision of consumables goods or a take-back guarantee for example. Here, the sales of a product remain at the center of the business model and there is a transfer of property from the provider to the consumer.

#### A.2. Use-oriented PSS

The second one is the use-oriented PSS in which the good isn't sold anymore and the provider remains the owner of the product. In this case, the product is still at the core of the offer (Tukker, 2004). The use-oriented PSS can be assimilated to a rental model based on use. According to Le Petit Robert (2010), a rental contract is « *a contract by which one of the*

*parties compel herself to allow the use of something to the other party during a certain period, at a certain price that the latter has to pay ».*

As explained in the definition, it is a system in which we pay for the use and the disposal of the good but without any property transfer. In this case, the responsibility and risk endured by the supplier are higher than in a product-oriented PSS. This approach could aim at re-thinking the whole lifecycle of the product, as well as reviewing his purpose, through an environmental way of thinking (that differentiates it from a classic rental) (Sempels, 2016, p.13), but sustainability isn't often the primary goal.

This type can appear under different forms such as the collective consumption or selling the product's function.

#### (i) Collective consumption

The first definition of this concept appeared in 1978 with Felson and Spaeth, collective consumption is « *Those events in which one or more persons consume economic goods or services in the process of engaging in joint activities with one or more others (Felson and al., 1978)* ». Then this concept evolved and as defined as: « *The set of resource circulation systems which enable consumers to both obtain and provide, temporarily or permanently, valuable resources or services through direct interaction with other consumers or through a mediator* ». (Ertz et al., 2016, p.1). Therefore, it shows that the collective consumption is when private individuals become suppliers and buyers (like a peer-to-peer model) of products and services usage, generally through a platform.

The short-term rental and the car-sharing belong to this category (Van Niel, 2014, p.9).

In a short-term rental contract, the consumer pays to be the owner of a product for a limited period of time. He usually has to pay a warranty to cover the risks of damage. It can be a benefit for the environment as it optimizes the « usage » value of the product, but on the other hand, it can have negative effects if it gives access to products that no one would have been able to buy and which use a lot of energy (Van Niel, 2014, p.9). A good example of a short-term rental contract is the rental platform created in 2007 by Zilok, a French company that was initially only for private individuals and eventually also for professionals. On their platform, 350 000 multi-purpose objects (household appliances, vehicles, etc...) are available for short-term rental (Zilok, 2018).

Car-sharing is also an example of collective consumption. Car-sharing is when consumers can pay for the use of a car for a limited time period and the journey of their choice.

It is important to note that collective consumption isn't limited to car sharing or short-term rental contracts because the field of applications of collective consumption is very large (Van Niel, 2014, p.9)

## (ii) Selling the product's function

This category gathers solutions which consist in giving the possibility to use a product to one unique customer, for a long period (which differs from a short-term rental contract), while the seller stays the owner of the good during the contracting period (Van Niel, 2014, p.10).

### (1) Leasing

According to the Cambridge Dictionary (2018), the verb to lease is defined as : « *making a legal agreement by which money is paid in order to use land, a building, a vehicle, or a piece of equipment for an agreed period of time* ». Therefore, it is a contract that implicates parties who agree on the time period and on the usage of the target product. Generally, the length of the contract is calculated according the economic lifetime of the product. At the end of the contract, the tenant has two choices: capital leasing or operational leasing. The former occurs when the consumer can decide to buy the good at a price equal to the residual value of the good. Van Niel doesn't consider capital leasing as functional service economy because it is only a contract leading to the sale of a product; the enterprise cannot plan the whole lifecycle of the product. Indeed, the producer doesn't really commit himself to eco-design his product, nor does he reuse or recycle the products at the end of the lifecycle. The latter option is when the consumer returns the product to the owner or can extend the rental contract (Van, Niel, 2014, p.10-11).

Initially, the leasing contract was mainly for companies but nowadays, some leasing contracts are for private individuals. For example, Lokéo launched in 2010 different types of long-term rentals for household appliances and multimedia, with the possibility to return the product at the end of the contract for private individuals (Van Niel, 2014, p.11). According to Van Niel (2014, p.11) this case is compatible with the principles of the functional service economy. Indeed, it is in the interest of the producer to plan eco-design and after recycling, re-use programs in order to maximize the residual value of the goods. But these initiatives depend on several factors such as the cost of implementation and the commitment of the producer.

## *(2) Functional sales*

This consists of selling the function delivered by the product and not the product itself.

Often under the form of an operational leasing, it differs in practice because the offer is a mix of products, consumables and services with the objective of removing the cost of maintenance and repair from the consumer side. The beneficiary isn't the owner, so he doesn't have to care about the maintenance, the possible repair or the recycling of the product. And the price to pay is proportional to the usage of the service (Van Niel, 2014, p.13).

The functional sales can be relevant for several reasons. To begin, it offers a profitable alternative to planned obsolescence as there is an incentive to manufacture the good in a sustainable way, based on an eco-conception model. This means to design it for its use and to make it easy to dismantle and to repair. Therefore, it is a good way to make financial economies because the enterprise is encouraged to use materials and machines that already exist. It is linked with the application of the circular economy. Finally, it is in the producer's interest to produce and use machines that do not consume many resources and perhaps to share his equipment with other organizations. For example, Electrolux decided to apply this model to their washing machine in establishing a « pay-per-wash » system, in which the consumers only pay by washing cycle (Van Niel, 2014, p.14).

### A.3. Result-oriented PSS

The third solution is the result-oriented PSS. Here, the company must to satisfy the needs of its clients, no matter how many services and goods it has to offer. It can be assimilated to result-oriented contracts. The provider commits to the achievement of certain results. The risks and the costs are supported by the provider, so it is in his interest to minimize material and energy flow (Van Niel, 2014, p.14).

In this case, instead of selling the use, the model consists in selling the wanted result. Both parties will make a contract and there will be bonuses or penalties if the goal is achieved or not (Sempels, 2016, p.15). This model changes the whole organization of the company particularly the production, distribution, creation of value and monetization.

## (i) Energy performance contract

The Energy Services companies (ESCO) use this model to set up a contract with a public authority or private enterprises in which they commit themselves to produce certain results that are clearly measurable and precise in the energy sector. They promise the client that they will offer a service (for example: provide them heat, electricity, lighting, refrigeration system,...) and a range of complementary services such as diverse financial and technical advices and help. For example, they can take care of the analysis of the field before coming, send recommendations to improve their energy saving, finance the investments and manage maintenance, repair and restoration work. This form of contract allows the beneficiary to pay the enterprise with the economies that he has made through his energy consumption. However, it means that the company covers all the risks associated with the project. If the results are above the expectations, the company and the client will share the benefits. The higher the economies of energy made by the client, the higher the enterprise's profit will be (Van Niel, 2014, p.15). For example, the city of Berlin implemented this type of contract in 1996. Due to a tight budget, they made a partnership with ESCO to increase their energy savings in 1300 old public buildings. Nowadays, the average energy savings is 26% from the 25 partnerships agreement (Berlin Energy Agentur, 2018).

According to Van Niel (2014, p.15), this creates a system in which both parties have convergent interests, while reducing the environmental footprint.

To conclude, the use-oriented PSS and the result-oriented PSS share common characteristics with the functional service economy. The functional sales or an energy performance contract are very similar as well. But according to Van Niel, it doesn't fit all the principles of the latter such as the way to create performance or the societal responsibility (Van Niel, 2007). Moreover, even if the PSS can reduce the negative environmental externalities through the stimulation of eco-conception and the inclusion of the whole lifecycle of the product, neither the rental model based on use nor the result-oriented contract offer solutions for the social aspect or for the quality of work. Because of this, what doesn't include the three aspects of sustainable development, which are economic, social and environmental pillars (Sempels, 2016, p.16).

## B) Eco-conception, eco-socio-conception and eco-efficiency

The eco-conception is a milestone in reducing one's environmental footprint. It is a multi-steps, multi-criteria and multi-actors approach which aims at integrating the environmental aspect in the conception and during the whole lifecycle of the product or service. Indeed, it includes a lot of stages, from the selection of raw materials to the use of end-of lifecycle products. Moreover, it covers many environmental factors such as air, water and earth pollution and finally it affects all the stakeholders of the chain (Brodhag, 2014).

Sempels (2016, p.8) has set up a few rules to apply the eco-conception theory to a product:

- Designed to serve its predetermined function
- Use as much renewable resources (materials and energy) as possible
- Try to avoid toxic components
- Be strong and useful
- Easy to repair, maintain and recycle
- Minimize negative externalities throughout the whole lifecycle

For example, the famous Levi's jeans brand launched the program water-less in 2007. The idea is to reduce water consumption during the production and the disposal of their products by the consumers. Indeed, from a study conducted on the famous Levi's 501 during its whole lifecycle, 55% of water consumption comes from the supply chain of Levi's and the remaining from the cleaning by the consumers. The company conducted research to reduce water consumption in its supply chain via the participation in the program Better Cotton Initiative. To encourage the consumers to reduce their water consumption, Levi's made a partnership with Goodwill Industries International, a network of independent agencies to offer more jobs to underprivileged people and programs to behave more eco-efficiently. In 2011, this program allowed Levi's to save more than 16 millions liters of water.

The eco-socio-conception goes further; it incorporates the characteristics of the previous concept while adding a new dimension: the possible social damage that can be endured by the stakeholders. To exemplify this, we can consider that the impact on the local population from the exploitation of raw materials needed for the production of goods.

However, these two concepts are considered as being in the volume approach because they still have an incentive to sell more products (Sempels, 2016 p.9).

Lastly, eco-efficiency is a broader concept (Sempels, 2016, p.7). The World Business Council for Sustainable Development (WBCSD), has defined it as « Creating more value with less environmental impact » (Hauschild & Jørgensen, 2014).

These concepts can be used as a first step towards a transition to the functional service economy model. However, applying these concepts in a company only helps to reduce the negative externalities but doesn't question the volume approach. By selling more products because they are eco-designed or eco-sufficient, the ecological footprint might stay the same or even grow (Sempels, 2016, p.9).

Even if these concepts aim at reducing negative environmental externalities, they differentiate themselves from the functional service economy in a few points. Indeed, eco-conception & eco-efficiency do not take into account the social dimension and none of them question the business model of their company.

### C) Link with the circular economy

The goal of the circular economy is to create productive resources from waste or unproductive resources (Sempels, 2016, p.9). As explained by Ghisellini, Cialani & Ulgiati (2016): « The inclusion of waste in the design of products and processes allows to close the material and energy cycle, maximize waste use, minimize the use of virgin materials and the release of noxious materials to the environment».

With that system, you can re-imagine the whole lifecycle of production, while empowering the local people. It implies partnerships with other actors like mutual investment, the sharing of competences, centers of research or other material or immaterial resources (du Tertre, s.d). It can also provide economic benefits for companies because they need to buy less raw materials and the cost of disposal is reduced (Ghisellini et al., 2016).

The industrial-based model is using a so-called linear approach because in most cases the liability of the producer stops after the point of sale. The buyer becomes responsible of the products, even if he bought without knowing what inputs were used to create the product. On the other hand, the functional service economy follows a dynamic of loop which reproduces a natural cycle. As said earlier in point 3), the producer sells the use of the products and his responsibility toward the product becomes more important (Stahel, 1994, p.183).

Moreover, this concept applies the « no waste » theory (Stahel, 1997b, p.122). Therefore, in order to reduce waste, Stahel has identified 3 areas: production, use and postuse wherein closed loops are a common factor. But among them, he distinguishes two types in terms of impact and economic feasibility: the reuse of goods and the recycling of materials (see figure 2) (Stahel, 1994, p.179)

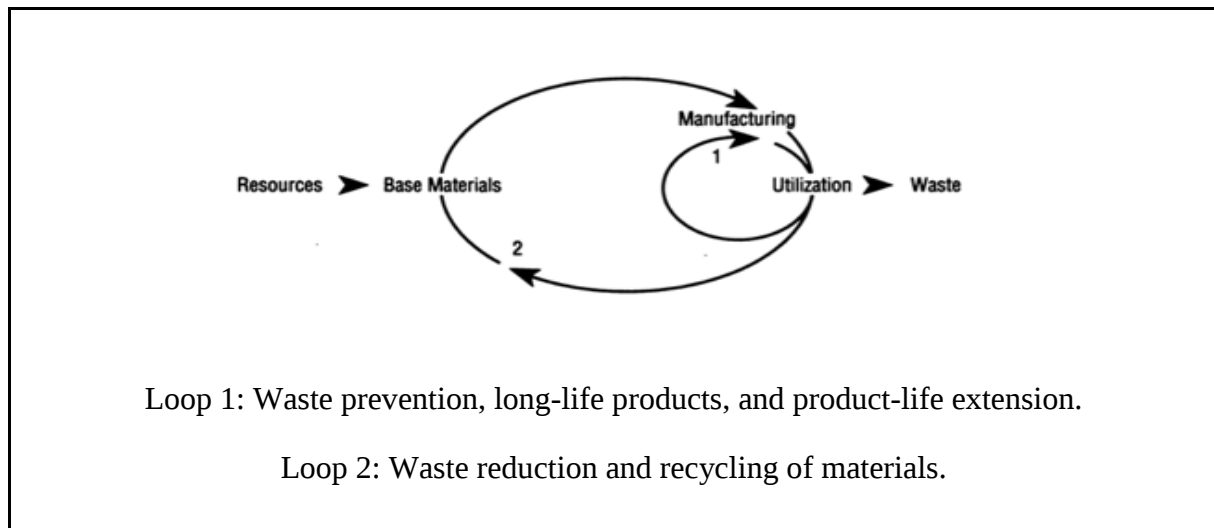


Figure 2: The reuse loop and the recycle loop (Stahel, 1994, p.179)

The reuse of good is « *an extension of the utilization period of goods, through the design of long-life goods; the introduction of service loops to extend an existing product's life, including reuse of the product itself, repair, reconditioning, and technical upgrading; and a combination of these* » (Stahel, 1994). The flow of materials is slowed down. Extending the life of the products can prevent waste through the increase of the usage of already produced goods but also through improvements in production, distribution and recycling while reducing the transportation required (Stahel, 1997a, p.1315).

A way to reuse the good can be remanufacturing. As explained by Sundin et al. (2009), it consists in taking a used product and returning it to its original performance. Then, the product receives a warranty equivalent to newly produced ones. This system reduces the overall costs as it reuses most components and requires from 50 to 80 percent less energy to produce. The reuse should be planned in the design phase to improve its effects. Indeed, by

eco-designing the products, we take into account all the environmental impacts and maximize the use of resource and materials (Ghisellini et al., 2016).

In remanufacturing system, the manufacturer could own the good and give the rights to use of use to the customers, which is one of the principles of the functional service economy (Sundin et al., 2009).

Remanufacturing diverges from reconditioning and repairing because it offers the same guarantees as new products, it involves more labour, the final product has a better quality and it allows for upgrades in the product functioning (Sundin et al., 2009).

Regarding the recycling of material, it is easier to implement but it isn't as efficient in reducing the ecological footprint as the reuse of good. Indeed, the impact is restricted because it creates an « oversupply of resources ». Moreover, it has no effect on the flow of material used by the organization; it only reduces the amount of waste (Stahel, 1997b, p.123).

Remanufacturing is therefore more desirable than recycling as it adds value to waste products by empowering them again whereas recycling doesn't and only reuses the raw materials (Sundin et al., 2009).

In the Figure 3, we can see the hierarchy of different stages. The smaller the loop, the more profitable it is for the organization. In addition, it makes sense to maximize the use of raw materials as they induce a cost for the company (Korhonen, 2018).

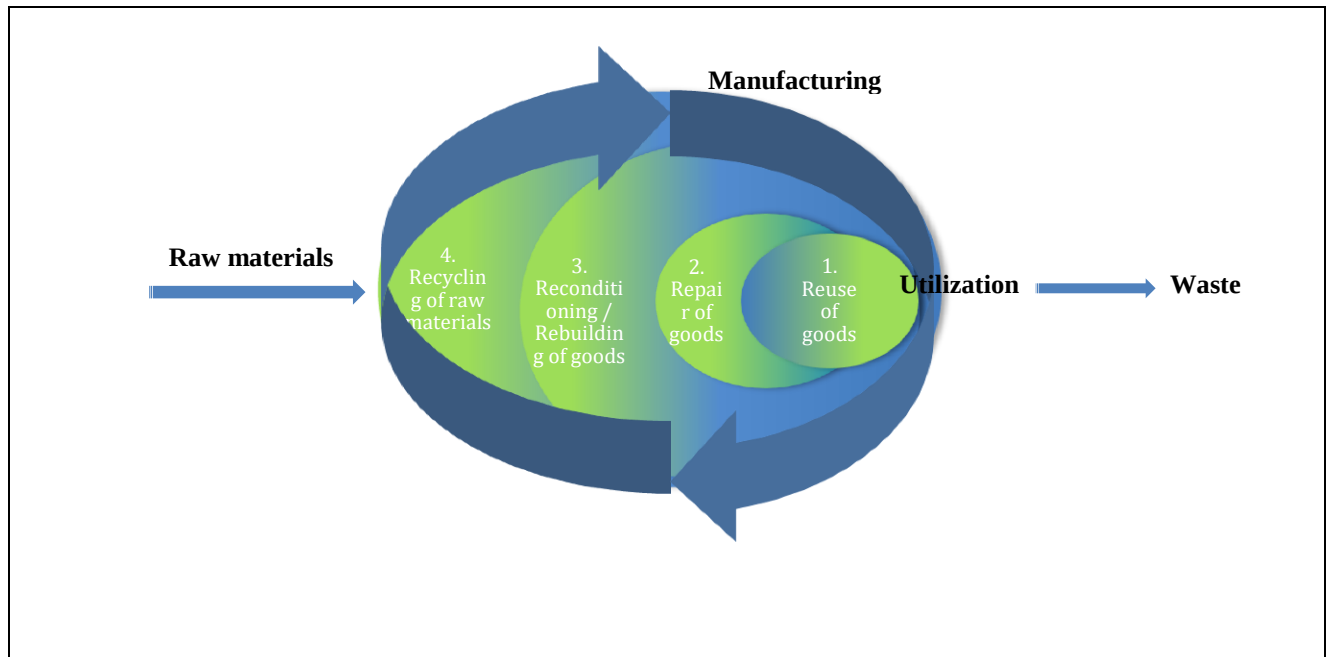


Figure 3: The self-replenishing system of product reuse and recycling services (Stahel, 1994 )

Since the thesis focuses on the functional service economy in the household appliance sector, we refer to Xu & Wang (2011) who explained a practical case of reverse logic. It consists in reusing and recycling disused household appliances to minimize the negative impact on the environment.

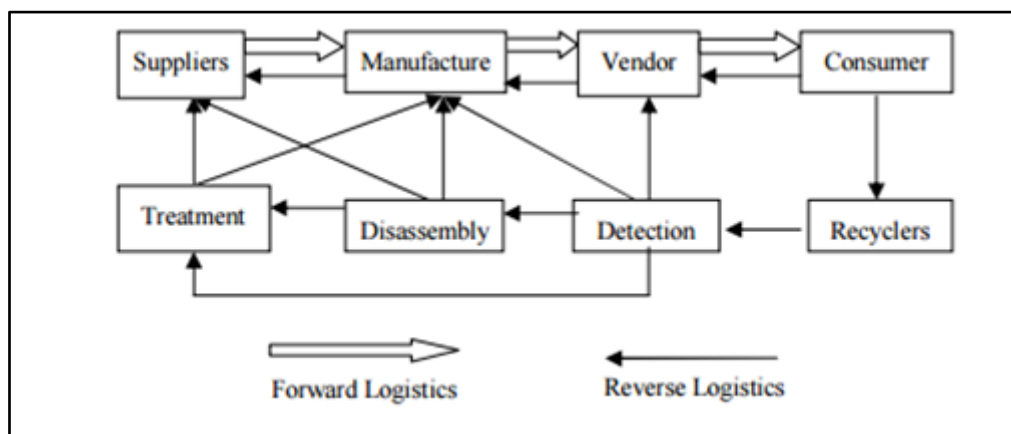


Figure 4: The process of reverse logic (Xu & Wang, 2011)

Companies must organize themselves to maximize resource utilization rate, reduce production costs and waste disposal expenses while improving their reputation and developing intangible assets (Xu & Wang, 2011). Three different modes of organizations co-exist depending on the type of companies: the self-mode (managing the whole lifecycle of the product); the joint business model (companies with similar products share their recycling network) or the third party model (companies outsource the whole recycling network). After considering these

three options, it was determined that the first model is more adapted for big companies that have already a strong basis of logistics. The second model seems to be more appropriate for companies that are economically strong but that lack logistic skills. Finally, the third model is most suitable for those that want to focus on their core business (Xu & Wang, 2011).

