

Marjo Puikkonen

**ACTOR ENGAGEMENT AS A BASE FOR VALUE CO-  
CREATION IN SERVICE ECOSYSTEM**

**A CASE STUDY OF FUTURE ELECTRICITY DEMAND-  
SIDE RESPONSE SERVICE FOR HOUSEHOLDS**



UNIVERSITY OF JYVÄSKYLÄ  
FACULTY OF INFORMATION TECHNOLOGY

2019

## ABSTRACT

Puikkonen, Marjo

Actor Engagement as a Base for Value Co-Creation in Service Ecosystem

Case: Future Electricity Demand-Side Response Service for Households

Jyväskylä: University of Jyväskylä, 2019, 117 p.

Information Systems Science, Master's Thesis

Supervisor: Tuunanen, Tuure

This thesis focuses on exploring the value co-creation in the future electricity demand-side response (DSR) service for households. DSR service is implemented as a cloud service, where high-power home appliances are switched off, if there are consumption overload in the power grid and the flexibility is needed. The service is necessary, especially when the use of electric cars increases. As electricity consumption is expected to increase, it creates challenges for electricity network capacity. Increased production in the near future, as well as moving towards more carbon-neutral production mode, will increase the challenges for the adequacy of electricity. With this service, it is possible to equalize the consumption of electricity with periods of household consumption.

However, it is challenging to get households into this DSR service. This opened the possibility of exploring further how users can be engaged to the service. The problem was solved through the operator's commitment, exploring the factors that affected the use of the service. The study was carried out as a qualitative case study, which dealt with the future electricity market and its DSR service. The data was collected through interviews (= 24), utilizing a special Laddering technique. From the responses the graphical thematic maps were created describing the most important things the respondents experienced. The data included the attributes, consequences and values with relationships between them. Respondents felt that the most important features related to the user's opportunity to participate in the service, the availability of the service and the production of a common good through the service. The most important value factors were own and others well-being, the economy and the well-being of the environment.

As a base theory for this study, actor engagement, value co-creation and value co-destruction were found most suitable. Based on this framework built on the theory, a solution was developed for the research problem. Also, the possibility to value co-destruction in this context was presented. Describing the service ecosystem helped to understand the field of action, thus creating a comprehensive description of the phenomenon.

Keywords: Demand-side response (DSR), value co-creation, value co-destruction, actor engagement, service ecosystem, service dominant logic (S-D logic), service logic, energy markets and flexibility in consumption.

## TIIVISTELMÄ

Puikkonen, Marjo

Actor Engagement as a Base for Value Co-Creation in Service Ecosystem

Case: Future Electricity Demand-Side Response Service for Households

Jyväskylä: Jyväskylän yliopisto, 2019, 117 s.

Tietojärjestelmätiede, Pro Gradu-tutkielma

Ohjaaja: Tuunanen, Tuure

Tämä tutkielma keskittyy tutkimaan arvon yhteisluontia tulevaisuuden kotitalouksille suunnatussa sähkön kysyntäjoustopalvelussa. Sähkön kysyntäjoustopalvelu toteutetaan pilvipalveluna, jossa kodin suuritehoisimmat laitteet kytetään tarvittaessa pois päältä saaden näin sähköverkkoon lisää joustoa. Palvelun katsotaan olevan tarpeellinen etenkin silloin kun sähköautoilu lisääntyy, sillä kulutuksen kasvaessa, luo se myös sähköverkon kapasiteetille omat haasteensa. Joustamattoman tuotannon lisääntyminen lähitulevaisuudessa sekä siirtyminen kohti hiilineutraalimpaa tuotantotapaa, lisää haasteita sähköenergian riittävyydelle. Tämän palvelun avulla pystytään tasaamaan sähkönkulutusta aikajaksoilta, jolloin kulutuspiikkejä tapahtuu, kotitalouksien avulla.

Haasteelliseksi kuitenkin koetaan kotitalouksien saaminen sähkön kysyntäjoustopalvelun piiriin. Tämä avasi mahdollisuuden tutkia tarkemmin, kuinka käyttäjät saadaan sitoutettua palveluun. Ongelmaa ryhdyttiin selvittämään toimijan sitoumuksen kautta, selvittäen tekijöitä, jotka vaikuttivat eniten palvelun käyttöön. Tutkimus toteutettiin laadullisena tapaustutkimuksena, jossa tapauksena käsiteltiin tulevaisuuden sähkömarkkinoita ja sen luomaa kysyntäjoustopalvelua. Aineistoa kerättiin haastatteluiden (=24) kautta, hyödyntäen erityistä Laddering-tekniikkaa. Aineistoista muodostettiin teemakarttoja, joilla kuvattiin vastaajien tärkeimmäksi kokemia asioita, niiden ominaisuuksia, myötävaikutuksia ja arvotekijöitä sekä näiden välisiä suhteita. Tärkeimmiksi asioiksi uuden palvelun käyttöön liittyen vastaajat kokivat käyttäjän mahdollisuuden osallistua palveluun, palvelun saatavuus sekä yhteisen hyvän tuottaminen palvelun avulla. Tärkeimmiksi arvotekijöiksi nousivat hyvinvointi, talous sekä ympäristön hyvinvointi.

Tutkimuksen taustalla käytettiin apuna teoriaa toimijoiden sitouttamisesta, arvon yhteisluonnista sekä arvon tuhoutumisesta. Näiden teorioiden pohjalta rakennetun viitekehyksen perusteella laadittiin ratkaisu tutkimusongelmaan. Samalla pohdittiin mahdollisuutta arvon tuhoutumiselle kyseisessä kontekstissa. Palveluekosysteemin kuvaaminen auttoi ymmärtämään vallitsevaa toimintakenttää luoden näin kokonaisvaltaisen kuvauksen kyseisestä ilmiöstä.

Avainsanat: Sähkön kysyntäjousto, arvon yhteisluonti, arvon tuhoutuminen, toimijan sitoutuminen, palveluekosysteemi, palvelulogiikka (S-D logic, service logic), energiamarkkinat ja kulutuksen joustaminen.

## **PREFACE**

I would like to thank my Supervisor Professor Tuure Tuunanen for the guidance that he has gave me during this master thesis work. With his help, the work has been rewarding to do and the challenges have been achieved, bringing ultimately valid research results. I would also like to thank my family for all the support they have given me during this journey. Without their encouragement, the work would have been hard to accomplish. Furthermore, I would like to thank all the case organizations that took part to the earlier study of DSR business models and by that way made this research also possible. Finally, I thank all my friends for cheering and creating faith during this journey. Thank you.

## FIGURES

FIGURE 1 Desired supply and demand status .....	15
FIGURE 2 Actor engagement explains value co-creation .....	26
FIGURE 3 Multilevel design framework for service systems .....	27
FIGURE 4 Main actors in service ecosystem.....	29
FIGURE 5 Actor engagement leads to value co-creation or value co-destruction .....	30
FIGURE 6 Example of thematic map.....	46
FIGURE 7 Thematic map of the reliability of the service .....	49
FIGURE 8 Thematic map of the user involvement in the service .....	52
FIGURE 9 Thematic map of the availability of the service.....	55
FIGURE 10 Thematic map of producing a common good with the service .....	58
FIGURE 11 Thematic map of the financial factors of the service.....	61
FIGURE 12 Thematic map of information content.....	64
FIGURE 13 Thematic map of information timing.....	67
FIGURE 14 The framework of engagement process in DSR service .....	69
FIGURE 15 Current (/future) situation without flexible household.....	115
FIGURE 16 Flexible household in the future electricity market .....	115

## TABLES

TABLE 1 Case research characteristic comparison with related strategies .....	34
TABLE 2 Demographic details of the participants.....	37
TABLE 3 Selected stimulus themes and their distribution among respondents	40
TABLE 4 Example chain from one of the participants.....	41
TABLE 5 Created themes and descriptions .....	42
TABLE 6 The chains divided into the themes .....	43
TABLE 7 Example of the internal classification of one theme .....	44
TABLE 8 The most important attributes relating to user involvement.....	71
TABLE 9 The most important consequences relating to user involvement.....	72
TABLE 10 The most important values relating to user involvement .....	72
TABLE 11 The most important attributes relating to availability of the service	73
TABLE 12 The most important consequences relating to availability of the service .....	74
TABLE 13 The most important values relating to availability of the service .....	75
TABLE 14 The features that may lead to value co-destruction.....	75
TABLE 15 The most important attributes relating to ability to produce common good.....	76
TABLE 16 The most important consequences relating to ability to produce common good.....	77

TABLE 17 The most important values relating to ability to produce common good.....	77
TABLE 18 The most important attributes relating to the influence of information content.....	78
TABLE 19 The most important consequences relating to the influence of information content .....	79
TABLE 20 The most important values relating to the influence of information content.....	80
TABLE 21 The most important attributes relating to influence of information timing.....	81
TABLE 22 The most important consequences relating to influence of information timing.....	81
TABLE 23 The most important values relating to influence of information timing.....	82
TABLE 24 The most important consequences relating to service reliability.....	83
TABLE 25 The most important values relating to influence of service reliability .....	84
TABLE 26 The most important attributes relating to influence of financial factors.....	85
TABLE 27 The most important attributes relating to influence of financial factors.....	85
TABLE 28 The most important values relating to influence of financial factors	86
TABLE 29 The main features of attributes that emerged mostly from these all themes .....	88
TABLE 30 The main features of consequences that emerged mostly from these all themes.....	89
TABLE 31 The main features of values that emerged mostly from these all themes.....	90
TABLE 32 The main findings of the research .....	94
TABLE 33 The main findings of features leading to value co-destruction .....	95