However, the circular economy presents a few limits. It is not considered as a business model but rather as a concept of material flow (Sempels, 2016, p.9) and it doesn't question the base of the material growth.

Researchers demonstrate have different points of view regarding the link between the circular economy and the functional service economy. The foundation Ellen Macarthur (2016) considers that the functional service economy was one of the currents of thought that founded the circular economy while others like Sempels (2016) and Stahel (1994) see the circular economy as a component of the functional service economy.

For this thesis, we decided not to classify one concept as being a subset of another but rather to acknowledge that they share common principles while remaining different from one another.

## D) Functional and cooperation economy

### D.1. Introduction and justification

In some regions of France and Belgium, the concept of functional service economy has evolved towards the concept of functional and cooperation economy (FCE). This term is only present in the French literature but we decided to take it into account as, it complements the model of functional service economy. Indeed, it reinforces the integration of the three pillars of the sustainable development, the use of immaterial resources and the stakeholders' involvement.

These last years, some FCE specialized structures started to appear : the French club of the functional economy and sustainable development, the Belgian club of the functional and cooperation economy, the European institute of economy of functionality and cooperation, the research and intervention laboratory ATEMIS in France and the company Innergic in Belgium.

## D.2. Concepts

According to Dallemagne (2015a) and Sempels (2016), there are five principles which determine the functional and cooperation economy.

### i) « Scissor effect »

The principle of « scissor effect » can be summarized as « The creation of value via the degrowth of the material factors and the growth of immaterial factor » (Dallemagne, 2015a).

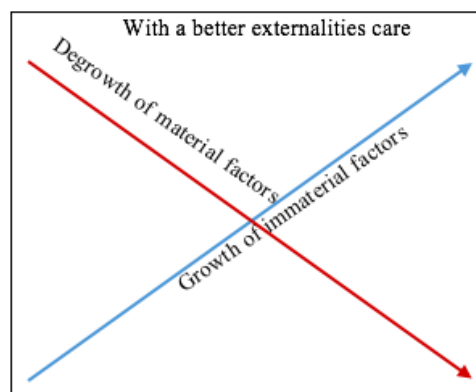


Figure 5: Scissor effect (Sempels, 2016, p.17)

On the one hand, by following the circular economy principles, the FCE wants to reduce as much as possible the consumption of energy and raw materials (see red arrow in figure 5).

On the other hand, the FCE wants to use immaterial resources owned by the company. Immaterial resources are not measurable and not enumerable (Sempels, 2016; Benqué et al., 2014) and constitute strategic assets for the company (Benqué et al., 2014). These are growth levers (Benqué et al., 2014) and the company uses them to increase value as much as possible (see the blue arrow, figure 5). The most cited are skills, know-how, trust from customers, health and commitment of partners and the relevancy of the solutions proposed (Dallemagne, 2015a; Sempels 2016; Benqué et al., 2014).

The main advantage of this type of resource is that they are unlimited, contrary to material resources. But it is important to note that human dynamic is the support of immaterial resources, therefore their condition has to be taken into consideration (Dallemagne, 2015a; Benqué et al, 2014).

## *ii) New lever for service productivity*

Productivity is going through a fundamental change in nature. New types of economies appear:

- From economies of scale to economies of flexibility (Benqué et al., 2014). Indeed, workers become multi-task as they have to adapt to a changing environment. This flexibility profits to the company but it must also profit to the workers (help them to manage their private life). The more processes are flexible, the more teams are able to react through cooperation processes (Benqué et al., 2014). However, it is important to mention that trust is a mandatory condition to link flexibility to productivity (Sempels, 2016, p.5).

- Learning economies. If we consider knowledge as a strategic resource, learning must be considered as a significant process (Grønning & Fosstenløyken, 2015). The more the knowledge is high due to feedback from their client, the more efficient is the co-production and the more the coordination costs are low (Benqué et al., 2014). The perspective of the market changes from generating transaction costs to an opportunity for learning benefits (Grønning & Fosstenløyken, 2015). This is an economy based on the professionalization of people (Benqué et al., 2014).

- Synergy economies. Through partnerships with other organizations, they achieve a better level of performance than if they were both acting separately (Sempels, 2016, p.5). Companies can apply different type of synergies: collusive synergy (that leads to market growth), operational synergy (that improves the production or administration process) and financial synergy (that allows to save on capital costs) (Chatterjee, 1986). There is a change from economies based on specialization of work to economies based on complementation. The more the cooperation between actors with complementary skills happens, the more the efficiency increases, with a high quality and relevant results (Benqué et al., 2014).

- Integration economies. It happens when an immaterial resource improves the performance of a material or an immaterial solution (Sempels, 2016, p.6).

### *iii) Cooperative eco-system*

Profitability is achieved through the management of the immaterial resources and the cooperation of all the stakeholders (Sempels, 2016; Dallemagne, 2015a). The offer becomes more complex and the necessity of cooperation between actors can help to deliver a whole solution to the customer (Sempels, 2016), and enhances the innovation process (Benqué et al., 2014).

This collaboration happens internally and externally. Within the company, with the integration of Opale organizations, based on an auto-governance model, with autonomous teams working together (Laloux, 2015), and externally with all stakeholders involved such as customers and partners involved.

« Cooperation is about integrating the constraints of the other in a common goal »(Benqué et al., 2014). Like the functional service economy, this provides the opportunity to align the objectives of the customers and the producers such as the consumption reduction of material resources.

This cooperative agreement appears to be effective through contractualization (Benqué et al., 2014).

### *vi) Systemic approach*

The systemic approach broadens the view of the leaders by taking into account inter-relations in the business environment and enhancing performance (Segatto, Dallavale de Padua & Martinelli, 2013). It means that there is a change in the value chain. It evolves to a produced ecosystem which takes into consideration the environmental and social externalities. The company has to broaden its action zone by taking into account all the stakeholders affected by the company's activities. This process can be an opportunity for the value creation because it considers all the positive and negative impacts of the company (Dallemagne, 2015a).

*v) The strategic issue is the quality of work*

The quality increases with the participation of varied partners and the process of co-creation with the beneficiaries. They evolve from a measurable to an evaluable quality (Sempels, 2016, p.4).

The FCE insists also on two other aspects that are reflexivity and externality. The first one refers to the self-analysis of the company's approach, seen as a driver for innovation (MacCurtain, Flood, Ramamoorthy, West & Dawson, 2010). It concerns the implementation of the model which can be improved or deteriorated through the support of immaterial resources and the organization of the management. For example, the trust within the company, the skills, the consistency of resources owned by the company and the health of all stakeholders (du Tertre, s.d). The second one takes into account the immediate and long-term effects of the company on the environment and especially the stakeholders (Sempels, 2016, p.6).

### D.3. Advantages of functional and cooperation economy

The mentor, Damien Dallemagne (2015a), through his findings, highlighted many advantages of the FCE. First, the cooperation aspect can enhance motivation and helps deliver a complex offer to the customers while aligning the determination of all stakeholders. Second, it can generate more immaterial resources, which depends on human activity. This leads to a positive impact on the workers because they are considered as being at the emergence of immaterial resources and not as a cost to minimize. Therefore, the quality of work increases and more sense is given to their job (Dallemagne, 2015a, p.3).

### E) Conclusion

To conclude, all those concepts differ from the functional service economy in various ways. Some only share few principles while other go beyond by integrating new characteristics. There is no hierarchy or concepts better than others but it is important to understand the divergences between them.

Now that we have explored the principles and the positive externalities that the functional service economy is able to produce, what are the limits and obstacles?

## 6) *Limits and obstacles*

When implementing the functional service economy, companies face several obstacles that we have identified:

The most cited is that the functional service economy **can be an obstacle to innovation**. According to Bourg & Buclet (2005), in the household appliances sector it is generally believed that the development of sustainable products would prevent the renewal of technologies.

However, the functional service economy can incite a new wave of innovation. For goods with a long-term cycle, it is important to understand what are the incentives to innovate while producing sustainable products. The producer has to innovate to reduce his usage cost including maintenance costs, repairing and remanufacturing on the functional sales. There exist many potential solutions: the producers can be focused on energy savings during the utilization process or the flexibility and modularity of the components, for example. They have to be completed with an operational cost as small as possible. The modularity can increase the possibility to integrate new technologies within the goods without its entire substitution. Some secondary functions of the good could be flexible, especially the electronic parts where the tendency of miniaturisation allows to multiply the auxiliaries' solutions for the same goods (Bourg & Buclet, 2005, p.8).

However, there is a clear **need for appropriate design and conception strategies**. The designer has to think about product-compatibility, standardization of some component to facilitate the remanufacturing and repairing (Stahel, 1997a). This means that companies will have to acquire new competencies, such as research and development abilities (Boutiller et al., 2013).

Another consideration is the extension of the offer. When offering associated services to **customers, they may become more and more demanding**. If a competitor offers an additional option, the customers may switch easily. The producer has to figure out how comprehensive he wants his offer to be (Bourg & Buclet, 2005).

A downside effect may also arise linked with policies reducing energy consumption, called **the rebound effect**. It reduces the savings in energy as a result of more efficient energy

consumption. Indeed, improvements in energy efficiency can lead to a reduction of the price of energy and therefore could increase the demand. Therefore, the potential of energy savings can be offset by the rise of the demand. There are three types of rebound effect: direct, indirect and economy-wide.

The direct rebound effect is the one explained above. The indirect effect arises when the lower price of energy increases the demand for other services that require energy. The economy-wide effect happens when the reduction in energy price service leads to lower prices of intermediate and final goods, requiring adjustments in demand and supply. The two first effects can be applied to the household energy appliances sector. Indeed, the elasticity of substitution between energy services is an important determinant for the amplitude of the rebound effect (Abdessalem, Labidi, 2015).

It is also important to note that the functional service economy implies **more complex contracts**. If the client does not pay enough attention to the products, it could alter the life and the quality of the products. The producer should be assured that the contract covers those kind of risks and incites the customers to act with prudence.

Moreover, to implement this concept, **the services of the company have to rise significantly**. The need for a good after-sales services and staff competences cannot be avoided (Bourg & Buclet, 2005). The companies need to develop new management abilities and could have a hard time determining a clear strategy when the core business is composed of different activities (Boutillier et al., 2013).

Another obstacle could be a **low profitability of the services**. This can happen in manufacturing companies when the development of the service requires important investment without generating high profits. It is called the service paradox and is usually due to the difficulty in finding a good price for the offered services (Boutillier et al., 2013). Redesigning a business model creates new opportunities for technical improvement and economic profitability that may lead to success. However, a good business model isn't sufficient to ensure success. Indeed, when evolving in an environment with high technology and market uncertainty, adaptability to the external environment (Chesbrough & Rosenbloom, 2002).

In addition, the producer has to **maintain the impossibility for the intermediaries to become a competitor**. A good example is the case of Electrolux, a global leader in home appliances, that lost control of the market when they decided to offer to customers in Gotland island free lavatory with a pay-per-wash system. The system was working thanks to the local

electricity provider which set up a smart system to measure the electricity consumed. They were also tending to the energy bill for Electrolux. Thus, they were directly in relation with the customers, which allowed them to offer the service instead of Electrolux. In this case, Electrolux became dependent of the electrical provider which charged them for the service, and they lost their place in the market (Bourg & Buclet, 2005, p.7).

Furthermore, from a customer's point of view, **the substitution of the ownership for a functional usage can be a psychological obstacle** (Bourg & Buclet, 2005). According to Stahel (1997b): « The logic framework of a functional economy requires a demand-side definition of quality based on unlimited customer satisfaction and the guarantee of a system functioning over longer periods of time ». Moreover, as Oksana & Mont (2002) asked themselves, can the satisfaction of the customers' needs be narrowed to a functional need? (Van Niel, 2007).

All in all, a functional service economy will not solve all the problems but it induces a change within the economy. Many high-volume producers with standardized components will stay necessary but the increase of regional assemblers and remanufacturers will become important (Stahel, 1997b, p.128). Moreover, Christian du Tertre, the scientific chief of ATEMIS, expert in functional service economy said that without a support of the authorities, the diffusion of this model is not possible (du Tertre, s.d). He states that four institutional logics have to be set up. First, the need to determine the perimeter of relevant externalities and stakeholders involved. Second, the know-how economy has to be reinforced by a better cooperation between all the knowledge fields of a company. These can help provide a better consistency of the theory. Third, the measurability of immaterial resources and externalities has to be solved. Finally, territorial responses through cooperation between actors will enhance the process (du Tertre, s.d).

Even if there are obstacles to overcome in the implementation of the functional service economy, we will examine the elements that can ease the transition towards this model in the next chapter.

## Chapter III : Recommendations and conclusion

To overcome some of the limits and achieve a better implementation of the model, here are some pieces of advice that companies and other stakeholders could take into consideration.

### *1) Recommendations for the implementation of the model*

#### A) For companies

According to a study of Ecores (2015) for the « Conseil du Développement Durable » in Belgium, there exists four types of companies which have an interest in the implementation of the functional service economy. First, the « traditional companies », when they care about sustainable development, they usually implement it in an environmental approach. They adopt environmental practices to conform to legal requirements. Second, the « pragmatic companies » led by an economical reasoning. They want to set up the functional service economy with the aim of optimizing the resources and the client's satisfaction. Third, the « visionary companies » who want to use the functional service economy as a first step toward their ultimate goal: sustainable development. They focus on resources and pollution reduction and local production. Fourth, the « committed companies », start-ups which begin their business with the functional service economy model. They are not yet able to evaluate the sustainability of their choices. Therefore, this study reinforces what is said before, the functional service economy doesn't lead automatically to sustainable development but it can be a first step towards a sustainable approach (Ecores, 2015).

The transition to a functional service economy could be introduced into several ways. According to Sempels (2016, p.14), to apply this model based on usage value, the company must reorganize his activities and management style. He identifies several phases, each of which adds a new concept to the previous one.

### 1. Simple rental model

Indeed, as quoted by Stahel (1997b), there exists different strategies for a cradle-to-cradle product responsibility, some of which are explained by the steps of Sempels. You can put in place a rental model based on the sale of use instead of the sale of goods, as developed in part 1-2)a) ii. Selling the product's function.

### 2. Rental model + Improved use

Then, you can improve your rental model by adding services. A shift is necessary from a product-oriented view to one that is service-oriented. A scientific study (Peruzzini, Germani, & Favi, 2013) which examines the transition of a big Italian company said that: « *One pillar of service innovation is service differentiation (Servitization), which consists of the ability to offer a wide range of services connected to the same product* ». To make this transition a success, the relevant service-based functions need to be assessed through the evaluation of the current ecosystem (Peruzzini et al., 2013). To achieve this, the company has to understand where are the gaps from their current economic model to justify the shift into a service-oriented view (Dallemagne, 2015a).

### 3. Rental model + Improved use + Eco-conception

As an additional step developed by Sempels, can design the products by taking into account the environmental externalities, this is the eco-conception developed in part 1-2) d.

### 4. Rental model + Improved use + Eco-conception + Circular flow of materials

One step further, you must also reduce the flow of matter; this is the material loop developed by Stahel. Indeed, in this loop, Stahel proposes some strategies to slow down the flow of matter. The product-life extension of goods and their components can be achieved through, as previously discussed, the reuse, remanufacturing, repairing and some technology upgrading. Moreover, the development of multifunctional products like the fax-scanner-printer-copier all-in-one, system solutions and the remarketing of products from waste can also be made.

To achieve a circular flow of materials, you can also apply the reverse logistic. Depending on the type of company, it may be better to apply either the self-mode, the joint business model or the third party model (as seen in chapter II.5).c) Link with the circular economy). If companies want the model to have a real impact, they must make sure that their partners are also respecting the principles of eco-conception.

### 5. Improve immaterial resources, cooperation and partnerships

We decided to add a fifth stage to Sempels model because to implement the functional and cooperation economy, the company must primarily analyze its immaterial resources, which are the key stakeholders, the externalities tied to the functioning of the company, the authentic customers' needs, the way to create a collaborative management... (Dallemagne, 2015a). Mutual learning processes should be facilitated with feedback loops in all organizational departments and management levels (Baumgartner & Rauter, 2017). By leading these ways of thinking, the company can create a new value offer which takes into account the social and environmental issues.

Finally, the firm can launch the new offer into the market. This phase has to be continuously assessed to find the relevant partners and to be adapted at each level; commercial, organizational, contractual, operational and financial. (Dallemagne, 2015a).

Throughout the process, the company should enhance the perceptions of the public and the stakeholders about the company operations. The organizational culture should raise awareness for people to act in a sustainable way by clearly communicating short and long-term objectives regarding social and business value. Indeed, the more people are educated, the more ambitious can goals and strategies be (Baumgartner & Rauter, 2017).

In conclusion, different types of companies might be interested in implementing the functional service economy for their own specific reasons. To transition towards the new model, they could go through one or several phases identified or create a new business model from scratch. Aside from companies, other stakeholders might also help to ease the transition.

#### B) For other stakeholders

For there to be a real change, there must be a change in mindset. For example, we could develop education and information programs that promote altruistic and ecological values such as equality, social justice and respect for the environment by preventing pollution (Nguyen et al., 2016).

Moreover, manufacturers of energy efficient appliances should communicate about the benefits of their products and the positive impact on the environment and the society. It requires careful planning of the strategy and cooperation with diverse actors to be able to pass

on a clear message and have an impact on the beliefs (Nguyen et al., 2016). In addition, the government should support education and communication programs to deepen knowledge about eco-efficient appliances and energy rating labels. Indeed, a good way to convince customers of the validity of their purchase is to use labelling system which are more persuasive when supported by the government (Ghisellini et al., 2016).

They should also foster manufacturers to build eco-efficient products by offering tax advantages and other discounts to help them reduce their costs (Ecores, 2015). Retailers must also make additional efforts to showcase these types of goods and make them available in attractive points-of-purchase while being able to inform the consumers about their impacts.

Government intervention is even more important in lower-income countries to make eco-efficient appliances accessible to a larger number of persons (Sonnenberg et al., 2014).

It has been shown that regulations on innovation can be positive for companies and countries can promote policies that encourage their firms to shift towards markets where sustainable development is key (Booms et al., 2013).

We also need to educate the consumers about repairing their appliances when they are broken, as half of the people prefer to buy a new device instead (Salommez, 2014).

## ***2) Conclusion & summary table of the theory***

Through the theoretical part, we have studied the functional service economy from a sustainable perspective by explaining the business model innovation for sustainability. Various definitions were highlighted showing the different perspectives of the authors regarding the model. The definition of Stahel was chosen for this thesis followed by an explanation of the concept and the principles. The Kotler analysis helped us to differentiate it from the current business model. Then several concepts linked with the functional service economy were exposed. We have found that the product service system is similar to it, especially the use-oriented PSS and result-oriented PSS. The eco-conception, eco-socio-conception and eco-efficiency are tools to implement the FSE but don't induce a complete change in the business model of the company. Then, while the authors have different points of view concerning the relations with the circular economy and functional service economy, we noticed that these concepts are similar to each other, share common principles but still are two

different models. We have also noted that the functional and cooperation economy took the concept further than the FSE by insisting on the use of immaterial resources, the integration of three pillars of sustainable development and the stakeholders' involvement. Finally, the limits of the FSE were explained.

In this last part, we have made recommendations and highlighted the key success factors to implement this concept. This table summarizes the obstacles and leverages of the FSE but also it's the key success factors. This table will be a useful guide for the practical part.