## TABLE OF CONTENTS

ABSTRACT .....	2
TIIVISTELMÄ .....	3
PREFACE .....	4
FIGURES .....	5
TABLES .....	5
TABLE OF CONTENTS.....	7
1 INTRODUCTION.....	10
1.1 Research background .....	10
1.2 Research objective.....	11
1.3 Research problem.....	11
1.4 Research design.....	12
1.5 Thesis outline .....	13
2 DEMAND-SIDE RESPONSE SERVICE FOR HOUSEHOLDS IN ENERGY MARKETS .....	14
2.1 The meaning of demand and supply .....	14
2.2 DSR service.....	16
2.2.1 The benefits and challenges of DSR service .....	16
2.2.2 The role of independent aggregators .....	17
3 VALUE CO-CREATION IN SERVICE ECOSYSTEM.....	18
3.1 The base for value co-creation .....	18
3.1.1 From dominant logic to service dominant logic .....	19
3.1.2 Idea of service innovation.....	20
3.2 Value co-destruction.....	20
3.2.1 Actor engagement styles affecting value co-destruction.....	21
4 ACTOR ENGAGEMENT AS A BASE FOR VALUE CO-CREATION .....	23
4.1 Background to actor engagement.....	23
4.1.1 The Service Ecosystem .....	24
4.2 The actor engagement as a microfoundational view for value co-creation .....	24

4.2.1	Multilevel design framework .....	26
4.3	Creating a Lens .....	28
5	RESEARCH METHDOLOGY .....	32
5.1	Research approach.....	32
5.2	Research strategy .....	33
5.2.1	Laddering – technique.....	35
5.3	Research case.....	36
5.3.1	Participants.....	37
5.3.2	Case description and presentation of the themes to the participants.....	38
5.4	Data collection.....	39
5.5	Data analysis .....	41
5.5.1	Thematic analyses.....	42
5.5.2	Placing chains into themes.....	42
5.5.3	Clustering analysis .....	43
5.5.4	Building thematic maps .....	44
6	THEMATIC MAPS OF THE CASE STUDY.....	47
6.1	Reliability of the service .....	47
6.2	User involvement in the service .....	50
6.3	Availability of the service.....	53
6.4	Producing a common good with the service .....	56
6.5	Financial factors of the service.....	59
6.6	The Influence of information content on service usability .....	62
6.7	The timing of information influences service usability .....	65
6.8	Chapter summary .....	68
7	FINDINGS.....	69
7.1	User involvement in the service .....	70
7.2	Availability of the service.....	73
7.3	Producing a common good with the service.....	76
7.4	The Influence of information content on service usability .....	78
7.5	The timing of information influences service usability .....	80
7.6	Reliability of the service .....	82
7.7	Financial factors of the service.....	84
7.8	Value co-creation in DSR service.....	86
8	DISCUSSION .....	91
8.1	Research question .....	91
8.2	Theoretical impications .....	96
8.2.1	Implication 1: The DSR service should work as a service ecosystem, thus creating the basis for the value co-creation.....	96
8.2.2	Implication 2: By engaging the actors in the service ecosystem, the value co-creation is possible to achieve.....	97



8.2.3 Implication 3 : The relationships between the actors and the integration with the resources ultimately determine the realization of the value co-creation .....	98
8.3 Implications on practice .....	99
9 CONCLUSION .....	101
9.1 Summary .....	101
9.2 Contributions to research and practice .....	105
9.3 Criteria of reliability and limitations of the research .....	106
9.4 Future research.....	108
REFERENCES .....	111
APPENDIX 1 - DSR SERVICE PRESENTATION.....	115
APPENDIX 2 - STIMULI THEME LIST.....	117

# 1 INTRODUCTION

This introduction chapter introduces the research background, that will clarify the main reason for this study. After that the research objective, problem and design has been presented. This chapter will end to introducing the thesis outline for getting the idea of what sections the research will be built.

## 1.1 Research background

The energy market will change in the near future, as the sufficiency of electricity is no longer guaranteed. New technological innovations are developing markets, while also contributing the consumption of electricity. The sufficiency of our country's electricity is secured by reserve power plants, but launching them is very costly and, above all, environmentally consuming. Demand-side response (DSR) is very common in the field of industry, but in the future, the commitment of households to demand-side response is intensely important.

According to Puikkonen & Raati (2018) the changes in the energy market will also increase DSR within households. The change in the trading time of the power exchange from hourly pricing to the pricing of a fifteen-minutes price will contribute to the need for rapid regulation. Also seeing new marketplaces is perceived as possible. Therefore, electricity companies consider it extremely important that they can be involved as many marketplaces as possible and thus retain their position in the competition (Puikkonen & Raati, 2018). Changes in the energy market will strongly shape the market position of electricity companies and tighten competition further, whereby new business practices are welcome. Although, above all, this enables an environmentally friendly way to meet the peak of growing energy consumption, it also opens up the possibility for a new kind of business in the energy market.

Energy business practices will change, which will be visible both in electricity production, in use and in transmission. Systems are designed to be carbon neutral, whereby the basic power of fossil fuels is replaced by varying pro-

duction. This is produced with renewable or otherwise non-emission energy sources. Development will bring a change that will move from large production units to a more decentralized and bi-directional system. The aim is also to accelerate change through various means of control such as emission trading and support systems (Nurmi, 2018).

The role of the customer will also change. The current passive customer is transformed into an active market player. With advanced technology, the customer can also become part of the prevailing market. Their role is seen as important, especially in DSR service, small production and storage. The energy market requires a new kind of thinking, innovation, courageous decisions and experimentation (Nurmi, 2018).

Muratori & Rizzoni (2016) points out in their research that to get the customer in to this demand response program, the consumer must be influenced to change their demand, in response to the needs of the supplier. To achieve this goal, the final customer has to receive some signal, which requires to be implemented throughout interactions between humans, energy infrastructures, and local conditions (Muratori & Rizzoni, 2016).