*Table 1: Summary table of the obstacles, leverages and key success factors to implement the functional service economy*

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Definition of Functional Service Economy | Stahel (1997b) defines: « <i>The Functional Service Economy, which optimises the use or function of goods and services, focuses on the management of existing wealth in the form of goods, knowledge and natural capital</i> ». He indicates that : « <i>The economic objective of the Functional Service Economy is to create the highest possible use value for the longest possible time while consuming as few material resources and energy as possible</i> ». According to him, it is « <i>considerably more sustainable, or dematerialized, than the present economy, which is focused on production as its principal mean to create wealth and resources flow</i> ». |
| Leverages                                | <ol style="list-style-type: none"> <li>1. Economic producer's incentives to maximise the use, the performance and lifespan of their products</li> <li>2. Recycling and remanufacturing become a source of competitiveness</li> <li>3. Understanding of the customer's needs</li> <li>4. Ecological goal : fight against planned obsolescence</li> </ol> <p><u>FCE :</u></p> <ol style="list-style-type: none"> <li>1. Immaterial resources are unlimited</li> <li>2. Synergy economies through partnerships</li> </ol>                                                                                                                                                       |
| Obstacles                                | <ol style="list-style-type: none"> <li>1. Change in business model <ol style="list-style-type: none"> <li>a. New conception and design strategies</li> <li>b. New ways of working (importance of a good after-sales services)</li> <li>c. New skills needed</li> </ol> </li> </ol>                                                                                                                                                                                                                                                                                                                                                                                           |

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | <ol style="list-style-type: none"> <li>2. Change in the economy, position of intermediaries?</li> <li>3. More demanding customers</li> <li>4. Rebound effect</li> <li>5. Complexity of contracts</li> <li>6. Low profitability of services</li> <li>7. Removal of property from consumers</li> <li>8. Support from authorities</li> <li>9. Questionable feasibility of the implementation depending on the sector</li> </ol> <p><u>FCE :</u><br/>Challenge with territorial issues and consumers implications</p>                                                    |
| Key Success Factors | <ol style="list-style-type: none"> <li>1. Determine relevant perimeter of stakeholders involved for the whole value chain</li> <li>2. Progressive implementation : Rental model + Improved use + Eco-conception + Circular flow of materials</li> <li>3. Improve their use of immaterial resources and their ways of cooperating and making partnerships</li> <li>4. Importance of feedback loops for continuous improvement</li> <li>5. Clear marketing message to enhance the acceptance</li> </ol> <p><u>FCE</u><br/>Managing the immaterial resources is key</p> |

## ***Part 2: Practical approach***

## Chapter I: Overview of the practical part

This second part aims at confronting the theoretical analysis with a pragmatic view. That is why an exploratory research was conducted to answer the question: « *Are the consumers interested in changing their consumption habits towards a functional service economical model in the household appliance sector?* ».

First, a research was conducted, based on the literature, about the drivers affecting the choices of consumers in the household appliance sector and the target groups that could be interested in this type of offer. The goal was to look for information that may already answer some questions or lead us towards a specific angle of reflection (Berg, 2004). Then, to explore the research problem above, we divided it into sub-questions and key insights linked with the findings from literature.

Those key insights helped us to develop a fictional offer of the functional service economy in the household appliances market. To improve the fictional offer and have a primary opinion on the key insights, we contacted 5 experts that gave us various feedback. Then, once the offer was improved by the expert's advice, consumers from the three countries (Belgium, Canada and Philippines) were interviewed with the aim of knowing their opinions on the offer. Finally, a summary table was developed to gather learning points from experts and consumers.

## Chapter II: Household appliances market

### 1) Consumer behavior

Before asking the consumers about their opinion, it is important to clarify: « What are the factors that affect the consumers when buying household appliances? » and « Who would be interested in this type of offer? » based on articles from the literature.

#### A) Choice determinants

According to the study of Barba-Gutiérrez et al. (2010), the first two reasons for which people replace their current household appliances are malfunction and technological obsolescence. To give more details, Lin, Wu & Wang, (2000) set up a table showing the factors affecting consumers brand choice when buying household refrigerator in Taiwan.

**Table 1** Ranking of factors affecting consumers' brand choice of household appliances

| Factors for repeat purchase   | Average value | SD    |
|-------------------------------|---------------|-------|
| After-sales service           | 4.136         | 0.800 |
| Useful life                   | 4.072         | 0.781 |
| Speed of repairs              | 4.045         | 0.824 |
| Quality                       | 3.940         | 0.764 |
| Energy saving features        | 3.940         | 0.820 |
| Design excellence             | 3.893         | 0.934 |
| Brand reputation              | 3.846         | 0.904 |
| Ease of use                   | 3.670         | 0.888 |
| Aesthetics                    | 3.630         | 0.867 |
| Extra features                | 3.501         | 0.934 |
| Diversity of product line     | 3.499         | 0.899 |
| Innovative design             | 3.439         | 0.966 |
| Selection of sizes            | 3.419         | 0.887 |
| Discounts or promotions       | 3.404         | 0.865 |
| Popularity                    | 3.330         | 0.937 |
| Recommendation by sales staff | 3.181         | 0.943 |
| Advertisement                 | 3.027         | 1.037 |

Figure 6: Factors affecting the consumers' choice of household appliances (Lin et al., 2000)

We can notice that after-sales services, useful life and speed of repairs constitute the top three factors leading to repeat purchases, while advertising is considered as the least important for customers in Taiwan (Lin et al., 2000).

Indeed, manufacturers should deliver more services (offer repair, give advices...) and provide fast response to customers when they are facing problems or having questions (Lin et al., 2000). Salommez (2014) explains that the quality and accessibility of the service offered to the customers in case of failure are both factors that extend the lifecycle of the products. These can help to meet the challenges of the functional service economy.

The energy label is also a criterion taken into account by the customers in Spain. Indeed, a study of Galarraga, Gonzalez-Eguino & Markandya (2011) showed that the demand for labelled energy-efficient appliances is more elastic than the demand for other products. The authors think that it is because of the trend effect and the rise of personal environmental concerns that customers are ready to pay a price premium to buy that kind of product.

Moreover, a study was realized in 5 European countries (Belgium, Spain, France, Holland and Czech Republic) to observe if the indications on the product's lifetime at the point of sale would influence the decision of the customer (Dupré, 2016). The question was: «Would we consume differently if we knew how long the appliance would last? »

The results show that there is a real influence of the information towards the purchase of more sustainable goods. The products were even more affected if they were not fashionable, if the customers bought them for useful reasons and if they were only used periodically (Dupré, 2016).

In addition, the importance given to the lifespan increases also with the amount that they are ready to pay for the product. Thus, the lifetime criteria influences more the purchase decision for high-end products than for lower-end ones (Dupré, 2016).

To give concrete examples, 90 percent of the respondents state that they are ready to pay more to have dishwashers that last more than two years. In addition, the products that have a lifetime longer than their competitors have on average increased their market share by 84% (Dupré, 2016). According to Dupré (2016), the amount of the price-premium found acceptable to buy sustainable product increases with the GDP of the country. As a matter of fact, in low-income countries, customers are more price-sensitive towards eco-friendly alternatives and in some cases; the price premium may inhibit pro-environmental decision while increasing the value of other features. Indeed, customers might prefer immediate

advantages to long-term consequences. Even if sometimes the eco-friendly alternative is seen as a restraint, it is also occasionally seen as a mention of superior quality by South Africans (Sonnenberg et al., 2014).

All these factors combined usually have the effect to involve more the consumer in the purchase decision and his choice becomes more rational which, at a broader scale, results in a highly competitive market for durable products (Lin et al., 2000).

In conclusion, because of the changing competitive environment, with globalization and the leading multinational appliances manufacturers, the quality and quantity of eco-friendly high-end household appliances have both increased. Indeed, firms are under the pressure of an expanding mass of environmentally-conscious consumers in developed markets. However, the effect is moderate as most of the purchase decisions are still driven by price sensitivity (Sonnenberg et al., 2014).

#### B) Target group

The target group that is the most sensitive to sustainable products in Europe are women between the ages of 25 and 35 years old, with medium or slightly superior revenue and which are generally involved in the environmental cause (Dupré, 2016).

Nguyen et al. (2016) observed that attitudes, beliefs and knowledge shape how we behave and how we make our purchase decisions. Indeed, the more people adhere to egoistic values, the less they will be sensitized by the environmental cause unless they see an individual benefit in reducing their energy consumption, whereas biospheric (i.e. values emphasizing the quality of the environment and the biosphere) and altruistic persons will want to buy eco-efficient appliances to both reduce their impact on the environment and make energy savings. In addition, those that have a high knowledge of energy efficient appliances or those that have a stronger adherence to environmental and social value will be more likely to buy them for their ecological virtue even if it creates personal inconvenience.

In conclusion, Nguyen et al. (2016) claim that there is a link between the motivation derived from specific inherent value of the person and the eventuality that he will buy energy efficient household appliances. But this is nuanced by Sonnenberg et al., (2014) who moderate this statement as they agree that individuals develop a sense of moral constraints to act in favor of

the environment but they claim that the behavior is strongly influenced by the actual purchasing context.

These information on the choice determinants and target group will be used, as a supplement of the theoretical part to develop the key insights in chapter III.

### **Chapter III: Elaboration of key insights and an offer based on experts opinions**

To answer the research problem: « *Are the consumers interested to change their consumption habits towards a functional service economy model in the household appliance sector?* », key insights will be developed based on the theoretical part and research on the household appliance market. We divided this problem into 5 research questions and 12 key insights. Then, a fictional offer will be elaborated based on the key insights and enriched by the experts' advice.

#### **1) Key insights and their justification with theoretical approach**

As it is a qualitative analysis, the aim isn't to test hypothesis. Instead, the key insights elaborated could be complemented by interesting elements for our research while others could be invalidated later. The entire table is the appendix 1.

It is important to note that the letter “**R**” means research question and the letter “**K**” refers to key insight.

- **R1:** *What would be the factors valued by the consumers for their purchase in the household appliance sector?*

Through this research problem we would like to know to which extent the after-sales service, the quality or a low price can have an influence on the purchase decision of the consumers.

- K1: The consumer will value the product with the best after-sales service (warranty included).

According to the study of Lin et al. (2000) (see p.43), among the factors that affect the consumer's choice, the after-sale service is the one that influences the most the customer's loyalty.

- K2: The consumer will prefer the low-cost offer.

To which extent will the consumer be price-sensitive when having the opportunity to switch to a functional service economy offer?

- K3: The consumer will value the product with the best quality.

According to some authors Lin et al. (2000) (see p.43), the quality is the fourth criterion that affects the choice of the consumer regarding the brand.

- **R2:** *What is the profile of the consumers interested in the FSE offer?*

We would like to know which type of customers could be targeted by a functional service economy offer.

- K4: The consumer with a high level of knowledge on energy efficient appliances will choose the FSE offer.
- K5: The consumer with a stronger adherence regarding environmental and social value will choose FSE offer.

According to Nguyen et al. (2016) (see p.44), the beliefs and value could influence the purchase decision. Therefore, people who are more green-minded or knowing energy-efficiency solutions could be more sensitized to a functional service economy offer.

- **R3:** *What are the switching costs for the consumers to move on from the classical model to the functional service economical model?*

- K6: The consumers don't want to lose their property rights regarding the product for a functional usage.

As explained in the limits and obstacles part (see p.31), the functional service economy questions the property right of the consumers. From a customer's point of view, the substitution of the ownership for a functional usage can be a psychological obstacle (Bourg & Buclet, 2005).

However, Stahel explained (see p.14) that ownership makes sense only for durable goods increasing in value (real estate for instance). Following this reasoning, it could mean that ownership could be less constraining with basic goods such as domestic appliances in the household appliance sector, which contradicts the key insights. That is why it could be interesting to ask questions on this topic during the interviews.

- K7: The consumers don't want to engage themselves in a complex and long-term contract.

With this key insight, we would like to analyse to which extent the consumers would be ready to pay for a monthly subscription. Indeed, the functional service economy could imply new ways of managing the contracts. It could be in the form of a rental agreement which implies a different level of responsibility for the producers, the insurance and the warranties.

- **R4:** *How can culture have an influence on the transition?*

- K8: The consumers in some countries are more willing to collaborate and make partnerships than in others countries.

To implement the functional service economy, and especially the functional and cooperation economy, we need to set up a cooperative ecosystem that integrates different stakeholders (see pp.28-29). Thanks to the synergies achieved between multiple actors, it results in an increase of efficiency, higher quality and lower coordination costs. We would like to see if a culture of collaboration can ease the acceptance of a functional service economy offer.

- K9: The consumers coming from a country with a high GDP are less price-sensitive to eco-friendly alternatives than others.

According to Dupré (2016) (see p.43) the amount of the price-premium found acceptable to buy sustainable products increases with the GDP of the country. Based on this theory, the key insight developed is that in low-income countries, customers could be more price-sensitive towards eco-friendly alternatives and in some cases, the price premium may inhibit pro-environmental decisions while increasing the value of other features.

- K10: Consumers in countries with a low-uncertainty avoidance score (according to Hofstede) are more inclined to accept the functional service economy model.

When a new model is implemented, consumers must be willing to change their habits. This is why we would like to measure if some cultures react better to the offer and if it is linked with their uncertainty avoidance score.

- **R5:** *Are the consumers ready to cooperate with the producer?*

- K11: Consumers want to be involved in the production process

By implementing the functional service economy, the company must have a good understanding of the customers' needs. As the consumer is a value user and the producer a value provider, consumers' needs are part of the value chain (see p.10). The goal is to measure to which extent consumers are ready to cooperate with the producer by answering surveys and providing ideas in co-creation events.

- K12: Consumers value a trust relationship with the producer of their household appliance.

As explained before (see p.27) the functional service economy and especially the functional and cooperation economy maximizes the use of immaterial resources through the scissor effect principle. The trust relationship developed with the customers could be an opportunity to develop immaterial resources. Moreover, through learning economies, the companies can receive feedback from their clients which would help them to improve the quality of the products (Sempels, 2016, p.5) (see p.28).

## 2) Methodology for experts interviews

We have decided to contact experts in sustainable development or functional service economy to valid our key insights and get potential answers to the research problem of the thesis. We tried to reach many experts, for example Stahel, but ultimately only five accepted to have a Skype call. To collect different points of view on this topic and on the offer proposal, the five experts chosen come from different entities: associations, companies and academic sector, and have different backgrounds. Here is a table that summarizes the different profiles.

*Table 2: Interviewees' profiles*

| Interviewees      | Background/Experience                                                                                                                                                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Damien Dallemagne | Consultant in sustainable development, expert in functional and cooperation economy and founder of the company “Innergic” which helps companies to improve their sustainable development and economic efficiency.                                                                                                                              |
| Claire Pinet      | Expert in functional service economy for the French Public Agency ADEME, an agency for environment and energy mastering.                                                                                                                                                                                                                       |
| Patrick Vuidel    | Associate consultant at ATEMIS, general delegate of the French club of functional service economy and sustainable development and member of the board of the association Tempo Territorial. This association helps companies in their strategy for sustainable development. For example, to set up a functional and cooperative economy model. |
| Sylvain Plouffe   | Professor at University of Montréal and expert in lifecycle analysis, ecodesign and multicriteria analysis.                                                                                                                                                                                                                                    |

|                 |                                                                                                   |
|-----------------|---------------------------------------------------------------------------------------------------|
| Bruno Vermoesen | Senior Expert EU Technical Governmental Affairs and Associations<br>at BSH Home Appliances Group. |
|-----------------|---------------------------------------------------------------------------------------------------|

We have chosen the form of semi-directive interviews as we wanted to have their points of view regarding our offer and how they thought it would affect the producer or the customers. The advantage with semi-directive interviews is that it starts with a basic structure, but with the opportunity to react directly or ask additional information regarding their area of expertise or specific projects (DiCicco-Bloom & Crabtree, 2006).

A questionnaire was established (see appendix 2) divided into seven parts. The first part was about the presentation of the interviewee. Then, the second part was based on the expert's point of view regarding the advantages and disadvantages of the functional service economy, to assess his level of knowledge. The third part focused on the functional service economy, the application in the household appliances sector and the expert's opinion on the offer. From the fourth part onward, each of them focused on research questions regarding respectively the type of customers that would be interested in the functional service economy; the cultural differences affecting the functional service economy and the cooperation between consumers and producers in the household appliance sector. Finally, we concluded with open questions regarding suggestions or remarks from the interviewee.

Since we constructed our questionnaire before knowing exactly the profile of the interviewees, we adapted it based on the profile and the field of knowledge of our respondents. For instance, as none of the five interviewees had knowledge about cultural differences that could influence the acceptance of a functional service economy offer, we chose not to ask questions about it. Moreover, as Mr. Vermoesen was the only one working in the household appliance sector (BSH Home Appliances Group), we asked him specific questions about the industry and his opinion regarding the implementation of the functional service economy in this sector.

### 3) Results on the key insights

Our experts have given potential answers to the key insights. Indeed, four experts gave their opinion on the scope of FSE by saying that the functional service economy can be applied to all sectors but at different intensities, depending on the ratio of immaterial and material resources and on the choice between selling a usage or offering a service or usage performance.

Concerning the choice determinants, experts explained that if the consumers understand the added value of the offer and the functioning of the model, they will value the quality or the after-sales service over the price (Key insight 1,2 and 3). Mr. Plouffe added that it has to stay simple as the object of the offer is basic domestic appliance.

Then, for the target group, the four experts highlighted that the consumers interested by this model could be in the B2C sector. The more interested would be either green-minded people if the environmental value is well-explained with proof such as certification, or people who appreciate the monthly payment. In the B2B sector, this model could work for hotels or organizations that are currently subcontracting services (Key insight 4 and 5). Indeed, Mr. Dallemagne explained : « *En B2B : Souvent on sait aller plus loin dans le niveau de configuration et de détails de la solution. En effet, car le gestionnaire de l'hôtel regarde ses coûts, sa réputation envers ses clients* ». This thesis focuses on B2C but further research could be made to apply the model to B2B.

The potential switching costs could be the substitution of the old machine for the new energy-efficient one, the substitution of the property from the consumer to the producer or the implication of the consumer in the creation process. The property will stay an obstacle depending on the customers preferences, and his belonging to a specific brand (Key insight 6). Regarding the contract, it has to stay simple and flexible to attract more customers (Key insight 7). Mrs. Pinet also expressed that : « *La fidélisation, la contractualisation doit être vue comme une coopération entre l'utilisateur et le prestataire* ».

The experts also mentioned that consumers will be reluctant to participate in the creation process. To solve this issue, the offer should be tested on a small sample with clear rewards for the participants (Key insight 11). Mr. Vuidel specified: « *Je ne sais pas s'il aimerait mais c'est évident qu'il faut qu'il le soit. On ne peut pas travailler sur la performance d'usage sans*

*impliquer le bénéficiaire. Il faut créer un moyen, à travers des expériences ou autres pour récolter les données ».*

When the consumers made a purchase decision, they will trust the producer if they don't know the product or if the level of risk is high. However, for a washing machine, the attractiveness of the brand is important (Key insight 12).

#### ***4) Explanation of the offer based on insights from experts***

The discussions with the experts helped us to elaborate and improve the fictional offer that we will present to the consumers. This section summarizes every aspect of the offer, while explaining the contribution of the experts.

##### **A) General presentation of the offer**

The mantra would be: *« We offer you a clean and customizable wash in the form of a subscription to a washing machine and the provision of a variety of advantages to ease your life ».*

The offer would be a monthly subscription for a washing machine integrated into an app that provides free repair 24 hours a day, 7 days a week, and innovation updates to be sure that the clients consume less energy while having access to the best programs.

The consumers don't buy the washing machine anymore but pay for the use of the service.

As the company remains the owner of the machine, it allows them to integrate the whole lifecycle of the product.

When considering the cooperative side, the goal is to collaborate with the clients through an online platform (app) to get new ideas, feedback, share advice between customers and co-create the product together.

This offer would be set up through a flexible contract that the consumer can stop whenever he wants if he notifies at least two months in advance. In that case, the company will take back the washing machine to allow someone else to use it.

Mr. Vuidel insisted on the importance of the client's understanding of the offer. A clear explanation of the offer and the options available is needed otherwise it can be an obstacle to the subscription. He said : « *La machine à laver, normalement tout le monde sait l'utiliser, même si on n'optimise pas son utilisation. Alors que quand vous faites la transition vers un service, plusieurs questions apparaissent : "Comment j'y accède ? ", " Qu'est-ce qu'il se passe si ça marche pas ? ", "Comment on paie ? "...Le frein n'est pas forcément un frein monétaire mais plutôt un frein cognitif* » .

## B) Clarification of the dimensions

The offer is subdivided into diverse aspects which were discussed in the experts' interviews.

### B.1 Rental contract

#### (i) Fixed or variable amount

At first, we imagined 2 types of contract for 2 different customer profiles:

1. A pay-per-use system in which the consumer pays a fixed amount (to pay for the rent of the machine) and a variable cost depending on how much they use the machine. It would be an incentive to use it with parsimony.
2. A contract where the customer pays an agreed amount per month independently of his usage of the washing-machine.