In Finland we have had small pilot projects with households in DSR service. According to the study of Puikkonen & Raati (2018), electricity companies and the transmission system operator have an interest in bringing households into DSR service. However, they have seen a problem with households' commitment to this service. This study will continue the earlier study of Demand-side Response business-models and bring some answers to the question of How to Engage Households to the Future Electricity Demand-Side Response (DSR) Service of households.

## 1.2 Research objective

The purpose of this research is to investigate the co-creation of value in the deployment of a new service which regulates household electricity supply. In particular, what are the factors that ultimately affect user engagement and value co-creation in this context. Therefore, the objective of this research is:

*To find out how households can be engaged to the future electricity demand-side response service.*

## 1.3 Research problem

In the near future the household's commitment to the supply chain will be more and more important in balancing the production and consumption of energy. In order to ensure a clean environment and adequate supply of electricity, we must adapt the market to meet future needs.

Being able to understand this process, it is important to understand how value co-creation occur and what kind of role the engagement plays in this process. This study investigates, how value is co-created in the context of Consumer Demand-side Response Service and what leads to customer engagement. The main research question is:

*How to Engage Households to the Future Electricity Demand-Side Response (DSR) Service?*

There is always possibility to opposite results when we are speaking of actor's relationships in service innovations. Since this service has not yet been developed and has not yet been released to households, it is particularly important to investigate the possibility of value co-destruction. That is why this framework searches also the possibility of value co-destruction in this context of DSR service. The sub question is:

*Can the actor engagement lead to value co-destruction?*

This research has been carried out as a case study because it is best suited to study the phenomenon in this context. As this research searches the answer to the question of engagement, the connection to the value co-creation is crucial. This research focuses on value co-creation in a service ecosystem, where electricity demand-side response (DSR) service describes that context. Through these theories, a framework for investigating this case is created. The empirical part of this study is carried out through interviews using the Laddering technique. The results of the interviews will be compared with the framework created through the theory, which will be used to answer the research question.

## **1.4 Research design**

This research consists of two parts, a literature review and an empirical study. Literature review brings together the existing scientific research data of value co-creation, actor engagement and DSR creating a reference framework for the following empirical research. This framework was based on the models created by Storbacka et al (2016) and Grotherr et al (2018) for actor engagement. The theory of demand-side response was used to facilitate understanding of the prevailing context.

The empirical part was carried out as a case study. Data for the research was collected through interviews using the Laddering technique. This technique was chosen as it is best suited to investigate the factors that influence value co-creation in the deployment of a new service. It also gives the explanations for the end-user's requirements that eventually leads to actor engagement and value co-creation. This Laddering-technique has already yielded excellent re-

sults in examining the value factors involved in service ecosystem (Reynolds & Gutman, 1988). That is one of the reasons why it was chosen for this study also.

## 1.5 Thesis outline

The master's thesis is dealt in two parts, theoretical and empirical part. The structure is like follows.

**The first** chapter includes the introduction to the study. It consists of the background of the study to clarify the motivation factors associated with the research. It gives the objective to the research and introduces the problem that the research seeks to solve. The first chapter also gives a brief description of what research methods will be used in the work and what kind of sections the whole research will consist of.

**The second, third and fourth** chapters consist the theoretical part. It is the literature review of the main perspectives: DSR service, value co-creation, value co-destruction and actor engagement. It provides the overall understanding of the main concepts of these theories. At the end of these literature parts, a new framework has been introduced, which has been created from these main theories. This will be used as a lens to explore the data of empirical part.

**The fifth** chapter is for the research methodology. It explains the methodology that has been chosen to this study and introduces the research strategy with the method of data collection and data analysis. It also explains more about how the data has been gathered, introducing the profiles of the research participants and how they have been selected.

**The sixth** chapter explains how the collected data is brought into an understandable form. It explains in more detail how the collected data is divided into themes and presented as thematic maps to clarify the matter. The seven thematic maps form the interview results has been presented.

**The seventh** chapter "findings" explains more detailed the thematic maps and its results. This chapter highlights seven themes that emerged from the results of the interview. The results will be described in more detail, and what they mean in this context creating the basis for the next discussion part.

**The eight** chapter is the discussion part, which explains more about the findings and gives also the answer to the research questions. In this part the implications for research and practice are given.

**The ninth** chapter of this study is conclusion, which summarizes the whole work together. This chapter includes also the contributions, limitations and suggestions for future research. It also discusses the reliability of the results. From the end of this research the used references and the attachments can be found.

## 2 DEMAND-SIDE RESPONSE SERVICE FOR HOUSEHOLDS IN ENERGY MARKETS

Demand and supply are well known and much used terms on the business economics. As it is well known, the demand and supply should be in balance so that the organization's operations are profitable. The same law of demand and supply stays in energy field, considering the slight difference that production cannot be higher than consumption. This means that less energy is being produced, which is estimated, and the gap is closed by purchasing it on a daily basis in the energy market. If there are spikes in consumption, they are also compensated by these means, which in turn are reflected in the selling prices of electricity to consumers. In the future, as consumption continues to increase with smart devices, it also poses a challenge to electricity production. Systems must be able to respond faster to ever-changing needs. As one solution, DSR service is considered. It is also in favor of environmental protection when there is no need to launch back-up power plants (Puikkonen & Raati, 2018).

### 2.1 The meaning of demand and supply

Needs and production come from economics, where the ultimate purpose of all economic activity is to satisfy people's needs. It is very challenging that some of our needs are unconscious and that our needs are constantly changing as our environment and ourselves change. Therefore, it is also challenging to consider these aspects when designing a service, as they may change in a moment (Pohjola, 2018).

Pohjola (2018) explains that the needs are met by consuming commodities, which can be tangible (such as clothing, food, computers) or intangible (such as services). Nowadays, the structure of the cult has become more and more focused on the services to which the growth of digitalization has contributed. As consumption increases, the number of needs and, consequently, their production also increase. However, it must be borne in mind that the resources of the

national economy are scarce, with a limited number of production plants, workers and raw materials producing the necessary needs. Thus, the availability of commodities limits the need for satisfaction, which is the most important starting point for economics. The consumer makes a decision based on the availability of the commodity, how well his/her needs will be met and what his personal financial situation is. Thus, the demand for a particular commodity is affected by (1) the structure of consumer needs, (2) commodity own price, (3) the prices of other commodities and (4) consumer income, which is determined by the demand for the commodity. On the other hand, the supply of commodities is the result of decisions made by commodity-producing companies. The commodity market, on the other hand, offers a field where exchange is taking place. The price and volume of commodities will affect when the demand and supply meet (see Figure 1). This is very important for the success of the market (Pohjola, 2018).

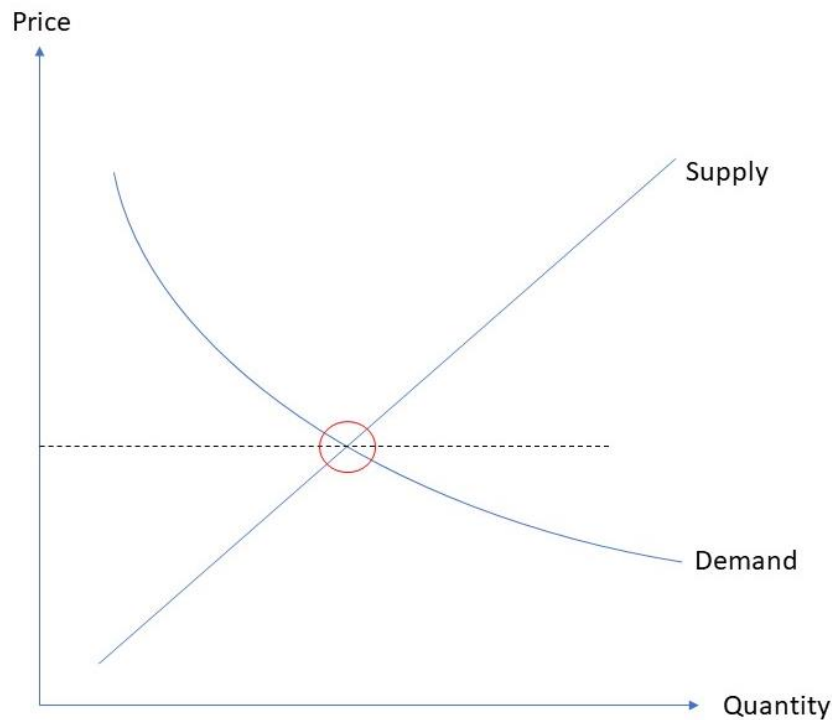


FIGURE 1 Desired supply and demand status (Pohjola, 2018)

If we think of the electricity market, the same balance is sought even though it is a slightly different commodity market. In any case, consumption is high even if the price is high. There, the price can regulate consumption a little more moderate, but it will not end. When it comes to demand elasticity, it means trying to regulate the demand for a commodity so that the potential for supply is

achieved. That is, if supply cannot be increased as quickly as demand sets it up, demand will be reduced to the supply level, i.e. consumption will be reduced. As the future power generation methods will change even more towards the inflexible form of production, these demand elasticities are needed from households. The following sub-section details the DSR service.

## 2.2 DSR service

Consumption and production of electricity must be balanced at all times. As the volume of non-flexible production, (e.g. nuclear power, wind power) and renewable energy increases, there is a need for demand-side response. Demand-side response means transferring electricity from a high consumption to a more moderate consumption time or momentary change in the use of electricity. According to the Paris Agreement (Ympäristöministeriö, 2016), our energy system must be (nearly) emission-free by year 2050, which means that fossil fuels must be completely abandoned over a few decades. As we are aiming for an emission-free era in power generation, the significance of DSR will increase even further.

Muratori & Rizzoni (2016) describe demand response as a technological solution to make electricity demand more flexible, which allows private customers to modify their demand profiles to fit the needs of energy supply. It is made for to match peak demands, follow seasonal and daily fluctuations, and ensure reliable operation of the electric power system. Instead of adapting electricity generation to match changes in demand, the demand itself must be more flexible that the system works in overall (Muratori & Rizzoni, 2016).