However, it evolved when we presented it to Mr. Vuidel. He advised us to go beyond : « *Il faut dépasser l'idée de l'usage pour interroger les effets. Vous êtes centrées sur l'usage du bien, d'ailleurs vous proposez de payer à l'usage. Alors que si vous êtes centrées sur la performance, vous devez vous demander : " Qu'est-ce qui se joue à travers la machine à laver ? " et " Quels sont les effets attendus ? " »*

We then decided to forego the first option and focus on the second one. To integrate the usage performance, the offer would consist in selling: « A clean and customized wash » to

customers. They would pay a fix amount every month to access the service whatever the number of load they do.

#### (ii) Payment frequency

Concerning the payment frequency, by offering a monthly contract with minimum two months of subscription, the aim is to give to the consumers more flexibility than in a yearly contract. Indeed, the expert Mr. Dallemagne insisted on the fact that to make the offer appealing to the customers, we have to offer them the possibility to get out of the contract when they want. That is why the consumer can stop the contract at any time by giving two months' notice. Moreover, it is a way to spread the investment over time by paying a small amount each month instead of a larger sum all at once.

### B.2. Innovation updates

Concerning the innovation, the professor Mr. Plouffe said that there is a dilemma between innovation and sustainability. The machine could have two different designs:

The first one would be a machine that lasts the longest possible with the goal of minimizing the repair issue. The producer would design the machine with the explicit goal of extending the lifecycle of this appliance. In this case, the efficiency of the machine will be accomplished but not necessarily with an ecologic goal.

The second is the eco-conception of the machine. In that case, the machine could be designed with interchangeable materials that can easily be repaired or replaced by other more efficient components. The primary goal is the eco-efficiency of the washing-machine. By staying open to innovation it could be considered being in contradiction with the ecological goal.

We decided to find a balance between the sustainability and the updates tied to innovation. Indeed, we choose to take into account only the innovations that reduce the energy consumption of the machine without compromising the sustainability of the product.

Concerning the software or hardware of the machine and the updates, Mr. Vermoesen explained that in general the updates are very expensive because they directly affect the supply chain. The legal aspect can be a barrier or an incentive. Indeed, the last big update in this field was supported by the European Union for the energy labelling and eco-conception measure. Moreover, as explained by Mr. Vermoesen, when BSH group launch new products, they have to be in accordance with the current legislation and prove it by a declaration of

conformity. Therefore, a modification regarding the security or the energy consumption of the product directly affects the conformity declaration. It is important to take into account the obstacles due to the regulation when innovating in the field.

In addition, the cost linked with the eco-conception of such a machine could be very high. It is clear that in the short term this model isn't profitable because the producer has to produce a new eco-efficient machine and has to rethink his production process. However, in the long-run, it could be more profitable than selling the product itself.

First, because the system of monthly subscription gives constant access to cash flow to the producer, which he could use to finance his operations.

Indeed, in the long-run, if the washing-machine at the core of the offer is well eco-designed, less of them would be produced and most of the initial components from the beginning will stay. It would ease the repair process because the pieces are interchangeable. The machine will be re-used by the new customers or could be dismantled to use its pieces for other machines. This is inspired by the principle of circular economy where everything is reused and no more is produced.

Then, as Mr. Vermoesen mentioned, the recycling stage has to be taken into account in the whole offer. Indeed, he explained that after 10 to 30 years, the components need to be recycled. He said : *« C'est là aussi qu'il faut optimiser au max les techniques de recyclage afin de pouvoir récupérer un max les matériaux qui se trouvent dans les appareils recyclés et de réintroduire ces matériaux dans la production de nouveaux appareils au lieu de s'en défaire dans une décharge »*.

To conclude, free innovation updates would be included mainly for the improvement of energy consumption. Indeed, offering full innovation updates may be too demanding for the operational team all the while being resource consuming. The innovation will be limited as the legal barriers are high in this sector. The offer won't be profitable in the short-run but could become attractive for the producer later on if the products are eco-designed and then recycled.

### B.3. Application for smartphone

This application could assist the customer and ease his life by providing the possibility to launch his load of laundry by distance. The client could:

- Launch his machine whenever he wants
- Receive an alert depending on the Smart Grid, saying that it is the best time to launch his machine because the electricity is cheaper
- Measure the consumption of electricity and water of each loads
- Adapt the program (temperature, level of water, rinse option) and the powder depending on the clothes inside, to insure a unique clean wash
- Set up an alert if some elements go wrong or have to be repaired or replaced

As Mr.Vermoesen explained, the system of Home Connect already exists at BSH Group. « *Nous développons depuis quelques années des appareils qui sont connectables, cela s'appelle Home Connect. Les machines se connectent au wifi, nous avons des app qui permettent de contrôler l'appareil, l'état de déroulement de l'appareil. Si l'appareil est en train de laver, s'il y a eu une erreur,... Cette fonction Home connect permet de faire des mises à jour du software de l'appareil, c'est possible. Elle permet aussi de faire un diagnostique à distance, s'il y a un défaut dans l'appareil ce sera mentionné dans l'app avec comme but de pouvoir faire de la maintenance prédictive, la machine vous informe qu'il y aura bientôt un problème. L'app peut vous donner des infos sur comment traiter le linge, avec quel programme, par exemple pour un four on peut vous offrir des recettes, vous pouvez lancer automatiquement le four à partir de l'application avec les bonnes températures. »*

The app could serve as foundation to share an online platform for advice, repair and co-creation

#### (i) Online platform to share

The platform would serve as a foundation to facilitate contact between the producer and the consumers and between the consumers themselves. This could help with:

- After-sales service: They could ask questions and have direct answer from the producer or from other users.

- Advice on washing techniques and products (type and quantity)
- Immaterial resources: By collecting knowledge among the users, the producer improves his understanding of the exact needs of the customers and how he can fulfill them. The idea is to involve the consumers as much as possible, it is a cooperation relationship between the producer and user as mentioned earlier (Sempels, 2016; Dallemagne, 2015a)
  - Annual surveys : Consumers would be invited to answer surveys annually
  - Co-creation: The consumers would be invited to participate in co-creation events that would take place at the production firm. The consumers could give their opinions and suggestions about the product via brainstorming.

According to Mr. Dallemagne and Mr. Plouffe, the co-creation process can be considered. Indeed, to promote it, the value added for the participants has to be higher than the cost of implication, which in the offer is not well-developed. A solution could be to offer incentives, such as discounts or free months, to the voluntary participants. In BSH Group, Mr. Vermoesen explained that an entire department is dedicated to gaining insight related to the customer experience and to integrate it for future product development.

In conclusion, the incentives to increase the consumers' involvement in the feedback loop have to be further developed.

#### B.4. Partnerships

The seller could create a partnership with a producer of detergent in order to provide eco-efficient detergent adapted to every kind of fibers (efficient = with less you have the same effect, ecologic= the mixed of used water and soap don't produce damage for environment).

Another suggestion would be to create a partnership to provide a package of eco-efficient washing-machines and eco-efficient dryers. Indeed, the producer could commit himself to provide eco-efficient dryers to complete the offer. It would be the same functional service economy offer than for the washing machine.

Mr. Vermoesen highlighted the importance of keeping the choice in the hands of the consumers. At BSH Group, they are used to making partnerships for their products for marketing reasons. *« Quand on a développé nos projets circulaires, on y a pensé mais le problème c'est que le consommateur a aujourd'hui accès à une très grande offre. Et on n'a pas voulu manquer une vente juste parce que le consommateur ne voulait pas prendre le consommable de tels marques offerts. Comme au final c'est le consommateur qui choisit, on n'a pas voulu diminuer son choix car je crois que c'est une barrière très importante. Mais je n'exclus pas les partenariats, je pense que c'est possible ».*

After reflexion, we decided to provide eco-soap as an optional service.

### C) Positive externalities for the client

If the consumer subscribes to this offer, he would:

- Benefit from a personal follow-up that allows him to have a customized machine. As explained by Mrs.Pinot: *« On n'est pas sur une production en masse d'un modèle, mais on est plutôt dans une relation de besoin et usage et comment répondre spécifiquement aux besoins et aux usages ».*
- Save money on his electricity/water bill and could reduce his ecological footprint.
- Benefit from an efficient and permanent after-sales service.

After clarifying every aspect of the offer based on the experts' advice, the following section will be more focused on the consumer side and their opinions on the offer.

## **Chapter IV : Consumer qualitative analysis**

### ***1) Methodology***

We decided to do a qualitative analysis to get the customer's point of view regarding the offer elaborated with the experts. Indeed, it is more relevant for our study than a quantitative one for different reasons:

First, it allows to better understand the drivers affecting the consumer choices, while giving the possibility to deepen some questions. Indeed, qualitative research allows to study the

meaning that people give to their actions and to understand their role in their environment (Yin, 2011). Second, we can explain individually what the functional service economy is while describing our offer and responding to their inquiries. Third, the questionnaire is related to cultural dimensions which are better approached with qualitative research, as it incorporates contextual conditions such as institutional, cultural and environmental conditions (Yin, 2011). Furthermore, we had the opportunity to be in the field, respectively in Canada and the Philippines and conducting qualitative research encompasses better the local ground features and the fact that the data was collected locally in a certain context (Miles & Huberman, 1994). Fourth, in the Philippines, many people still don't have access to internet, which could be an obstacle to participate in online surveys. However, they are willing to answer to a face-to-face interview. Finally, because we are doing an explorative research in a particular context and we want to deeply understand the process and include participant's views and perspectives (Yin, 2011). It gives us proximity with the studied situation while being able to understand the « Why » and the « How » (Lejeune, 2013).

For this, we conducted interviews with a sample of 60 respondents: 20 Belgians - 20 Filipinos - 20 Canadians. We have chosen Belgium as it is our native country and the Canada and the Philippines as they were the countries in which we were doing our internship.

Different profiles of consumers were targeted. The only prerequisite was that the consumers should be aged over than 21 years old as they had to use a washing machine. We wanted to emphasize face-to-face interviews but some of them were also done by telephone when it was the only option (for example, for the Belgians).

We realized semi-directive interviews, which are based on a set of predetermined questions while letting the possibility for spontaneous questions to emerge as well (DiCicco-Bloom & Crabtree, 2006). Indeed, semi-directive interviews ask for the opinion of the interviewees on concrete points while staying open to suggestions and discussions. The questionnaire was divided into different parts. It started with the presentation of the interviewees, as an ice-breaker. Then, consumers were questioned about their habits and the use of their washing machine. Finally, consumers had to give their opinion on the offer. This began with an overview of the offer and then we asked specific questions on every aspect of the offer. We ended up by asking what were the most/least valuable parts of it, if they had any questions and if we had their permission to transcript the interview.

From the qualitative analysis, a positive interest towards the offer emerged. To clarify the tendencies observed, a statistical table that gathers different trends can illustrate this positive disposition.

The table shows the percentage of respondents who have a washing machine at home; who communicated a positive reaction towards the offer in general; who wanted to stay the owner of their washing machine; who were in favor of the application feature and who were in favor of the eco-soap feature.

*Table 3: Statistical table from customers interviews*

|                  | <i>Owner of a washing machine</i> | <i>In favor of the principle of subscription</i> | <i>In favor of keeping the property of their machine</i> | <i>In favor of the application feature</i> | <i>In favor of the eco-soap feature</i> | <i>In favor of co-creation</i> |
|------------------|-----------------------------------|--------------------------------------------------|----------------------------------------------------------|--------------------------------------------|-----------------------------------------|--------------------------------|
| <i>Canadians</i> | 90%                               | 70 %                                             | 20 %                                                     | 75 %                                       | 75 %                                    | 20%                            |
| <i>Belgians</i>  | 100%                              | 65%                                              | 15%                                                      | 85%                                        | 80%                                     | 30%                            |
| <i>Filipinos</i> | 100%                              | 90%                                              | 20%                                                      | 90%                                        | 95%                                     | 40%                            |
| <i>Total</i>     | 93,33%                            | 75%                                              | 18,33%                                                   | 83,33%                                     | 83,33%                                  | 30%                            |

It appears that the three countries positively reacted to the offer, the application and the eco-soap. However, the Filipinos are the ones that value it the most.

Aside from those results, a qualitative analysis is preferred to deeply understand what influences the purchase decision of the consumers, while being able to ask more details on the “Why” and “How”.

First, we transcribed every interview to be able to analyze them better. Then, we noticed that some themes were recurrent and helped us to answer our five research questions. Therefore nine analysis axis were identified. The data were analysed according to a colour code that represents each axis

1. Energy Savings
2. Innovation
3. Cooperation
4. Ecology
5. Price sensitivity
6. Contract management and legal aspects
7. Repair
8. Consumers' expectations (Sustainability and convenience)
9. Feeling regarding the property

It is important to note that everything related with sustainability and convenience was merged onto one axis: « The consumers' expectations ». Moreover, no colour was used for the axis: « Feeling regarding the property » because it refers directly to one question in the interviews: « *How important is it for you to be the owner of your washing machine?* ».

We decided to analyze first the nine axis in every country and then to proceed to a comparative conclusion between the three countries.

Finally, for the analysis of the Canada, there were two interviewees that had the same surname: Dominique. To distinguish them, we have written their ages in brackets following their surname.

## ***2) Analysis of axes per nationality***

The analysis for each country will be divided in two parts. We will first explain the state of the household appliance market and the initiatives related to the functional service economy taken in the particular country. Then, we will gather the information found on every axis and describe the reactions of the interviewees, the tendencies observed and the specific remarks or suggestions from individuals.

## A) Belgium

### A.1. General state

The washing machine market in Belgium is very price competitive. However, customers are usually ready to pay a premium for convenience. Regarding their habits, we observe ecological practices such as colder and shorter washing programs. The eco-friendly detergent is also appreciated by the Belgians even if they tend to over-dose their wash (Euromonitor international, 2018a).

Concerning the initiatives taken, as Belgium is a member of the European Union, it is affected by the policies taken at this level. Currently Europe is promoting eco-conception, the durability of the product and the circular economy. The Ecodesign Directive established in 2009 is a first step towards a more sustainable development, it forces manufacturers to reduce the negative environmental externalities of their products. But its transposition in the single market takes a lot of time especially when there are ill-defined performance indicators (Montalvo, Peck et Rietveld, 2016). There are also some directives such as Waste Electrical and Electronic Equipment which rise the incentive of PSS implementation. (Sundin et al., 2009)

Moreover, in Europe and therefore in Belgium, the management of electricity is evolving towards a Smart Grid system. It refers to the management of electricity demand in a sustainable, reliable and economical manner. A platform has been created, The Smart Grids European Technology, to connect all the users and producers of electricity to provide electricity in a sustainable way (Wang & Srinivasan, 2015).

Concerning the impact of more sustainable product, a study was conducted by the Policy department for the European Parliament (2016), and showed that the modifications of the current economic activities with the aim to increase the lifetime of the products could have a positive effect on the GDP of the EU and push the innovation in current business models. Sectors which will be directly affected by a longer lifetime for products are mostly R&D, repair, maintenance, leasing and renting. Moreover, all the economic agents such as households could be positively affected because the higher the dependence toward the product, the higher will be the benefit of a longer lifetime. However, in order to support these benefits, the communication with consumers is primordial (Montalvo et al., 2016).

Specifically in Belgium, as explained by Mr. Vermoesen, BSH home appliance group is already leading a pilot program linked with the functional service economy. It is called the “butterfly project” and consists in a long-term rental contract for washing machines, dryers, refrigerators and freezers. The commitment from the producer is 10 years of free repair. The user pays less than 10 euros per month and benefits from the use of the machine and a free repair service. The customer only has to pay for water, electricity and soap. After ten years, BSH home appliance takes back the appliance and decides what is best between repairing it and putting it back on the market, reusing some components for other machines or recycling it.

Aside from the economic and ecological dimensions, the project also has a social dimension. Indeed, they have a partnership with the social services that look for people who are financially in need. They offer to replace their old machine that is usually very energy consuming with efficient appliances. Instead of selling the machine, they propose a rental contract so it is affordable for them and allows a reduction of their water and electricity bill.

For now, it is a pilot project to see how the market reacts to it. The final goal is to develop more circular model to get out of the current linear approach.

BSH home appliance also offers appliances that are connected through the « Home connect » service as explained earlier in chapter III.4) B.3: Application for smartphone.

We can see that an initiative is taken by the producer BSH appliance to get closer to the functional service economy model. However, it is still a pilot project and the producers are not ready yet to implement it as they have to go through intermediaries (distribution network) and they lack direct contact with the customers. But are the consumers ready to switch towards this model? We will try to analyse their reaction through the qualitative analysis.

#### A.2. Analysis of the 9 axis

- Energy savings

In Belgium, the Smart Grid system is well-developed (SPF Economie, P.M.E, Classes moyennes et Energie, 2018) which is why some of the respondents already make use of an

electricity meter that applies attractive prices during off-peak hours. It allows them to launch their laundry when the electricity is the cheapest.

In general, almost everyone demonstrated interest for a washing machine that decreases their current electricity and water consumption. They may however be driven more by price incentives and by ecological convictions.

Most of the respondents consider the energy saving or the label A++ for their purchase decision.

For the application, many respondents were interested by the data analysis of their energy consumption. Laura said : « *J'aime bien le concept du savon, du lancement en fonction de l'électricité, du fait qu'elle soit adaptée à mes besoins pour consommer moins* ».

Those who already use a Smart Grid system (Vinciane, Thierry, Isabelle, Céline) weren't interested by the feature that warns you when the electricity is cheaper.

Vinciane and Dominique raised the importance of maintaining a good performance when the producer wants to decrease the energy consumption of the appliance. Gauthier highlighted that the remote access is interesting only if the electrical network is flexible : « *Je dirais le fait de pouvoir le lancer en fonction du prix de l'électricité et tout ça et donc le fait de pouvoir donner de la flexibilité au réseau. Je dis ça aussi parce que je suis dans le domaine. Au début, je pensais qu'une machine ne faisait pas la différence mais il faut savoir que tu as peut-être 1 million de lave-linge. Grâce à ça, tu peux avoir de la bonne flexibilité et je pense que de ce côté-là, il y a vraiment quelque chose à creuser* ». Thierry suggested that we combine the offer with a water heater pump in order to consume less electricity.

Generally, Belgian people seem aware of their energy consumption and are incited to decrease it because only two out of twenty provide answers without mentioning energy saving concerns.

- Innovation

The Belgians were divided regarding the application and the remote access. Most of them were not interested for different reasons. Stephanie and Sylvaine don't like the fact that the machine is connected. Vinciane would like to use the remote access but she is facing a

problem: *« J'utilise des produits liquides qui m'empêchent d'utiliser cette fonction. Parce que quand je mets le produit, il coule directement sur les vêtements et je suis obligée de lancer ma machine directement »*. Pierre is scared about sharing his information through an application, Alain already has the possibility to delay the start of his washing machine but he doesn't use it. Isabelle doesn't have a smartphone and even if she would have, she wouldn't use it as she is scared of launching a machine when she is not home. Celine also expressed that she doesn't see the added value because you still need to be there to put your clothes inside the machine and delayed start options already exist. She shares the same fear with Isabelle and wants to be there when her machine is working.

Gaetan understands that it could be trendy to have a remote access but he wouldn't use it too much as he is often home when using his machine. Laura also confessed that what she likes the least was the application because she doesn't use her phone a lot.

Yves explains that, for him, a washing machine doesn't need frequent innovation updates, so this part of the offer doesn't affect his decision. However, he likes the application part.

On the other hands, others were really interested. Lucile shared that what had the most value for her was the fact that the machine was connected. Thierry likes the remote access but thinks that we should let the people decide if they want to have an alarm regarding the Smart Grid system: *« Il faut peut-être laisser le choix aux gens, si je suis en réunion et que je n'entends pas l'alerte, cela pose problème. Vous pourriez laisser le choix, ou bien il y a une alerte et le client choisit s'il veut lancer la machine. Ou bien le client vous fait totalement confiance et la machine se lance automatiquement au meilleur moment »*. Indeed, Dominique likes the application but she wants to be able to choose when to start it : *«...si l'application offre une proposition de lancer ma machine à telle heure, je veux pouvoir avoir le dernier mot et pas qu'elle se lance automatiquement »*.

Gauthier liked the personalized service that the app can offer and Carole really liked the connectivity aspect and the fact that you always have a machine fully updated. She even said that having a connected machine is what she values the most in the offer.

To innovate further, Thierry offered to extend the application to the dryer and Gauthier thinks that we should include a service wherein the machine measures and releases the exact quantity of soap needed depending on the weight and the program chosen.

It is hard to come to a definite conclusion as it seems that everyone has a different opinion about the remote access and the application. To please everyone, the best decision could be to create different offers that can be customized depending on the customer's preferences.

- Cooperation

Only Yves and Gauthier were interested in a platform for consumers to share their advice about the product. The others who weren't interested mentioned several reasons such as they don't use the social media yet or they don't want to take the time and prefer to search on the internet directly.

Most of the respondents agreed to answer to surveys. Céline explained the importance of showing the objective of the survey and receiving feedback about the results: *«...C'est de la curiosité mais à partir du moment où on donne ton avis j'aime bien avoir des feedback sur les résultats. Il faut que je sache à quoi j'ai contribué quelles sont les statistiques et ou je me situe par rapport aux résultats»*. Only Sylvaine didn't want to participate in the survey because the results are very questionable: *«...Je ne réponds pas aux enquêtes de satisfaction en général. Cela dépend très fort comment c'est traité. Car parfois t'as des enquêtes où il y a juste des questions simplistes, donc tu perds les commentaires. Pour juste une question de traitement des données on perds les commentaires des utilisateurs»*.

Concerning the co-creation, a lot of the respondents didn't want to participate because they think that they don't have the right skills. Among those interested (6), Pierre and Gauthier explained that the collaboration should be a win-win system with rewards for participating customers. Gauthier said : *«Pour moi, je suis prêt à investir du temps mais alors il faut un retour et la bonne conscience ne suffira pas parce que je l'ai déjà à travers mon travail. Il faut donc soit avoir des produits qui sont moins chers grâce à ça, soit des réductions »*.

Mathilde was interested by the possibility of meeting the producer through to the co-creation process.

In general, it is important to think about the implementation of a real follow up for the surveys and the co-creation to show the impact of the customer intervention. Moreover, to increase the

numbers of participants, a system of incentives such as discounts mentioned by Gauthier and Pierre, has to be developed. The collaboration must be a win-win situation.

- Ecology

The ecological mindset of the Belgians is reflected in different aspects of the offer.

First, it is taken into account by some of them when buying new appliances. Indeed, Thierry and Pierre want ecological machines that consume less water and electricity while Daphné and Mathilde would like to avail eco-programs, for example ones that allow to wash everything at low temperatures.

Then, almost all respondents liked the idea of the eco-soap to further improve their ecological footprint. Daphné and Brigitte had already been looking for that kind of soap while Gilles explained that it could help him to save time all the while being environmentally friendly.

However, some nuanced their opinions. Gaetan explained that it depends on the distribution channel : *« J'en pense que ça dépend de la facilité avec laquelle on me fournit le savon. Si je dois aller le chercher à 30km de chez moi, ça ne m'intéresse pas. Si c'est quelque chose qui est livré dans ma boîte aux lettres 3 jours après que je l'aie commandé, alors oui »*. Brigitte and Dominique (57) said that the new eco-soap needed to be as efficient as the other ones and Pierre wanted to have the possibility to cancel anytime if the customer is not satisfied with the product.

Regarding the price of the soap, Céline and Gaetan would be ready to pay more if the price is reasonable and Lucile suggested that the price could be lowered compared to other eco-soap because they could benefit from scale effects.

Stéphanie and Yves said they were not interested in the product at all for different reasons. Indeed, Stéphanie already makes her eco-soap herself and Yves distrusts additional options: *« Non merci. Car dès que les fabricants proposent des extras, des offres annexes, je me dis toujours que c'est là où il se font le plus de profit donc c'est que c'est là où je peux mieux acheter ailleurs en faisant attention...»*.

Finally, some respondents also expressed that the ecological aspect is what they value the most in the offer. Vinciane liked the fact that we reuse the materials when a machine is broken, instead of throwing everything away. Brigitte added: «...ça limite la pollution, cela réduit le nombre de machines qu'on trouvera dans les conteneurs etc. C'est vraiment très bien ». Alain, Laura, Sylvaine and Thierry also said that the more important for them was the fact that the model itself was more ecological and sustainable.

To conclude, the Belgians seem sensitive to ecological features. They particularly like the functional service economy model itself, the furniture of an ecological washing machine and the possibility to avail an eco-soap option.

- Price sensitivity

3 interviewees mentioned the price as an important criterion when buying a new machine. 14 of them said that price could be an obstacle to subscribe to the offer.

On one hand, some respondents are not ready to pay more for the service. Indeed, Daphné would like to pay the same amount as what she currently pays for her washing machine. Dominique would subscribe if it is cheaper and offers the same performance as her current washing machine. Vinciane explains that now that her children are not living in her house anymore, she is using her washing machine less so she would like to minimize the costs as well. She said : « ...Le prix que vous allez demander m'importe, surtout si je n'utilise plus très souvent ma machine. Quand je l'utilisais tous les jours, cela aurait été justifié mais maintenant que je l'utilise moins, je suis prête à payer moins ». Pierre, among others, said that the price has to be reasonable: « Le point potentiellement négatif c'est : « Quel est le coût? » Si on doit payer 5 fois le prix, on n'adhèrera pas ».

On the other hand, 7 respondents (Thierry, Alain, Céline, Daphné, Gauthier, Gilles and Carole) accepted to pay a little bit more for several reasons. Daphné and Gauthier mentioned the importance of paying more for a good additional service. Carole, Thierry and Brigitte highlighted that the price must be competitive, which can be difficult. Brigitte made a suggestion to convince customers : « Pour le prix, je trouve que l'appli devrait faire les

*calculs pour démontrer que le client y gagne. En effet, il y a pas mal de paramètres à prendre en compte (prix et qualité de la machines ainsi que ses fonctionnalités et sa durée de vie plus le prix de ses réparations éventuelles; prix des produits de lessive en tenant compte de la quantité utilisée qui est sûrement excessive chez beaucoup de personnes. Economies d'électricité...) ».* Indeed, as it can remain a bit more expensive, we have to show to consumers the ecological impact and the added value of the offer to justify the premium. The future return on investment by energy savings has to be highlighted as well.

Then other respondents questioned the profitability of the model. Indeed, when we asked the respondents to give an estimation of the price, they directly made their calculation with a comparison of the expense required for a new washing machine. As explained by Gaetan, the monthly price has to be very low (10-15 euros per month): *«Une machine à laver je la paie 500 euros, du coup si ton abonnement c'est 10euros/mois, tu vas vite payer cher. En quelques années tu as déjà couvert le prix que tu aurais payé pour une nouvelle machine. Je dirais aux alentours de 10-15 euros, pas plus parce que sinon tu dépasses vite le montant de ce que tu dépenses pour une machine à laver».*

Yves explained that we need to evaluate the price considering different situations, for example by comparing with the price of the laundrette: *« Si on prend une situation où je fais 3 pressings par semaine, 1 pressing c'est entre 7 & 10 euros, je dépenserais donc 30 euros par semaine, 120 euros par mois, 1400 euros par an et ça me paraît beaucoup. Donc ce qui faudrait ce serait un prix un peu supérieur au coût mensuel de l'achat d'une machine et un prix inférieur à celui du pressing ».*

Moreover, the profitability of the model on the long term is questionable and the option of becoming the owner at the end of the contract has to be well thought out. Indeed, Lucile said : *«Moi, ce que je ne comprends pas bien c'est qu'au final c'est si il y a pas d'options d'achats à la fin, financièrement c'est pas très intéressant pour la personne qui loue la machine».* And Daphné questioned the viability of the model for the producer. She said : *« C'est assez intéressant, ce qui me fait un peu peur c'est la durée dans le temps. Il faut que l'entreprise soit viable dans le temps. Une machine ça dure 5-6 ans donc c'est intéressant si ça dépasse 5-6 ans ».* It shows the importance of a sustainable model with long-term objectives.

Gauthier, expert in energy, thinks that the financial model has to be well-developed and he offered a solution to raise the profitability of the model, called the Energy Pool: *«... leur idée c'est d'avoir une centaine de gros consommateurs (comme des PME) et s'ils ont besoin, ils*

*peuvent diminuer leur consommation pendant une heure par exemple. Cela permet d'être payé assez cher par le réseau. Si vous vendez un service comme ça et que vous avez 100.000 clients en Belgique, vous aurez la possibilité de vendre ce service-là au réseau. C'est le genre de service qui vous permettrait de diminuer le coût de votre service pour le consommateur ou même de donner des primes au consommateur qui voudrait être flexible et cela pourrait augmenter votre profitabilité ».*

It seems to be clear that the price sensitivity of our Belgian respondents is high, but some of them are ready to pay more if it is well-justified. This highlights the importance of a well-developed quantitative analysis.

- Contract management & Legal aspects

Only 7 respondents mentioned ideas and opinions regarding legal aspects and contract management. Brigitte, among others, put emphasis on the flexibility of the offer. For example, people who stay only six months in one place, should be able to limit their subscription to 6 months.

Pierre, Gilles, Dominique and Mathilde raised the issue of data confidentiality concerning the use of the application. Pierre explained : « ...*Tout dépend de ce que vous faites de toutes les données. On voit qu'avec le développement de Facebook, Google etc. Mon sentiment n'est pas paranoïa parce que le terrain l'a montré. Si l'application ne sert qu'à nous conseiller et qu'il n'y a aucune utilisation autre que d'aider le consommateur et éventuellement de prendre des données pour améliorer les machines, j'ai pas de problème. Le problème avec toutes ces applications c'est qu'on te demande d'avoir accès à tes contacts, à ta localisation etc. Honnêtement je ne vois pas l'intérêt* ».

Gauthier explained that an evolution of the legal system is needed in order to support this new model. As mentioned by du Tertre (s.d.) in the theoretical part earlier, in order to insert a new model, a real support from the politics and legal authorities is needed.

In conclusion, it is clear that some consumers are worried about the use of their data. Therefore, in the application, the data policy has to be transparent to improve the trust relationship with the customers.

- Repair

In general, a lot of respondents were interested by the after-sales service available 24 hours a day, 7 days a week. Some of them mentioned the use of a warranty extension, which shows that they are willing to pay for a service that ensures maintenance and repair instead of managing that aspect by themselves. Indeed, Vinciane mentioned that it is costly and takes time.

Others like Gaetan, Lucile, Céline and Laura enjoy being able to handle the repair themselves. Gaetan made a suggestion about the availability of the pieces: *«...Personnellement ce qui m'intéresse c'est qu'on m'offre les pièces pour réparer mais je paie moins parce que ce n'est pas quelqu'un qui vient chez moi pour réparer »*. Laura said she would repair by herself with the help of the application analysis.

In contrast, Céline wasn't interest by a repair service : *« Pour moi l'aspect réparations et innovations en ligne n'a pas grande importance. Je n'ai jamais eu besoin d'assistance pour mes machines. Pour moi l'assistance n'est pas un critère qui me séduit »*.

In conclusion, designing a machine with easily replaceable components seems imperative. Indeed, it is as important for the consumers who want to take the time to repair it by themselves than for the person in charge of the maintenance of the product.

- Consumers' expectations

When the respondents gave their opinions about the offer, five respondents (Vinciane, Thierry, Alain, Gauthier and Brigitte) agreed that it is a way to fight against obsolescence. Moreover, Pierre mentioned that we need to think about the recycling of the products : *« il faut que les machines soit adaptées contre l'obsolescence parce que sinon le fournisseur de service va devoir changer la machine tous les 5 ans et qu'est-ce qu'elle devient après? Si on continue à consommer comme ça alors ça devient dangereux. Il faut donc prévoir un parcours de recyclage des machines pour être sûr »*. Laura explained that we will see the

impact only in the long term. However Yves, Laura and Carole doubted the existence of a real planned obsolescence because they have never experienced it. Carole, for instance, said : « *Pour l'instant, mon investissement tient mais je sais que le jour où j'ai une pièce qui pète alors, là oui je risque de devoir la changer. Donc avant de dire obsolescence, pour moi ce n'est pas acquis* ». Yves wasn't convinced because he has confidence in the brand of his appliance. He said : « *...Dans tous les cas, j'ai confiance en la marque que j'ai AEG, une marque allemande où ces appareils tiennent je pense pour 15 ans* ».

Concerning a practical aspect: Thierry and Carole highlighted the importance of cleaning the appliance if it had been previously used by other consumers. Carole explained : « *Je pense aussi qu'il faut mettre en avant la question de l'assainissement. Car des personnes n'aiment pas aller au lavoir car ils trouvent que ce n'est pas propre. Donc il faudrait faire attention au fait que la machine passe d'une maison à l'autre, il faudrait argumenter sur la propreté* ».

Regarding the purchase criterion, the energy consumption of the appliance is the most cited by the respondents. It is clear that since it is controlled by the legislation, the consumers are accustomed to it. Then comes the longevity of the appliance, having programs adapted, the volume and the capacity of the appliance, the price, the quality, the efficiency, the robustness and the possibility to program the appliance. Vinciane and Gauthier suggested having the dryer included as an option. Only Yves mentioned the current discount and Gilles commented on the warranty and after-sales service.

The respondents enjoy a variety of programs with their current washing machine the variety of program, the differed start of their machine and a volume adapted to their needs. The most cited factor of dissatisfaction with their current appliance is the quality of the laundry and the need for a faster program. Then comes the noise and the complexity of the options. Gauthier explained that our offer needs to be simple : « *Il ne faut pas faire quelque chose de trop compliqué. C'est intéressant d'avoir des services en plus mais ça reste qu'une machine à laver ne coûte pas trop cher pour les personnes. Permettre d'avoir un service personnalisé est très intéressant. Par exemple pouvoir avoir un mode peau sensible ou habits clairs* ».

In conclusion, it is important to take into account the main consumer expectations. In our offer, the point about fighting against planned obsolescence is questionable. Some consumers are very confident in their brand and if they've never experienced damage to their appliances, they don't clearly see the use in the offer. However, as mentioned by Laura and Pierre, our

offer may contribute to reduce planned obsolescence in the long-term, with the reuse and recycling of components.

Moreover, in our offer for the Belgians, we need to provide clean washing machines, even if they are second-hand appliances. The consumers expect an energy-efficient appliance at a good price. The quality of the laundry and the duration of the program are the main points that could be improved according to them.

- Feeling regarding the property

When we asked if it was important to become the owner of his washing machine, a lot of respondents answered that it wasn't if the appliance stays at home and they can use it when they want. Others mentioned that it removes the responsibility toward the product as Gauthier explained : *« Un dernier point, le fait que la machine ne nous appartienne pas et donc on ne doit pas se charger de l'entretien. Je crois que c'est un excellent argument parce que beaucoup de personnes veulent juste avoir un service et s'en foutent d'être propriétaire d'un lave-linge. C'est encore plus intéressant pour les personnes qui partagent une machine parce que comme ça personne n'a de responsabilité ».*

Yves insisted on the fact that he could share his machine with other people: *« ...Partager la propriété ça je pourrais. Je ne vois pas l'utilité de payer un abonnement à l'usage si c'est juste pour moi...Je suis prêt à faire un partage de propriété pour que le bien soit accessible à tous. Je partage déjà ma voiture quand je suis en vacances à qui le veut ».* It shows that the model has to stay accessible for everybody who desires to use it. And Sylvaine highlighted that the service provided has to be efficient: *« ... A partir du moment où tu peux savoir quand elle tombe en panne, un remplacement de la pièce rapide, c'est bon ».*

Only Stéphanie, Lucile Gaétan, Isabelle and Thierry wanted to own the product. Gaetan was more interested by the after-sales service, he stated : *«...Je serais plutôt pour le même système mais où tu as vraiment ta machine à toi, tu l'achètes et puis tu paies des extensions de garantie tous les deux ans par exemple pour continuer à avoir ce service ».* Stéphanie and Thierry said they would need to adapt their way of living and at this point, they are not ready to do so. Thierry explained that paying a price justifies right to the property and he wants to have the choice : *Mais dans ma conception des choses, j'aime bien avoir ce qui est à moi. J'ai envie de choisir le modèle qui me convient le mieux. Que je la garde 5 ans ou que je la garde*

*20 ans, elle est à moi et j'ai payé une fois le prix.* Isabelle and Lucile explained that they prefer to be the owner because they use it with care and do their best to keep it as long as possible.

All these opinions show that our offer has to be flexible according to the specific customers' needs. Interviewees don't mind hiring the machine instead of owning it if they can access it whenever they want.

## B) Canada

### B.1. General state

In Canada, the household appliance market is at a mature stage and the sales stream is mainly to replace existing washing machines or dryers. Regarding the preferences of the consumers, convenience is an important driver. Indeed the format of the washing machine is different from Europe. Before the 2000s it was mainly top-loading machine after that, the frontal ones became popular and many consumers decided to switch to this type of model as they think it washes their clothes better and is worth the extra investment (Euromonitor, 2017b).

Even if Canada is one of the biggest global consumers in energy, there are many pro-environmental organisms and various initiatives in Québec. For instance, Equiterre is one of the most influential, their mission is to provide concrete solutions to accelerate the transition towards a society where people make fair, healthy and ecological choices (Equiterre, 2010). In May 2018, they published the first Pan Canadian study on planned obsolescence and the Canadian consumers' behavior of fast replacement of electrical and household appliance. The main insight derived from this study was that the responsibility of planned obsolescence comes from producers but also from the consumers. Indeed, from the survey on 2202 Canadians, only 19% take the time to repair their household appliances, 80% buy new appliances. The study called to increase the reuse policy in Canada and to change the consumers' habit of excessive purchase.

Aside from this, platforms for renting household appliances already exists. In Québec, one of the pioneers is Electroloc (Electroloc, 2017). They offer different formulas to rent washing machines, dryers, refrigerators and ovens, all with with the delivery, the setting-up and the

warranty for deterioration of components included. Moreover, the rental of domestic appliances isn't new in Québec. With HydroSolution, Canadians can lease their water heater (Hydrosolution, n.d ).

## B.2. Analysis of the 9 axis

- Energy savings

Due to the high availability of water in Canada, it is the second biggest producer of hydroelectricity in the world. The renewable energy sector in Canada represents 65% of the total production in electricity. Moreover, the consumption of electricity is high because Canada is one of the countries with the lowest price of electricity, especially in Quebec where the production of hydroelectricity represents 95,5 % of primary energy production (Gouvernement du Canada, 2018). HydroQuébec is in charge of the transport and distribution of electricity in Quebec (Régie de l'énergie du Québec, n.d ). This explains why during our interviews, few Canadians were interested in the possibility to reduce their energy consumption.

Out of 20, only four Canadians (Annie, Antoniette, Lianne and Elisabeth) mentioned the energy saving in their criterias when buying a new appliance. Furthermore, only two (Lianne and Tudor) raised the energy savings to the question: « *Qu'aimez-vous à propos de votre machine à laver actuelle? Qu'est-ce qui pourrait être amélioré?* ». Tudor said that his current washing machine consumes too much energy and Lianne explained that her current washing-machine consumes little water.

Louis-Philippe Karine and Line weren't convinced that our offer would lead to economies in energy. Louis-Philippe said : « *Pour ce qui est la réduction de la consommation d'eau je ne pense pas qu'il y aura une grosse différence : Car au Québec, la consommation d'eau n'est pas tarifée, pour les personnes soucieuses de l'environnement peut-être et encore* ».

Indeed, the Smart Grid system isn't developed in Canada. As Joëlle said when she gave her opinion about the app : « *Mais au Québec pour le moment il n'y a pas de différence de prix de l'électricité selon le moment de la journée* ». Indeed, we found that HydroQuébec confirms this information on their website (HydroQuébec, 2016).

Moreover, HydroQuébec tries to encourage users to pay more attention to their consumption (HydroQuébec, n.d) . As mentioned by Line to the question : « *Que pensez-vous de cette offre ?* ». She said : « *Mais ce n'est pas pour ça que je ne fais pas attention à ma consommation d'eau. HydroQuébec nous dit de le faire je le fais* ». Karine also said when she gave her opinion about the app : « *Pour ce qui est d'épargner de l'énergie je ne suis pas sûre c'est peut-être parce que j'ai déjà des pratiques aussi. Tsé d'économiser de l'énergie : Je lave à froid, j'utilise le cycle qui est le plus économique mais ça c'est parce qu'on paie HydroQuébec donc à cause de ça je fais attention* ». Both respondents wanted to reduce their energy consumption mainly for financial reasons, as it could lower their costs

Nevertheless, 6 Canadians (Maïra, Annie, Jérôme, Louis-Philippe, Ivana and Michel) showed interest regarding the feature that allows you to measure the electricity and water consumption. Particularly, Jérôme mentioned the opportunity to maximize the use of already produced electricity : « *Avec HydroQuébec, il y a des pics d'électricité qui font que parfois on en a trop, ça pourrait être intéressant d'informer les gens sur ces pics pour éviter de la perdre et éviter d'autres pics...* ».