When we look at consumer DSR programs, the main target is to influence consumer's habits in their energy consumption to cover the needs of electricity grid. To meet this goal the proper signal must be sent to the final customers. The visible benefits from this system are obtaining cheaper energy and getting much reliable systems. That is what smart grid and DSR system is offering. According to Siano & Sarno (2016) the drivers in restructuring of the electric power industry has been the new renewable energy technologies, the incentives to renewable sources usage and the introduction of the Information and Communication Technologies (ICTs) (Siano & Sarno, 2016).

### 2.2.1 The benefits and challenges of DSR service

The benefits of DSR is well known. O'Connell et al (2014) have investigated the benefits and challenges of electrical DSR. Although the benefits are in higher penetrations of renewable resources on the power system, and an increase in economic efficiency through the implementation of real time pricing, DSR is not without its challenges. They listed the key challenges as reliable control strate-



gies and market frameworks so that DSR resource can be used optimally. The biggest challenge is then the lack of experience (O'Connell et al, 2014). That is why it is important to use pilot projects in order to gain insight into the functionality of the system in the relevant target group and market. Like in Finland, they have had some project going on around this issue, where they have searched the suitability of household heating loads to this DSR service (There, 2016).

In Finland, large-scale industries have been operating as a reserve for maintaining power balance for a long time. However, the focus has been only on large industries such as the forest, metal and chemical industries. In the future, the need for smaller participants will play also an important role; one of the target groups is households. In order to bring households into DSR system, the market must change. New players, such as an independent aggregator, should be involved in the market (Fingrid, n.d.).

### **2.2.2 The role of independent aggregators**

Aggregator activities have already taken place elsewhere in Europe and have gained good experiences. However, the activity is still not very big, but its necessity in the near future is well-known. According to the article of Gkatzikis et al (2013) aggregators are entities in the electricity market that act like brokers between users and the electricity grid operator. They are responsible for the communication and control devices at end-user premises from the installation up to the maintenance of connections. In the case of peak-demand emergency they can turn off the energy intensive appliances of the users, e.g. heating system or air-conditioning, with these devices for a short period. From these operations, the aggregator gets monetary reward from the electricity grid operator and the aggregator, in turn, provides monetary incentives to home users to modify their demand pattern through a day-ahead market. As the energy intensive appliances are turned off for a short period, it does not affect the general living comfort in any way (Gkatzikis et al, 2013).

According to Puikkonen & Raati (2018), in order to have such an approach to work in the current market in Finland, households should be involved in more than one hundred to this DSR service. The aggregator should get several small residential DSR assets to build a larger unit to participate in the current market. Although, there are possibility to obtain household heating - loads with this system, to get the acceptance from customer to use this system, is another case. It needs awareness about customer's value creation in these cyber-physical systems and services (Puikkonen & Raati, 2018).

### **3 VALUE CO-CREATION IN SERVICE ECOSYSTEM**

To get an understanding of value co-creation, the overview of dominant logic by Vargo & Lusch (2004) is recommendable. Also, the idea of service innovation in information system field is important to notice. That is why, in this research, first introduces the service innovation, then explain more about service-dominant logic and after that give a good overview for value co-creation. Together with this theme, the idea of value co-destruction will be presented and what it means in this DSR service context.

#### **3.1 The base for value co-creation**

The marketing science researchers have been investigated the meaning of customer value expectations for a long time, highlighting the fact that it has the most influential impact on customer decision making. Zeithaml (1988) has been described value is perceived as a result of exchange, where benefits are generated by wasting resources. Defining value is quite difficult as it has many meanings which shows the difficulty in conceptualizing and measuring the value constructs in research. However, the perceived value can be described like Zeithaml (1988) as the customer's overall assessment of the utility of product or service which is based on received and given perceptions (Zeithaml, 1988).

As the commodity market has become more and more service oriented (Pohjola, 2018), this perceived value perspective has brought new variations to customer engagement and value co-creation researches, based on individual value factors. Vargo & Lusch (2004) introduced the idea of value co-creation from the service-dominant logic point of view where value co-creation happens through customers with the help of organizations value propositions. The next sub-chapter describes more about this phenomenon.

### 3.1.1 From dominant logic to service dominant logic

Vargo and Lusch (2004) has introduced the dominant logic for marketing where service provision is primary to economic exchange. The focus is on intangible resources, the cocreation of value, and relationships. As early marketing thought was concentrated on the products and other physical goods, this new service-centric view of marketing was more eager to make better value, where marketing was considered as continuous learning process. The process includes four main activities, which are related to identifying organization's core competences, identifying other potential customers (entities), cultivating relationships and analyzing financial performance from exchange. The main idea in this process were the customer centric and market driven view, where collaborating with and learning from customers and being adaptive to their individual and dynamic needs are the core thing (Vargo & Lusch, 2004).

Lusch and Nambisan (2015) introduced later a broadened view of Service innovation, which were based on this Service-Dominant logic. They concentrated in their research more to the actor-to-actor (A2A) relationships and built a tripartite framework of service innovation which was formed of the components of service ecosystems, service platforms and value co-creation. They examined these components of the information technology point of view and introduced its implications for research and practice in digitally enabled service innovation. They found that as there can be seen the significance of platforms and ecosystems in shaping the evolution of markets and industries, it is important to consider in devising a broader conceptualization of service innovation (Lusch and Nambisan, 2015).