In conclusion, due to the high availability of energy in this region, people aren't very sensitive to this topic.

- Innovation

Towards our offer in general, some interviewees (Nadir, Tudor, Joëlle, Antoniette) mentioned that this system of monthly subscription isn't new in Québec. Indeed, with HydroSolution Canadians can hire their water heater (Hydrosolution, n.d ). Nadir noted that the risk is taken into consideration. If the water heater breaks down, it puts the customer into a critical situation whereas a problem with a washing machine can be easily solved by going to a launderette. That is why a system of hired water heater seems, according to him, more attractive than a monthly subscription for the washing machine because the level of risk is high and having reliable maintenance support is very reassuring. The existence of a HydroSolution system for the water heater could explain why some Canadians were reluctant regarding the offer of a monthly subscription for the washing machine.

The application was a success among the Canadian people. Many of the respondents liked the advice that the application can give (about the energy consumption and the use) and the alarm when a component has to be repaired or replaced.

Only four (Nadir, Line, Tudor and Prescillia) responded negatively towards the application. One reason cited by Line, (55) was that the old generation doesn't like the connectivity:

*«Ce n'est pas mon mode de vie actuel mais je ne te dis pas que la nouvelle génération d'aujourd'hui n'acceptera pas ça cependant. Moi la technologie je suis en retard et cela ne m'intéresse pas du tout»*. Another reason was the utility of the application, Tudor said : *«C'est joli comme gadget, c'est très cool mais je ne l'utiliserais pas et ce n'est pas nécessaire selon moi»*. Nadir highlighted the importance of keeping the simplest appliance as possible when he answered to the question : *«Qu'aimez-vous à propos de votre machine à laver actuelle? Qu'est-ce qui pourrait être amélioré?»* *« Elle est simple- Elle ne coûte pas cher – Elle fait le boulot. Je ne sais pas si tu sais mais au Canada les machines elles sont beaucoup moins high-tech. Elles sont beaucoup plus simples, il y a moins de modes, elles ne chauffent pas l'eau elle-même ce qui fait une grosse différence »*.

Antoniette believes that with the current technology of today, this feature isn't possible. This reaction illustrates that sometimes people are not aware of the possibilities available to them through technology.

Some interviewees (Alex, Michel, Annie, Jérôme, Louis-Philippe and Nadir) didn't recognize the added value of launching the appliance by distance, because they have to put the laundry inside the washing machine before starting it while others (Joëlle, Karine, Jean-Renée) said that it is useful because you can program your machine.

- Cooperation

When we asked this question : *« Jusqu'à quel point aimeriez-vous prendre part au processus de production de votre machine à laver (de répondre à une enquête jusqu'à co-crée le produit avec le fabricant)?»*. Among our respondents, many agreed to answer to annual survey but didn't want to participate in co-creation events. Several reasons were mentioned: They think that they don't have the right skills, their opinion won't be taken into account, they are not interested in washing-machine production, they don't have the time or they doubt of a real possibility of innovation in this sector. Jean-Renée said : *« La co-créeation je n'ai*

*vraiment pas d'intérêt dans ce domaine, surtout que je pense qu'il n'y a pas beaucoup d'innovations dans les machines ».*

For the surveys, Joëlle raised the importance of a constructive collective opinion when consumers and producers co-create : « ...le problème c'est qu'ils disent cela dans une optique individuelle et non pas de société. C'est un peu comme moi j'aime mieux bleu et l'autre vert. Ce n'est pas nécessairement constructif. C'est pour ça que je me dis que mon opinion à moi n'est pas nécessairement importante et représentative. C'est pour ça que je préfère laisser les enquêtes et les études faire le travail qui sont spécialisés là-dedans».

Karine mentioned that the surveys shouldn't occur frequently because we are too often asked to answer surveys. Dominique (31) and Maïra raised the importance of incentives and rewards when answering surveys or participating in co-creation. Maïra explained : « Et j'ai déjà participé à un focus group : Les gens nous regardent derrière un miroir et on devait parler sur un nouveau concept d'habitation. C'était rémunéré. Sinon je fais des enquêtes en ligne et on peut gagner des points».

On the other hand, those who are interested by co-creation events mentioned different reasons. Dominique (55) explained that as an engineer, he would like to participate. Maïra is interested because she already has experience with this topic. Karine also raised that, with the co-creation, meeting the producer is interesting and Ivana said that if the co-creation takes place near her, it is okay.

In conclusion, the co-creation seems relatively new and only a few know what it exactly means. That is why to make it more accessible we could think of a reward and incentive system for customers who participate in co-creation or surveys.

- Ecology

During the interview, some respondents demonstrated their ecological awareness. Dominique (55) explained that he is aware that in North America there is a lot of waste. Maïra liked the idea of reducing waste in our offer, Ivana mentioned the circular economy, Joëlle raised that she likes the shared-economy and Antoniette explained that she encourages her colleagues to recycle everything. Karine mentioned that in Montréal, it is very common to inherit the washing machine from the past tenants: «...C'est tellement facile de se procurer une machine

*à laver ici. Les gens donnent facilement les électroménagers aux futurs locataires. Ça se transmet très facilement».*

When we explained the option of ecological soap, most of the respondents were interested but the premium that they will pay has to be justified. Indeed, some already buy ecological soap in the pharmacy, therefore they need to be convinced to switch. Moreover, some brought up the point that if we provide soap, the price should be low because of the big volume of purchase by the seller of the offer.

Moreover, Dominique (55) drew attention to an authentic certification of soap. He explained : *« ...Car je veux avoir la preuve et pas seulement le logo sur le papier du produit biologique. Car il y a plein de tromperies quand les producteurs affichent de la certification. Je travaille dans l'écologie donc oui j'y crois mais non aux supercheries. Mais par exemple l'idée me plaît si on m'explique pourquoi le savon est écologique ».*

Others said that it can limit the freedom of choice of the consumers. For instance, Mike loves brands therefore he still wants to choose the brand of his soap. He suggested to have the choice between several soaps in our offer.

Lisanne and Joëlle noticed that it is a good idea but the consumption of soap can differ over time. That is why a possibility of buying a bottle of soap only once is maybe better than a supply of soap by period.

Others suggestions also appeared: Louis-Philippe proposed a system where the quantity of soap is automatically controlled by the machine depending on the amount of laundry loaded inside. Elisabeth found that it could be interesting to have a free trial period so the consumers can judge by themselves the efficiency of the soap. Jérôme suggested that we reuse the bottle when the soap is provided.

In conclusion, through this analysis, we discovered that the Canadian consumers make their purchase decisions based on the price and the justification for a premium. Canadians seem more price-driven, the ecological purpose remains secondary in their purchase decision. Moreover, the suggestions show that the Canadian users still want to have a choice and the offer has to be flexible towards their needs (quantity of soap, the type,...).

- Price sensitivity

Price is the predominant factor to decision-making among the Canadian people. Almost everybody during their purchase decision pays attention to the quality-price ratio. Maira explained that she prefers second-hand products because they are cheaper and easy to procure: « *Mon colloque a acheté une machine usagée, on a fait attention au budget, on ne pouvait dépasser un certain montant* ». Other people, like Jean-Renée, prefer buying products to be able to resell them later : « *Ben ça m'intéresse bof car vu ma situation actuelle, je préfère acheter ma machine à un prix bas, genre 300 dollars, c'est vraiment facile d'en avoir à ce prix-là. Puis je n'ai jamais de problème avec les machines, elles durent 8-9 ans. Et je préfère l'acheter pour après avoir une valeur de revente*».

As said earlier, even if there are some ecological reasons, the offer must have an attractive price. The offer could also be flexible as illustrated by Dominique (55) when he gave his opinion: « *...Je serais intéressé de savoir quel serait le prix au contrat avec maintenance ou sans maintenance.* » Elisabeth would like to have the choice between different level of price : « *... Je pense aussi à la possibilité de choisir entre trois modèles de location : de la base – intermédiaire – haute gamme, je pense que ça serait bien adapté aux besoins de chaque personne. Trois niveaux de prix selon trois modèles, j'aimerais ça car j'aime ça choisir* ». These two answers show that the respondents prioritize having the choice and the flexibility in the offer.

Moreover, the system of monthly payment can be a real obstacle for consumers because it is a new way of managing expenses. Line explained that she doesn't want to owe money to people: « *Nous avec mon conjoint, on a toujours payé nos affaires tout de suite. Tout ce qu'on a dans la maison, on ne doit rien à personne. La mentalité que j'ai c'est: "si j'ai l'argent tu te le paies"* ». Moreover, it is an additional incentive to stay the owner of the product if this option is less expensive. Nadir mentioned also the existence of a bias that can explain why people prefer to buy directly in one time their products : « *Mais ce qui est très étonnant avec les consommateurs c'est qu'ils ont souvent l'impression que s'ils paient la somme totale au début ce sera moins cher qu'une mensualité ce qui étonnamment n'est pas toujours le cas* ».

But the possibility of paying little amount each month can be an advantage as illustrated by Nadir: « *...Mais c'est bien que tu ne doives pas sortir autant de dollars d'un coup. Faudrait vraiment que ce soit beaucoup plus cher pour que je ne le prenne pas là* ».

What will be the profitability of our offer for a 10 years subscription? Is it really profitable to keep renting? This point raised by Annie has to be taken into account in the elaboration of the offer. Nadir also doubted the profitability of this model for the producer. He proposed an alternative : *« Tu sais ce que tu devrais faire à la place : Le taux d'utilisation d'une machine, il est faible, c'est genre 3 brassées par semaine qui prennent probablement 3h. C'est super faible, donc faites un service de lavage vous allez chercher les vêtements et puis vous les lavez : Vous économiser l'espace- le plombier – L'eau. Ça je serai prêt à payer une prime pour ça ».*

In conclusion, a quantitative analysis to measure the real price per month for the consumers is necessary. We deduce that the price has to be justified and flexible to give to the users a certain freedom of choice.

- Contract Management and Legal aspects

When we explained the offer about a connected washing machine, Joëlle, among others, explicitly mentioned the security of the data: *« Ça me fait un peu peur la connexion. Les données que la machine pourrait récupérer, ce serait un moyen de savoir quand est-ce que je ne suis pas à la maison etc. Au Canada, il y a une attaque informatique des sites gouvernementaux et l'attaque a été lancée via des frigos connectés et ce genre d'appareils, c'est juste parce que ce n'était pas suffisamment protégé. Donc oui c'est une bonne idée mais il faudrait que la sécurité soit là. Je trouve ça bien que l'entreprise puisse se connecter à l'appareil afin de voir les défauts ou afin de nous conseiller sur les chargements, les cycles, des rappels sur l'autonettoyant. »*

Concerning the application and the possibility to launch it by distance, the respondents questioned the role of insurance. Line explained the insurance policies in Canada : *« Au niveau des assurances on est supposé de fermer les valves d'eaux après chaque lavage et aussi on est supposé d'être là à la maison pendant chaque lavage. Du coup il faudrait voir au niveau des assurances cela va impliquer quoi. Moi j'ai déjà eu des dégâts d'eau et heureusement j'étais à la maison donc les assurances nous ont remboursés mais si je n'étais pas à la maison, les assurances nous auraient pas remboursés ».* This legal point has to be taken into account if one day, this application feature is launched.

Concerning the contract several points were raised by the interviewees. Dominique (55) explained that they could offer two prices: one with maintenance and the other without, because if the washing machine is very reliable maybe maintenance isn't necessary. Then, the contract has to be very flexible, as Maïra explained when she mentioned what would restrain her from subscribing: «*La flexibilité du contrat : Je ne voudrais peut-être pas m'engager pour toute une année*». Therefore a balance has to be reached between a very flexible contract and an realistic minimum length. Moreover, Annie, among others, questioned the profitability of the contract for a long period such as 10 years: «*...le fait de la louer pendant 10 ans je ne pense pas que ce soit avantageux* ».

In conclusion, on one side the offer has to be in order with the legislation of Québec, on the other side, a very flexible and realistic contract has to be settled.

- Repair

When the respondents gave their opinion about the offer, they directly highlighted that a good after-sales service covering the repair is very useful for them. First, it removes worries as mentioned by Prescillia : «*La partie la plus intéressante, c'est le service après-vente, ça fait un souci en moins* ». Moreover, as raised by Dominique (55), the after-sales service has to be efficient and the producer needs to conform to the customers expectations: «*Quand on est propriétaire d'une machine on peut tolérer un petit bri mécanique en attendant de la faire réparer pour de bon. Le consommateur est donc intéressé à la réparer le plus tard possible. Si c'est le producteur ou fournisseur qui offre le service clés en main, l'intérêt d'offrir un service au point est aux mains du locataire et ça c'est parfait.* ». The after-sales must also be fast mentioned Elisabeth: «*Mais je voudrais m'assurer d'un bon service clientèle. Ça c'est sûr, car si ta machine a un problème tu veux vraiment que ce soit rapido* ».

Moreover, among the respondents, nobody seems to take care of the repair by themselves. Joëlle explained that she doesn't know anything about repairing appliances: «*C'est vraiment une bonne idée. C'est vraiment compliqué quand les pièces se brisent. Ici la machine a brisé et ça a été vraiment compliqué et on a dû la remplacer. On est très néophytes quand il faut réparer la machine et on n'y connaît rien.* » Others like Jérôme or Michel, mentioned that most of the time, replacing the component is more expensive than buying a new washing

machine. Michel said : « *Le produit pourrait être plus durable. Quand les pièces brisent on achète une nouvelle machine car ça coûte trop cher de racheter des nouvelles pièces* ».

Although, Antoniette suggested to pay separately for the after-sales service, it shows that there is real interest to externalise the maintenance of the appliance: « *Moi j'aime la technologie et j'aime l'environnement. Moi je suis prête à acheter tout ce que vous avez dit, mais je préfère acheter un service, je pense que c'est encore mieux plutôt que de le louer à x par mois. Le système d'abonnement ne m'intéresse pas mais je suis prête à acheter tout ce service-là* ».

In conclusion, we discover that Canadians don't want to take the time to repair their machine by themselves. The after-sales service has to be quick and efficient.

- Consumers' expectations

Even if the respondents reacted positively regarding our offer, only Ivana, Alex, Tudor and Dominique (55) agreed that our offer can limit the planned obsolescence. Other respondents were more skeptical regarding this argument. Dominique (31) questioned the power of the producer to influence the whole sector of the home appliances: « *Je voudrais juste vous dire que votre offre n'est pas applicable à tout le monde. Je ne sais pas à quel point votre offre pourrait influencer l'obsolescence programmé de tout le secteur des électroménagers. Je ne sais pas à quel point le producteur pourrait influencer le design des machines à laver* ». It shows that saying that it can limit the planned obsolescence has to be nuanced. Indeed, we think that by implementing this offer, reusing components and providing maintenance support can prolong the appliance's lifespan as much as possible, and therefore limit the planned obsolescence in the long-term, but it is clear that the lifespan of these appliance isn't infinite and the recycling has to be thought out.

Also, it is interesting to note that the models sold in North America are different from those sold in Europe. In Québec, the majority of washing machines are with a vertical loading instead of a frontal loading and they are generally bigger than in Europe. Nadir also said that canadian machines are more simple: « *Je ne sais pas si tu sais mais au Canada les machines elles sont beaucoup moins high-tech. Elles sont beaucoup plus simples, il y a moins de mode, elles ne chauffent pas l'eau elle-même ce qui fait une grosse différence* ».

Joëlle explained that the choice is limited and she is drawn towards offers with a washer and a dryer included in one machine: *«...au Québec on a pas accès aux mêmes modèles. Par exemple au Maroc on avait vu une petite machine à laver qui lavait et séchait les vêtements, elle n'était pas très grande et c'était génial. Mais en même temps tu ne savais pas faire des grosses brassées, tu sais juste laver un drap à la fois. Mais c'est quand même bien et pratique pour un chalet».*

That is why, among the criteria of purchase cited by the respondents (price - quality - the reviews - the branding - the efficiency - the performance - the energy saving - the capacity - a frontal - the reliability), having a frontal machine seems important. Indeed, Prescillia explained : *« J'avais acheté une machine à laver frontale, c'était très pratique .... Elles sont violentes sur le linge, je n'aime pas les machines à chargement horizontale ».*

Moreover, the space covered by the machine can be an obstacle for switching towards a new offer, as illustrated by Dominique (31) : *« Moi je ne serai pas partant pour ce système car j'ai déjà ma machine à laver X qui est dans les bonnes dimensions. Je ne vais pas m'amuser à la remplacer juste pour ça ».* When we asked Alex what would restrain him from subscribing, he answered: *« L'espace ! Je n'ai pas assez de place chez moi. En ce moment je suis étudiant, mon appartement est vraiment petit donc je n'aurais pas la place pour une laveuse ou une sécheuse ».*

Regarding the offer, the fact that it can be a reused washing machine could restrain the consumers. As mentioned by Joëlle, she likes the fact that her washing machine is self-cleaned. Therefore it shows that even if the washing machines offered are reused by other users later, they have to be cleaned.

Another point is that the current situation of the respondents could pose an obstacle to a new offer. Indeed, the offer seems more attractive for people that live in a flat on the short-term basis than for people who are owners of a house. Louis-Philippe, among others said : *« Moi je serais intéressé si j'avais à déménager dans un appart, ce serait pratique d'avoir ce système d'abonnement. Si j'achetais une maison je serais plus intéressé à avoir une machine qui m'appartient. Dans un appart, ça serait moins d'argent à déboursier d'un seul coup ».* Some mentioned that depending on the situation, if there are relatively satisfied with their washing machine they don't want to switch towards a new model.

In conclusion, in Canada, what consumers prioritize having a frontal washing machine adapted to the available space, with programs adapted to their needs. They want an appliance, not too noisy, energy-efficient, fast, clean and relatively simple; saying that it can fight against planned obsolescence isn't compelling. Moreover, we need to be careful when targeting the consumers because depending on their situations, some might be more interested than others.

- Feeling regarding the property

When we asked the respondents if it was important for them to be the owner of their appliance, the majority of the Canadians said that it doesn't matter to them. Karine, Jean-Renée, Ivana, Elisabeth and Alex said that they want their appliance to be at home. For instance, Ivana explained : « *Non. Comme elle est chez moi, c'est quasi comme si je l'avais. Je suis contente d'en avoir une chez moi, c'est confortable et je peux l'utiliser quand je veux et c'est vraiment plus simple* ». Dominique (55) and Jérôme explained that they don't have an emotional bond with their washing machine, therefore owning it isn't important. Karine, member of a car sharing system called "Car to Go", explained that she is accustomed to the rental model principle and therefore it doesn't bother her.

Only 5 out of 20 mentioned that being the owner is important to them. Louis-Philippe said that it gives him a feeling of safety while Tudor and Line mentioned that they aren't ready to change their habits. Finally, as explained by Line and Antoniette earlier, the price could be an incentive to remain the owner of the product, as mentioned in the price sensitivity axis.

As a conclusion, we can say that Canadians are open to a new model that makes them reconsider the notion of property.

One fact that can explain this trend is that in Montréal, many people (44,8 %) are still renting their house and 55,2 % are homeowners (Communauté Métropolitaine de Montréal, 2018 ). Moreover, they experience other rental models for their car or their water heater, as mentioned earlier.

## C) Philippines

### C.1. General state

The GDP per capita is lower in the Philippines than in Belgium and Canada. However, in 2017, Philippines' economy grew and became the third growth performer of the region after Vietnam and China (The World Bank, 2018). This economic growth results in a bigger buying power which leads to an increase in the sales of the household appliances sector (Euromonitor International, 2017a).

Most of the washing machines sold in the Philippines are semi-automatic. Filipinos value them for their practicality and low prices. However, automatic washing machines attract an increasing number of consumers living in condominiums or apartments even if most Filipinos still can't afford automatic machines. Whatever the machine, it is crucial to stay price competitive in this market as the Filipinos are very price-sensitive (Euromonitor International, 2018b).

### C.2. Analysis of the 9 axis

- Energy savings

Most of Filipinos consider energy savings as an important criterion when it comes to washing machines. Some of them emphasized this even before the proposition of the offer, when we asked them: *«What are the features that you value when buying a new washing machine?»* or *«What could be improved on your actual washing machine?»*. Wincel, Bem, Emelyn, Rodavil and Nathalie said they would like a washing machine that doesn't consume too much electricity and water.

Then, most of them reacted positively to the feature that allows you to measure the consumption of water and electricity of each load while notifying you of the best time to launch your laundry using the Smart Grid system. Odeon explained why it is important for him *« I also like the fact that you can measure your energy consumption because I could save money and pay attention about the environment at the same time »*. Bem, Micah and Aloysius liked this feature mainly because it would help them reduce and forecast their costs.

Only Irwin expressed clearly that the consumption wasn't particularly important to him.

Later, at the end of the interview, we asked them: «*In the whole offer, what is the feature that you value the most?* ». Emelyn responded: «*the monitoring of electricity and at the same time the fact that the machine is saving electricity and water that is the most important for me* ». Alma, Hazel, Nathalie and Cyrille also expressed either saving or monitoring electricity and water as one of the most valuable feature in the offer.

Rodavil went further in telling explaining that high consumption of water and electricity would dissuade her from subscribing. This could be shown through different labels.

Moreover, Emelyn brought up the fact that the energy should come from sustainable resources: «*I would like also if the water can be rain water and my electricity can be solar. That would be amazing, no?* »

All those reactions could be influenced by the fact that the price of electricity in the Philippines is one of the highest in South-East Asia (Department of Energy Philippines, 2017). Nathalie also explained: «*Filipinos can't track their consumption of water and electricity. If you can offer that, and they can see their level of consumption with your unit, then they might shift to a washing machine for rent* ».. As this is a completely new concept in the Philippines, we could consider it as a competitive advantage.

- Innovation

The application allows different innovations that are valued by most Filipinos. Bem believes that anything innovative is worth trying, Micah is compelled by the positive impacts of high-end technology and Christine stated: «*It is so high tech. I believe that kind of technology is possible so why not? Why not use it now?* »

Hazel and Irwin were drawn to it especially for the remote access. Irwin explained: «*It is a good service. The fact that you can start your washing machine when you are not there allows you to know when your washing will be ready to hang out your clothes* ».

Rodavil appreciated the application as a whole. When we asked her what she likes in the offer she answered: «*Particularly, being an application. I like the innovation part of it. (...)I like the fact that it is innovative, very convenient and customer centered* ».

Marla (24), gave us valuable insight into her generation, one of our potential target segments. She explained: « *...Especially for us millenials, as we always want more innovations. We want also things to be fast and we don't want to wait so it would be really good. A lot of millennials would be happy to use it* ».

Finally, Marie liked that we also take care of innovation updates when needed.

It is important to notice that a lot of Filipinos still hand-wash their clothes compared to more-industrialized countries of the region like China or Japan (Retamal M., Schandl, 2017). This could be a reason why automatic washing machine and other innovation features were shown to be really valued by most of our interviewees.

- Cooperation

We noticed that 14 Filipinos out of 20 liked the offer partly for the community aspect and the possibility to exchange advice. Marie explained how important it is for her : « *It is like building a small community for the users already and it helps a lot. It is about collaboration. I like the interactive platform* ». The others appreciated the possibility to share, to exchange, to be more effective and to have a better use of the machine while being able to help others as well. Christine would ask advice on how to take care of her clothes while Rodavil expressed that she was only interested in exchange thoughts regarding the saving of water and electricity.

Alma was the only one that wasn't interested in exchanging with the other users. However, she would like to talk with the manufacturer.

Regarding the co-creation process, most of the respondents agreed to participate in surveys to help the producers. As Micah explains: « *I think it is really important that the producer gets the opinion of the consumers because in the end, the product will be used by the consumers* ». However, they are not interested in going further into the co-creation process which they justified by a lack of skills. Irwin explains: « *It would be hard for me to really co-create the product because I think that you really have to know it, which is not my case. I would agree to answer to evaluation forms though* ».

Nevertheless Wincel and Micah showed their interest for product testing, Hexel would help for designing the product and Nathalie and Emelyn for the whole process.

Finally, Cyrille was not interested in the co-creation process at all.

We can say that most Filipinos value the community aspect that the application offers. It is aligned with Hofstede's study (2018) as the Philippines is considered a collectivist society. It means that the degree of interdependence between the people is high, and people always belong to « in groups ».

- Ecology

During the interviews, the ecological aspect mostly appeared when we asked about the eco-soap. Most of them value this additional service because they care for the environment.

However, Bem would like to compare first with the products that she is currently using before taking her decision and Rodavil said that she would subscribe if we can ensure the same wash quality: « *...If you provide eco-soap, you have to be sure that the wash is as efficient as before and then no problem for me to change* ».

Emelyn insisted that she would like to have a wide range of choices for the eco-soap so she can use different ones depending on the types of fabrics and Christine suggested to develop an eco-softener as well that she could use with the detergent.

What would restrain Wincel and Marie from subscribing is the price, Marie warned: «*... It is really good for the environment movement but it depends on the price. The soap that we use for the automatic washing machine is already quite expensive. People don't buy ecological things because it is too expensive so you have to think about that* ».

Micah, Christine and Irwin also explained that water processing was also something that needed to be managed in order to be more ecologic. Irwin explains: «*I am definitely interested because the detergent is really harmful for the environment. Also it is important for me to be sure that the used-water goes into the right place and not directly in the river for example* ».

A lot of them also reminded us at the end that one of the things they value the most in the offer is its environmental consideration and the possibility to procure eco-soap.

- Price sensitivity

Price is mentioned as a valued feature when buying a new washing machine and it is also the biggest factor that restraint Filipinos from subscribing to the offer. Indeed, Micah said that Filipinos always try to reduce their costs and Hazel explained that: « *As Filipino, we are really price-sensitive so it would depend on the price per month* ».

They usually calculate and are ready to pay a little more than what they actually pay to benefit from additional services. Christine explained: « *If we are going to rent from your company, it is ok for me to be a bit more expensive because aside from the machine itself, you are also offering other services. It is a premium, it is an added value* ». Rodavil and Angela specified that they would pay more only if the quality is better while Odeon would pay a premium for the durability.

There are some exceptions, as Marie doesn't have the financial capacity at the moment and the mother of Nathalie would only consider the offer if the price is lower than what she currently pays.

Others expressed their doubts regarding the costs. Joy, who wasn't interested in the offer at all, said: « *I am worried because a company would not introduce that kind of offer if they don't earn more from it than what they were earning before* ». Alma also warned us that it could be costly for the manufacturer. Wincel was worried that the repair service combined with a monthly subscription could be much more expensive in the long-run.

However, Bu thought that it would be a good fit with the average Filipino's habits: « *I think that is a good idea, especially here in the Philippines. We are used to buy in really small quantities like shampoo sachets. We always buy small first because we don't want to invest. It would help to pay every month instead of doing an investment* ».

Aloysius, who is running a hotel facility, explained: « *That will minimize my costs. I like that. I would be very profitable and competitive with it* ». However, he mentioned later that wouldn't pay more than what he actually pays.

To conclude, we can say that price is a very sensitive aspect that cannot be neglected in the elaboration of the offer. Some are ready to pay more if they see an added-value while others would only subscribe if it is cheaper. However, the monthly payment system seems to fit with the Filipino culture. Aloysius finally shared that it could be a competitive advantage if we target businesses. A precise costing analysis should be done before going further in the discussion.

- Contract Management and Legal aspects

Marie and Micah both shared that they liked the flexibility of the contract as they could end it anytime with a two months of notice. Micah also shared that the warranty was something important for her because they encountered problems before.

Aside from that, the mother of Christine would like to know who takes the responsibility if something happens to the machine. It seems like Filipinos aren't particularly worried about legal and security aspects in general.

- Repair

Most of the people were particularly drawn to the maintenance and repair support. It eases their life and lessens their responsibility towards the product as they don't need to worry if a problem occurs. Nathalie summarized it as follows: « *The fact that is free repair is an upside on your hand because we don't have to care about repair and it is usually the problem in the household* ». Linked to that, the application that alerts you when a part of your washing machine needs to be repaired or replaced received positive feedback as well. Indeed, they feel lost in front of a broken machine, as they can't fix it by themselves. The app will help them understand the problem and be supported by someone that will repair it for them.

It is appreciated that the service is offered 24H/7 as they don't want to wait. Indeed, some highlighted the fact that it is hard to find a repairman and he may take a long time before coming, further accentuated in the countryside. Christine showed her concerns: « *...Because usually when we ask for a technician to come, it takes a long time because they need to come from Manila and they will schedule it only when other people in the province also ask for their services* ».

Aloysius would like to improve the availability of the spare parts as well as the structure of the machine to be able to repair it by himself more easily.

Christine explained that her mum would always buy new products instead of repairing the old ones because of the price: « *... They would always tell you expensive prices just to repair one piece so my mum would always rather buy a new one because in the long run it will be cheaper* ».

Finally, Wincel is less interested by the service as he said that the washing machine doesn't need much repair and he wants something cheaper.

To conclude, the repair service is highly valued in the offer. Ensuring an efficient and fast repair service for the Filipinos in the rural and urban areas might be challenging but the customers give it much importance. The repair service included in the offer may swap those initially hesitant due to the price to commit in order to benefit from this service.

- Consumers' expectations

Regarding our offer, Rodavil, Alma, Cyrille and Christine liked the fact that it can reduce the planned obsolescence. Cyrille mentioned that it is what the people in Manila expect: « *...It is what most people in Manila want. It is a good way to be sustainable with your washing machine* ».

Also, the feature that is most valued by Filipinos when buying a new washing machine is the drying possibility. Indeed, most of them told us that they would like to have one appliance that is able to both wash and dry. On top of that, they would value an automatic machine

instead of a manual one. Other features that were mentioned were: availability of short cycles, convenience, quality of the wash, quality of the machine, low consumption of water and electricity, low price, long-lasting materials, big capacity, relevant after-sales services and warranty, availability of a dispenser, possibility of delayed start and digital options. Wincel also explicated that the brand was important for him.

Concerning their current washing machine, when we asked them what could be improved, the interviewees further insisted on their desire to have a dryer integrated, an automatic washing machine, a fast cycle, a clean wash, durable materials and a low consumption of water. They added new comments based on their personal experiences with their current machine. According to some of them, what could also be improved is the noise, the size, the smell that it omits compared to hand washing clothes, the possibility to open the door or reprogram once it is launched, the flexibility of the programs, an overly aggressive spinning that may damage the clothes, the availability of spare-parts and possibility to repair at a lower price. Micah also added: *«Our washing machine has problem with little clothes, like the socks, they tend to be stuck in the draining system»*.

On the other hand, what stood out in the interviews as highly-valued features of their current washing machine are good quality, long-lasting products and convenience.

This section gives different perceptions of what to develop in the offer and how to adapt marketing strategies to different groups of customers. The emphasis definitely needs to be on providing automatic low-water and low-energy consuming washing machines. However, giving the possibility to customize the machine would be a way to attain different markets.

- Feeling regarding the property

It seems that it doesn't matter to our respondents to be the owner of their washing machine. Indeed, most of them said that it removes worries about repairs and eases their life.

Odeon explained that it is a way to save space: *« Yes, but for me the problem is space so if I can put my washing machine outside of my apartment or share it, then I could save a lot of space. At the same time, I don't have to think about repairing it and everything. I would like if it is not in my house »*. Others said they would be willing to hire their appliance if it is available whenever they want to use it.

Only Bu, Mia, Joy and Wincel wanted to remain the owner of their appliance. Indeed, Bu is reluctant because of the sanitary aspects and the others aren't ready to change their habits. It is clear that meeting everyone's needs is the priority of the offer that is why flexibility and strategic targeting of the customers has to be made.

### ***3) Cross-nationalities analysis***

After analyzing the reactions in the three separated countries, it is relevant to analyse the similarities and differences between them. We wanted to answer to a question: « *Are there any obstacles or leverages toward the implementation of this new model that are more present in certain cultures rather than others?* ». For this, we will take back the nine axis to compare and summarize the points of view from different cultures while making links with the key insights.

As we realized a qualitative interview, we are not able to demonstrate that our key insights are true. However, we can provide part of the answer or invalidate some pre-established key insights.

- **Energy Savings**

In general, providing an energy efficient appliance interests respondents from the three countries but at a different scale. The electricity rate seems to influence the consumers. Indeed, in the Philippines, as it is one of the countries with the highest electricity rate, a majority of the respondents are interested in energy efficient appliances. Moreover, they are not able to track their energy consumption therefore they would like the opportunity to monitor their energy consumption through the app.

Through the contrary, in Canada, and especially in Quebec where electricity is very cheap due to the high availability of hydroelectricity, few respondents were interested in energy efficient appliances. The Smart Grid isn't developed, therefore the possibility of programming the laundry when the electricity is cheapest isn't applicable. Only few were interested in a follow up of their energy consumption.

Nevertheless in Belgium, a lot of respondents value an energy efficient appliance to decrease the energy bill and most of them look at the energy efficient label. The Smart Grid system is

well-developed, therefore those who use it aren't interested by an additional follow-up of their consumption with the app.

In conclusion, the provision of energy efficient appliance encounters success for the majority of the respondents but the level of interest seems to depend on the electricity rate.

- Innovation

The Canadian and Belgian respondents doubted the level of potential innovation for a washing machine and the utility of the free innovation update service. Regarding the application, it seems promising among the respondents. Especially for the Filipinos, as the level of innovation is low and a lot of them still hand-wash their clothes. The Canadians, however, appreciated the tips that the application can provide (about the energy consumption and the use) and the alarm when a component must be repaired or replaced. Like the Belgian respondents, they aren't convinced by the remote access because it still requires them to be at home to put their laundry into the appliance. The Belgians are more divided regarding the application as a whole for several reasons (they didn't like the connectivity, think that it is too complex and they consider the application more like a gadget than a tool).

Another valuable piece of information from our interviews is that the application's success may be limited to the younger generation. Indeed, one Filipino explained that it is very attractive for the millennials and not for the older generations as mentioned by Canadian and Belgian interviewees.

It shows the importance of providing a flexible application that can cater to customers' needs, differing between countries as well as age group.

- Cooperation

The aim is to know if the consumers are ready to build a spirit of community by sharing their experience through an online platform. From the three countries, the most interested were the Filipinos. Indeed, this collective society values the community aspect that the application is offering while only few Belgians and Canadians were interested in the platform (Key insight 8). Majority of the respondents from the three countries agreed to answer surveys but few wanted to participate in co-creation (Key insight 11). Indeed, they explained that they don't have the skills, the time nor the interest. Moreover, Belgians and Canadians insisted on the

importance of explaining the ultimate goal of a survey, implementing a real follow up by launching the results and giving incentives to the consumers to participate.

Lastly, we can state that incentives are needed to increase the consumers' feedbacks and involvement.

- Ecology

A part of the respondents from the three countries said that the aspect they valued the most in the offer, is the environmental issue. This is why many respondents were interested in the idea of eco-soap. Through the interviews with the three nationalities, the same results appeared (Key insight 10). The quality-price ratio has to be attractive as the consumers will directly compare it with their current detergent. Then, providing only one soap can affect the freedom of choice of the consumers, this is why different types of soap with different quantities should be offered. The Canadians added another dimension: the soap must have a recognized certification of its environmental footprint in order to convince the consumers to switch. A justification of the premium is crucial for the Canadians.

To conclude, various soaps with justified prices could be accepted by consumers.

- Price sensitivity

It is clear that a quantitative analysis is needed to assess the profitability of the model and the price of the offer. Indeed, all the respondents would like to know the price of the offer. Moreover, some of them questioned the profitability of the model and wonder if they could become the owner of the product in the long term.

The level of GDP per capita could have an influence on the acceptance of the offer. Indeed, there may be a link between the lower level of GDP per inhabitant of the Philippines compared to Belgium and Canada (Université de Sherbrooke, 2018) and the fact that the Filipinos are very sensitive to price (Key insight 3). Some of them are ready to pay a little bit more if it is justified while others can afford it only if it is cheaper than their current investment. But the system of monthly subscription seems to fit with the Filipino lifestyle.

The Canadians are less price-sensitive than the Filipinos but price continues to influence their purchase decision (Key insight 3). They would like to have a flexible offer with different features and level of prices (price with maintenance and without). They are divided regarding the system of monthly subscription, young interviewees (25-45) are more interested than the older ones.

Belgian interviewees are divided as well. Some are ready to pay more if there is a good justification for the premium (Key insight 3), a better future return on investment for example. When they made the computation, they compared it with different situations and they concluded that the price per month has to be very low to stay attractive (10-15 euros).

In conclusion, the price sensitivity of the population still plays an important role in the consumers' acceptance of the offer.

- Contract Management & Legal aspects

The Filipinos didn't give a lot of information regarding the legislation, they weren't worried about the legal and security issues in general. In contrast, the Belgians and Canadians mentioned that the contract must be flexible, with a realistic duration and several prices (Key insight 7). Respondents from latter two nationalities mentioned that the use of an application questions data confidentiality. That is why for the application, the data policy should be transparent to improve the trust relationship with the customers. Moreover, Belgian and Canadian respondents added that the offer has to be supported by the federal and regional legislation.

To sum-up, the contract should stay flexible with a realistic length and several prices, and the data policy must be transparent to encourage a cooperative relationship.

- Repair

In the three countries, respondents were interested in the after-sales service that provides repairs, which eases their life (Key insight 1).

First, in Canada, the respondents valued a fast repair service and were ready to pay for it independently.

Then, in the Philippines, due to the long distances between urban and rural area, the furniture of a fast and efficient repair service available 24h/7 can be challenging for the provider but valuable for the consumers.

Finally, in Belgium, some of the respondents preferred to manage repairs on their own while others would be willing to pay a warranty to access this service. Therefore, designing a machine with easily replaceable components becomes an imperative. It might be interesting to offer, at least in Belgium, two different offers, one with the service of a technician and one only with only giving access to spare-parts for self-repair.

- Consumers' expectations

It is interesting to note the similarity between the Canadian and Belgian expectations. Indeed, both expect an energy-efficient, clean, quiet, simple appliance with a size and programs adapted to their needs. Saying that it can fight against planned obsolescence isn't compelling and is questionable. It is important to keep in mind that our aim is to give incentives to design more sustainable products.

Specifically, Canadians stressed having a frontal appliance while Belgians insisted on a good labelling due to the current legislation. In the Philippines, where the level of development contrasts with that of Canada and Belgium, people brought up the possibility of having a dryer included and valued mostly an automatic low-water and energy consuming washing machine.

Depending on the experience of every customers, they all mentioned different criteria, including quality and durability (Key insight 2). This is why designing a customizable offer to be able to reach different groups of customers seems to be a good solution.

- Feeling regarding the property

It appears that losing the property rights doesn't disturb the majority of respondents (Key insight 6). However, in the three countries, they mentioned the imperative of being able to use it whenever they want. This is why if the appliance stays at home it doesn't change their habits much. In each country, only four or five respondents still wanted to be the owner of their products. In the Philippines, Bu highlighted the sanitation aspect. In Canada, some said

that paying for the property gives them a feeling of safety. In Belgium, few aren't ready to change their habits.

With the sharing economy trend, people tend to be more open to this new model that decreases their property rights. For a domestic appliance, such as a washing machine, it is clear that it must be located inside the home for practical aspects.