Vargo & Lusch (2004) have defined the Service-Dominant logic as applying specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another actor or the actor itself (Vargo and Lusch 2004). S-D logic consist of the elements: Service, which reflect the process of doing something beneficial for and in conjunction with some entity and goods (appliances), that serve as alternatives to direct service provision. Therefore, the service can be thought of as an exchange process: service is what is always exchanged. Another, important element in S-D logic is resources, which they meant the function of how something (tangible or intangible) is used or can be used. Those resources consist of two parts which are operand and operant resources (Lusch and Nambisan, 2015).

According to Vargo and Lusch (2004) the difference between operand and operant resources are that operand resources are tangible and static and operant resources are often intangible and dynamic. Operant resources can create value themselves, but operand re-sources need action behind to create value. Thus, operand resources can be seen as an actor and operant resources as a resource for an action. As service-oriented model highlights importance of the intangible and dynamic operant resources for the competitiveness and success of a company, the ordinary production and product-oriented model saw all the resources merely as operand and passive resources. The most important fea-

tures for the competitiveness of the company were specialized knowledge and skills (Vargo & Lusch, 2004).

### **3.1.2 Idea of service innovation**

Lusch and Nambisan (2015) introduced the value co-creation as third component of service innovation. When talking about added value, it means the process of firms transforming matter to change its form, time, place, and possession. It is important for the creation of value that actors are constantly dropping and forming new connections, and value experiencing is dynamic (Lusch and Nambisan, 2015). This process can be described as value-in-use, where organizations do not have possibility to deliver value. It means that organizations can only offer a value proposition as an invitation to engage with them (and potentially other actors) for the co-creation of value (Vargo and Lusch, 2004; Lusch and Nambisan, 2015).

According to Lusch and Nambisan (2015) value co-creation happens through resource integration and service provision. In the S-D logic the resource integrators are all the actors in a network of other actors, so all the actors are potential innovators or co-creators of value. The role of actors in this context is significant as they can proactively support the process of value co-creation by establishing new organizational mechanisms and making appropriate changes to their internal processes. As in this process the information exchange is remarkable, the actors develop new goals and pursue new opportunities, and this includes innovative solutions. Also, there are many possibilities to develop richer environments for value co-creation (Lusch and Nambisan, 2015).

This idea of service innovation has created the base for value co-creation. Only through this actor and resource integration, where actors are innovating with each other's, the value co-creation is possible to occur. As the organizations do not have possibility to deliver value, the key role is by these actors in the field. If the actors might not feel their expectations met or they might get negative user experience, the value co-creation does not necessary happen and the possibility to value co-destruction exists. The following sub-chapter describes more about this value co-destruction and what are the main threats that leads to this situation.

## **3.2 Value co-destruction**

To understand better, what value co-destruction means, the definition to this phenomenon is worth to state. According to Plé and Cáceres (2010) value co-destruction refers to the ability to adapt to the prevailing environment where the system operates in the background. They introduce the idea to the service dominant logic that the value co-creations do not occur always. As service dominant logic offers the idea that resources are utilized always positively to the

benefit of service ecosystem, this value co-destruction point of view alternatively serve the idea of the resources are used to harm one or all of the parties in this process. A good example of this is when the customer gives negative feedback about the company and its products to other users and thus spreads the bad image to the company. In this way, the customer launches the value co-destruction of both parties, abusing the value propositions that the company offers (Plé and Cáceres, 2010).

Many other researchers have also offered their point of view to value co-destruction from a slightly different perspective. Like Vartiainen and Tuunanen (2016) they stated that value co-creation and value co-destruction can happen simultaneously as the field of activity is always changing and resources are active amongst themselves. They described this phenomenon on the IS design point of view bringing the idea of that these both (value co-creation and co-destruction) are dynamically connected. Also, Lintula et al (2018) have considered this value co-destruction from the mobile games point of view, where they stated that experiences with negative outcomes can be considered as value co-destruction. These feelings are like sadness, hurt or disappointment which can be experimented, leads to value co-destruction. Strict opinions on the co-destruction of value have given Echeverri and Skålen (2011), who stated that value co-creation (which could be seen as unrealistic conception) should not be seen as only possible outcome from the interaction with customer and service provider, but also value co-destruction. They have described this phenomenon as interactive value formation, where value co-creation and value co-destruction are even, and derived from consumers and providers together. The interesting point of view considering this research is the study of Prior and Marcos-Cuevas (2016), who introduced the idea of actor engagement styles affecting the value co-destruction. This perspective has been presented in the following sub-chapter.