#### ***4) Synthesis & recommendations***

The table 4 summarizes the findings regarding the nine axis and the three countries

Table 4: Cross-nationalities analysis

| <b>Countries</b><br><b>Axis</b> | <b>BELGIUM</b>                                                                                                                                                                                                                                                                                                                                     | <b>CANADA</b>                                                                                                                                                                                                                                                                              | <b>PHILIPPINES</b>                                                                                                                                                                                                   | <b>Shared comments from 3 countries</b>                                                                                                                                                                                                                           |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Energy savings</b>        | <ul style="list-style-type: none"> <li>- Many valued energy efficient appliances to decrease the energy bill.</li> <li>- Most of them look at the energy efficient label.</li> <li>- The Smart Grid system is well developed, therefore those who use it weren't interest by an additional follow-up of their consumption with the app.</li> </ul> | <ul style="list-style-type: none"> <li>- Few respondents were interested in energy efficient appliances and by the follow-up of their energy consumption due to the high availability of energy.</li> </ul>                                                                                | <ul style="list-style-type: none"> <li>- A majority was interested by energy efficient appliances and by the follow-up of their energy consumption through the app.</li> </ul>                                       | <ul style="list-style-type: none"> <li>- There may be a link between the electricity rate and the sensitivity of the consumers. Indeed, the price of electricity is high in the Philippines and low in Canada.</li> </ul>                                         |
| <b>2. Innovation</b>            | <ul style="list-style-type: none"> <li>- They doubted about the usefulness of the free innovation update service.</li> <li>- They were not convinced by the remote access.</li> <li>- They were divided about the app (don't like the connectivity, too complex, considered as a gadget)</li> </ul>                                                | <ul style="list-style-type: none"> <li>- They doubted about the usefulness of the free innovation update service.</li> <li>- Many liked the advice given by the app and the alarm when a component has to be repaired.</li> <li>- They were not convinced by the remote access.</li> </ul> | <ul style="list-style-type: none"> <li>- The level of innovation is low and a lot of them still hand-wash their clothes.</li> <li>- They liked the application.</li> </ul>                                           | <ul style="list-style-type: none"> <li>- It seems that the application encounters success mainly by the young people.</li> </ul>                                                                                                                                  |
| <b>3. Cooperation</b>           | <ul style="list-style-type: none"> <li>- They insisted on the importance of explaining the goal of a survey, implementing a real follow-up and giving incentives for the consumers to participate.</li> <li>- Only two are interested in sharing experiences through a platform.</li> </ul>                                                        | <ul style="list-style-type: none"> <li>- They insist on the importance of explaining the goal of a survey, implementing a real follow-up and giving incentives for the consumers to participate.</li> </ul>                                                                                | <ul style="list-style-type: none"> <li>- They are the most interested to share their experiences through a platform. It may be because they live in a collectivist society that values community aspects.</li> </ul> | <ul style="list-style-type: none"> <li>- Majority of the respondents from the three countries agreed to answer surveys but few wanted to participate in co-creation. Indeed, they explained that they don't have the skills, the time or the interest.</li> </ul> |

|                                                |                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>4.Ecology</b>                               | <ul style="list-style-type: none"> <li>-They are sensitive to ecological features</li> <li>-They are interested in the option of eco-soap</li> </ul>                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>- They want a justification of the premium and the soap must have a recognized certification of its environmental footprint in order to convince the consumers to switch.</li> </ul>                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>-They valued the environmental aspect and the possibility to avail eco-soap but at a good price.</li> </ul>                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>- Some respondents said that the aspect they valued the most in the offer, was the environmental issue.</li> <li>- Many respondents were interested by the furniture of eco-soap. The quality/price ratio has to be attractive and different types and quantities of soap should be proposed.</li> </ul> |
| <b>5.Price sensitivity</b>                     | <ul style="list-style-type: none"> <li>- They are divided as well. Some are ready to pay more if there is a good justification for the premium that they will pay. - When they made the computation, they compared it with different situations; they concluded that the price per month has to be very low to stay attractive (10-15 euros).</li> </ul>        | <ul style="list-style-type: none"> <li>- They are less price-sensitive than the Filipinos but price still influences their purchase decision.</li> <li>- They would like to have a flexible offer with different features and level of prices (price with maintenance and without).</li> <li>- They are divided regarding the system of monthly subscription; young interviewees (25-45) are more interested than the older ones.</li> </ul> | <ul style="list-style-type: none"> <li>- They are very sensitive to price.</li> <li>- Some of them are ready to pay a little bit more if it is justified while others can afford it only if it is cheaper than their current investment.</li> <li>- The system of monthly subscription seems to fit with the Filipino lifestyle.</li> </ul> | <ul style="list-style-type: none"> <li>- A cost analysis should be done to be able to test a fixed price on the respondents.</li> <li>- Some of them questioned the profitability of the model and wonder if they can be the owner of the product on the long term.</li> </ul>                                                                  |
| <b>6.Contract management and legal aspects</b> | <ul style="list-style-type: none"> <li>- The contract has to be flexible, with a realistic length and several prices.</li> <li>-They think that the use of an application questions the data confidentiality. The data policy has to be transparent to improve the trust relationship with the customers</li> <li>- The offer has to be supported by</li> </ul> | <ul style="list-style-type: none"> <li>- The contract has to be flexible, with a realistic length and several prices.</li> <li>- They think that the use of an application questions the data confidentiality. The data policy has to be transparent to improve the trust relationship with the customers.</li> </ul>                                                                                                                        | <ul style="list-style-type: none"> <li>- Filipinos aren't worried by the legal and security issues in general</li> <li>-Some like the flexibility of the contract</li> </ul>                                                                                                                                                                | <ul style="list-style-type: none"> <li>-A flexible contract with several options, prices is needed</li> </ul>                                                                                                                                                                                                                                   |

|                                         |                                                                                                                                                               |                                                                                                                                                                            |                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                         | the federal and regional legislation.                                                                                                                         | - The offer has to be supported by the federal and regional legislation.                                                                                                   |                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                          |
| <b>7.Repair</b>                         | - Some of the respondents preferred to keep repairing by themselves while others would pay a warranty to access this service.                                 | - They value a fast repair service and are willing to pay for it independently.                                                                                            | - Due to the long distances between urban and rural areas, the furniture of a fast and efficient repair service available 24h/7 can be challenging for the provider but valuable for the consumers. | - In the three countries, respondents were interested by the after-sales service that provides repairs as it eases their life.<br>- Designing a machine with easily replaceable components seems an imperative                                                                                           |
| <b>8.Consumers expectations</b>         | - They expect an energy-efficient, clean, quiet, simple appliance with a size and programs adapted to their needs.<br>- They emphasize good energy labelling. | - They expect energy-efficient, clean, quiet, simple appliances with a size and programs adapted to their needs.<br>- They have a preference for front-loading appliances. | - They value low-water and energy consuming washing machines<br>- They would appreciate if there was an offer with the dryer included.                                                              | - Depending on the experience of every customer, they all mentioned different criteria, including quality and durability.<br>- Designing a customizable offer to be able to reach different groups of customers seems a good solution.                                                                   |
| <b>9.Feeling regarding the property</b> | - Some aren't willing to change their habits.                                                                                                                 | - Some said that they pay for the property rights gives a feeling of safety.                                                                                               | - One interviewee highlighted the sanitation aspect.                                                                                                                                                | - It appears that losing the property right doesn't disturb the majority of respondents. However, in the three countries, they mentioned the imperative of being able to use it whenever they want.<br>- In every country, only four or five respondents still wanted to be the owner of their products. |

As a synthesis of our findings, several results can be highlighted. We know we must take into account that the level of interest of the respondents regarding an energy efficient appliance is influenced by local the price of electricity and the water bill. In Québec, people are less price-sensitive due to the inexpensive rates for energy.

Also, the application still encounters resistance among the older population; moreover data confidentiality is questioned by Canadians and Belgians.

Regarding the collaborative side of our offer, the Filipinos are interested in cooperating, but the co-creation process is still little known by consumers.

Probably due to the different level of development of their country, Filipinos are more price-sensitive than the others. A good quality-price ratio for the offer and the options accompanied by a proper justification remain common factors impacting the purchase decision.

Finally, the offer has to be very flexible. Belgians prefer to manage repairs themselves, Canadians prefer having external maintenance support and Filipinos would value a good after-sale service in the rural areas.

From the three countries, respondents weren't reluctant to rent their machine if it remains inside their residence.

Regarding the key insights, most of them were elaborated in the discussion and elements were given to enlighten specific points tied to them. However, the sixth key insight: « The clients don't want to lose their property rights regarding the product for a functional usage » was invalidated because the majority of the respondents don't mind losing the property rights if they can still use the product. The ninth key insight: « The consumers in a country with a high GDP are more green-minded than others » was overturned as well as we found the same results in the three countries. The key insight 11: « The consumers want to be involved in the production process (feedback-cooperation-co-creation) » was partially refuted because most of the interviewees agreed to answer to surveys but few agreed to participate in co-creation.

## CONCLUSION

### Contributions

Through this thesis, the functional service economy is considered as a business model innovation for sustainability by delivering a functionality rather than ownership of a product.

A lot of other concepts such as product-service system, circular economy, eco-conception, eco-efficiency and eco-socio-conception are linked with this model but we decided to focus on the functional service economy as defined by Stahel : « *The Functional Service Economy, which optimises the use or function of goods and services, focuses on the management of existing wealth in the form of goods, knowledge and natural capital* » because he insists on three factors which are the optimization of use, the stock of existing goods and the creation of a more sustainable or dematerialised economy. To develop our offer, we also took some principles from the functional and cooperation economy, which insists particularly on territorial, social and cooperation aspects.

When the product is replaced by a service provided to the customers, it implies deep changes in the strategy of the company. Several phases were identified to implement this new vision. In most cases, they have to determine a relevant perimeter of stakeholders involved in the value chain, improve their immaterial resources, cooperation and partnerships, lead feedback loops for continuous improvement and advertize a clear marketing message to improve the acceptance by consumers. They can either create the new model from scratch or implement it through several progressive steps (Rental model + Improved use + Eco-conception + Circular flow of materials). In the end, it creates incentives for the producer to reduce resource flows, which could lead to higher profits and a lower environmental impact.

The transition doesn't only affect the producer, it affects the consumers as well. This is why we developed this research question for the practical part: « *Are the consumers interested in changing their consumption habits towards a functional service economical model in the household appliance sector?* ». To answer to this problem, key insights were developed and five experts were interviewed to create an offer for the washing machine. The experts expressed their opinion on our key insights and on the offer: they explained that if the consumers understand the added value of the offer and the way it works, they will value the quality or the after-sales service before over the price (Key insight 1,2 and 3).

Concerning the target group, the four experts highlighted that the consumers interested in this model could be in the B2C sector: either green-minded people if the environmental value is well-explained, or people who value the monthly payment (Key insight 4 and 5).

The potential switching costs could be the substitution of the old machine for the new energy-efficient one, the substitution of the property from the consumer to the producer, the implication of the consumer in the creation process or the complexity of the contract (Key insight 6 & 7).

The experts also mentioned that consumers will be reluctant to participate in the creation process. To solve this issue, the offer should be tested on a small sample with clear rewards for the participants (Key insight 11).

When the consumers make a purchase decision, they will trust the producer if they don't know the product or if the level of risk is high. However, for a washing machine, the attractiveness of the brand is important (Key insight 12).

Then, once the offer was improved with the experts' advice, consumers' opinions were analyzed. For this, a qualitative analysis was conducted by interviewing 60 respondents from three countries, with the aim to answer the following question: « *Are there any obstacles or leverages toward the implementation of this new model that are more present in certain cultures rather than others?* ». Indeed, it seems that the majority of the customers interviewed in Belgium, Canada and the Philippines were interested in this type of offer pertaining to washing machines, even if they valued different features depending on their culture.

From the qualitative analysis, the results linked with the key insights show that:

- The level of interest of the respondents regarding an energy efficient appliance is influenced by the local price of electricity and the water bill.
- The application still encounters resistance among the older population, moreover data confidentiality is questioned by Canadians and Belgians.
- The Filipinos are the most interested to cooperate (Key insight 8), but the co-creation process remains hard to implement as few people know this concept and most of them are not willing to participate. (Key insight 11).
- Probably due to the difference in the development of their countries, Filipinos are more price-sensitive than others (Key insight 3). However, a good quality price ratio for the offer and relevant justification remain indispensable for everyone, no matter the country of origin (Key insight 2).

- The contract and the offer have to be very flexible (Key insight 7), Belgians prefer to manage repairs themselves while Canadians prefer if someone external takes care of the maintenance (Key insight 1). Filipinos require a reliable fast service that could also reach rural areas without extensive wait time. Ensuring an efficient after-sale service in the rural areas of the Philippines could be challenging due to the long distance from the city.
- From the three countries, respondents weren't reluctant to rent their machine if it stays at home (Key insight 6)

The interviewees also invalidated the sixth key insight: « The clients don't want to lose their property rights regarding the product for a functional usage »; the ninth key insight: « The consumers in a country with a high GDP are more green-minded than others » and the key insight 11: « The consumers want to be involved in the production process (feedback-cooperation-co-creation) ».

The following table presenting the obstacles and the leverages regarding the washing machine offer can summarize the learning points received from experts and consumers interviews. It shows that by paying attention to the leverages, a company could overcome the obstacles and convince the consumers to change their consumption habits towards a functional service economical model in the household appliance sector, for a washing machine.

*Table 5: Summary table of the obstacles and leverages for an economical and functional offer in the household appliance sector: the specific case of the washing machine*

| Obstacles                                                                                                                                                                                                                                                                                      | Leverages                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Existing machines</li> <li>• Consumers are reluctant to get involved in co-creation</li> <li>• Contract is too complex</li> <li>• The app questions the data confidentiality</li> <li>• The choice will depend on the quality/ price ratio</li> </ul> | <ul style="list-style-type: none"> <li>• The offer and the contract have to be flexible and as simple as possible</li> <li>• The eco-efficiency of the new appliance has to be acknowledged with certifications</li> <li>• The communication around the offer must highlight the value added of the services</li> <li>• The incentives to increase customer feedback has to be well-developed</li> <li>• The price has to be clearly justified</li> </ul> |

The learning points from the practical part can be linked with the summary table of the theoretical part. Indeed, as mentioned earlier, two points can be removed: first, the switch of property to the producer has not been proven to be an obstacle for the consumers if the appliance remains at home, or if they can use it whenever they want. Moreover, in the leverages part, stating that it helps to fight against planned obsolescence isn't compelling and can be debated.

The table is updated with concrete examples applied to the washing machine case (in red).

*Tableau 6: Summary table of the obstacles, leverages and key success factors to implement the functional service economy updated with specific remarks for an offer of washing machine*

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Definition of Functional Service Economy | <p>Stahel (1997b) defines: « <i>The Functional Service Economy, which optimises the use or function of goods and services, focuses on the management of existing wealth in the form of goods, knowledge and natural capital</i> ». He indicates that : « <i>The economic objective of the Functional Service Economy is to create the highest possible use value for the longest possible time while consuming as few material resources and energy as possible</i> ». According to him, it is « <i>considerably more sustainable, or dematerialized, than the present economy, which is focused on production as its principal mean to create wealth and resources flow</i> ».</p> |
| Leverages                                | <ol style="list-style-type: none"> <li>1. Economic producer's incentives to maximize the use, the performance and lifespan of their products</li> <li>2. Recycling and remanufacturing become a source of competitiveness</li> <li>3. Understanding of the customer's needs <b>(By developing a flexible offer, contract)</b></li> <li>4. Ecological goal : fight against planned obsolescence <b>(Debatable and isn't compelling)</b></li> </ol> <p><u>FCE :</u></p> <ol style="list-style-type: none"> <li>1. Immaterial resources are unlimited</li> <li>2. Synergy economies through partnerships</li> </ol>                                                                    |
| Obstacles                                | <ol style="list-style-type: none"> <li>1. Change in business model <ol style="list-style-type: none"> <li>a. New conception and design strategies <b>(Remodelling the old existing machine)</b></li> <li>b. New ways of working (importance of a good after-sales services)</li> </ol> </li> </ol>                                                                                                                                                                                                                                                                                                                                                                                  |

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | <p>c. New skills needed</p> <ol style="list-style-type: none"> <li>2. Change in the economy, position of intermediaries</li> <li>3. More demanding customers <b>(Choice will depend on the quality/price ratio)</b></li> <li>4. Rebound effect</li> <li>5. Complexity of contracts</li> <li>6. Low profitability of services</li> <li>7. <del>Removal of property from consumers</del> <b>(Not if the machine is at home)</b></li> <li>8. Support from authorities <b>(Data confidentiality from the use of an application)</b></li> <li>9. Questionable feasibility of the implementation depending on the sector</li> </ol> <p><u>FCE :</u><br/>Challenge with territorial issues and consumers implications</p>                                                  |
| Key Success Factors | <ol style="list-style-type: none"> <li>1. Determine relevant perimeter of stakeholders involved for the whole value chain</li> <li>2. Progressive implementation : Rental model + Improved use + Eco-conception + Circular flow of materials <b>(Use acknowledged certifications )</b></li> <li>3. Improve their use of immaterial resources and their ways of cooperating and making partnerships</li> <li>4. Importance of feedback loops for continuous improvement <b>(Reward and incentives to increase of consumers involvement)</b></li> <li>5. Clear marketing message to enhance the acceptance <b>(Highlighting of the added value of the services and price justification)</b></li> </ol> <p><u>FCE</u><br/>Managing the immaterial resources is key</p> |

### **Limits of our analysis**

Despite the work accomplished and the effort invested throughout the research and analysis, we are conscious that this thesis has its limitations and could be improved in different ways.

First, regarding the theoretical part, it was difficult to find traditional management literature. Indeed, most of the documentation regarding the model comes from periodical articles and the diversity of authors is limited. Therefore we couldn't confront many different points of view.

We also found it challenging to make a clear classification of the concepts tied to the functional service economy. As a matter of fact, they usually overlap each other and the boundaries are not clear.

In addition, the functional service economy and the functional and cooperation economy are both new managerial models that usually combine strategic, environmental and social implications. Indeed, from the beginning of this thesis, we have stated that the functional service economy is part of the business model innovation for sustainability. We understood that our role was to separate the concept from its context. However, as the key activity is linked with the reduction of resources, it was sometimes hard to steer clear of environmental considerations. Nevertheless, we are aware that companies can apply the principles of the functional service economy solely for financial purpose. For example, Netflix offers consumers the possibility of watching a movie online by paying for the use of its service and iCloud offers to its consumers to pay to stock their files on a computer server (Vaileanu-Paun & Boutillier, 2012).

Also, regarding the practical part, we recognize that we have non-representative samples with only 20 people in each group. We consider them as random individuals that provide feedbacks and bring new ideas. However, the conclusions can't be generalized to the whole country. As a matter of fact, most respondents come from Montréal, Manilla and Wallonia which is one more reason attesting that the each sample is not representative of the entire country. Moreover, we were limited by the number of questions and we had to select the most relevant ones.

Furthermore, we have to be aware of the bias that our interviews can contain due to several reasons. Indeed, many interviews were conducted by call instead of face-to-face interaction; we were separated to conduct the interviews, which mean that there could be small differences due to our personalities and there could also be a bias due to the language used as we can't express ourselves exactly the same way in French and English. We also noticed that the model was quite difficult to understand for someone that has never heard of it. Thus, we must take into account the potential bias that some answers could contain due to the poor understanding of certain respondents.

In addition, we perceived that the interviewees found it difficult to give their opinion on the different features of the offer without knowing the price. Indeed, most of them interested in the services only if the price was acceptable.

Finally, we had to focus on washing machine, for our questionnaire to make it easier for the customers instead of asking general questions on household appliances. We are aware that we can't extend our conclusions to other appliances as we don't know if customers would have reacted in the same way. Indeed, they may value different features depending on the type of appliance.

### **Further researches**

Aware of the limitation, listed above, if we had the opportunity to continue the research, it could be interesting to deepen the theoretical analysis by studying the detailed divergences between the different currents and authors. Indeed, we decided to take the definition of Stahel as our base but we could have considered other angles as well.

For the scope of our analysis, we limited ourselves to a "Business to Consumers" approach but we have seen that the functional service economy could be applied to a "Business to Business" approach as well. In our case, we could propose a similar offer for hotels or organizations and conduct research to understand the implications for the producer and client businesses.

Then, we could analyze the reactions of the consumers to a functional service economy offer on another household appliance to understand how their opinion varies depending on the appliance. We could then observe if the model corresponds better to one appliance or if it can be extended to every household appliance. If we have convincing results, it could be relevant to create an offer in which we combine all the appliances needed in one contract.

A quantitative analysis is more adequate for generalizing the results to the country as whole. That is why a long-term cost analysis to offer to the customer an offer with a fixed price could be useful.

Moreover, we could look for other examples of companies that apply that kind of model in the household appliance sector to better understand the challenges that they face every day. It could be interesting to look for companies that have experimented with this concept but have forgone its implementation.

Finally, from a broader point of view, the functional service economy challenges the role of downstream and upstream actors involved in the supply chain. Indeed, by implementing cradle-to-cradle strategy and offering important after-sales services, the role of the distributor or supplier are questioned. A study on the evolution of these roles in the implementation of the functional service economy would be interesting.

Indeed, by subscribing to an offer, the consumers have access only to specific services offered by the provider. But these platforms could cannibalize the traditional services. How will evolve the traditional material services evolve with this trend of immaterialized services? Further research can be developed.



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Place des Doyens, 1 bte L2.01.01, 1348 Louvain-la-Neuve, Belgique [www.uclouvain.be/lsm](http://www.uclouvain.be/lsm)