### **3.2.1 Actor engagement styles affecting value co-destruction**

Prior and Marcos-Cuevas (2016) have also searched this concept of value co-destruction, which extended the notion of subjective value in service-dominant logic (SD-logic) and value co-creation with negative customer experience. They brought to this phenomenon the engagement point of view and how this affect the value co-destruction. Prior and Marcos-Cuevas (2016) stated nine actor engagement styles that influence the ways in which actors receive information, which affected the manner of their collaboration. They found it important as it allows a more in-depth understanding of how actor behaviors influence perceptions in value co-destruction contexts. These nine engagement styles related on the way the actor articulates their desires to other actors, which were dealt in (1) actor is very clear and deliberate (“explicit”), (2) actor is sometimes clear and sometimes not (“hybrid”), (3) the actor is not deliberate or clear (“implicit”). Also, the behavior of actor engagement was divided into parts according to how active they participated. These were (4) significant dedicated effort given

to actor-to actor interaction (“active”), (5) participation in some situations but not all (“hybrid”) and (6) choosing not to participate (“passive”). The third way to deal these engagement styles related to the ways the customer is probably experiencing the value co-destruction, which are (7) goal prevention and (8) net deficits. The last one is the fact that (9) how likely the actors are to declare their desires to other actors (“dynamics”) (Prior and Marcos-Cuevas, 2016).

These nine statements indicate that these styles of actor engagement have a major effect on whether the process leads to value co-creation or value co-destruction. They raise the importance of engagement as one of the main points that have an impact on the final outcome. According to the research of Prior and Marcos-Cuevas (2016), value co-destruction can be seen to occur when the result of actor evaluations of inter-action experiences is negative or when they rest on incomplete or misinterpreted information, which is the result of decline in a customer’s well-being. In their study they concentrated to the question of how actors develop negative appraisals, to clarify actor experiences from value co-destruction (Prior and Marcos-Cuevas, 2016).

There may be possibility to value co-destruction when activities and actor requirements do not align. As the service ecosystem provides a platform for all members with different kinds of requirements, at the same time it provides a basis for conflict. That is why it is important to understand how service ecosystem influences on value co-destruction. As Prior and Marcos-Cuevas (2016) founded in their research, if value co-creation occurs, this does not preclude value co-destruction. This arises due to two characteristics of lengthy and complex actor-to-actor relationships across a service ecosystem. They listed nine types of actor engagement behaviors, which influence actor value co-destruction. In addition, the bases in actor-to-actor relationship should be in condition. It means that any given action should be balanced between benefits and opportunity costs, because there is always scope for the coexistence of both value co-creation and value co-destruction. Also, it should be noticed that the goals are not always consistent. Different actors may have different priorities from the service experience and if the goals are not complementary the value co-creation does not occur (Prior and Marcos-Cuevas, 2016).

## **4 ACTOR ENGAGEMENT AS A BASE FOR VALUE CO-CREATION**

Actor engagement has been seen as a stage leading to value co-creation. In this chapter the meaning of actor engagement has been presented so that the overall picture of whole value co-creation process can be perceived. Through two frameworks of actor engagement, the lens has been created for helping to interpret the results of this research.

### **4.1 Background to actor engagement**

The engagement process has been studied in many different fields as it explains more about people's reasons for behaving. Although the development of society has brought new trends to researches, the basic idea of engagement remains in the background. There can be seen different alignment from the fields of psychology, management, information systems, marketing, education, and practitioner literature. Vivek et al (2012) stated that 1990s researchers were concentrated more to work and role engagement where the definition for the engagement is a state of mind which affects people's behaviour. They concentrated in their own study to engagement in marketing field and build a conceptual framework to describe customer engagement (CE). The framework describes CE, which is based on customer participation and involvement, and where the value, trust, affective commitment, word of mouth, loyalty, and brand community involvement are potential consequences (Vivek et al, 2012).

In the information system field, the studies are more about customer engagement in product innovations and system development. Like in research of Sawhney et al (2005), they presented co-creational perspective of the customer engagement in virtual environment. They stated that taking advantage of the information flow, it will help the companies to develop their systems better with a little effort. There are also many studies of mobile user's engagement,

like the study of Kim et al (2013) where they explain mobile user engagement intention through user's motivations, perceived value and satisfaction.

From all of these actor engagement studies the prevailing environment is of great importance. It has the effect on how actors can sense the things around and how they experience them. Also, the value propositions sent by the organization are more easily perceptible when the environment is most suitable. The next sub-chapter describes more detail the meaning of service ecosystem for getting the overall understand of value co-creation in service ecosystem.

#### **4.1.1 The Service Ecosystem**

The service ecosystem approach emerged from the research of Vargo and Lusch (2004) of Service dominant logic which put the service thinking on the primacy rather than the goods. According to Akaka et al (2013) the service ecosystem approach focuses on to understand the drivers and dynamics of social and economic systems where the exchange is influencing. The ultimate idea is on the levels ("macro, meso, micro") that make the integration and service- for service exchange with actors and resources possible by creating social contexts through which value is created (Akaka et al, 2013).

This service ecosystem emphasises the market interactions where customers, firms and other stakeholders are networked together creating rules for the system. However, there are also human actions and interactions shaping the ecosystem through their relationships. That means that the service ecosystem is an ever-changing environment where continuous observation and attention to change ensure a successful service experience. The social norms and culture are affecting in the background in this service ecosystem (Akaka et al, 2013; Akaka & Vargo, 2015).

As this service ecosystem is affecting in the background, by knowing its every stage is worth to notice. The main role are also the actors and resources which interaction shaped the field all the time. By knowing the progress of each stage, the upcoming features can be anticipated. The theory of Storbacka et al (2016) have introduced the idea of these steps towards the value co-destruction by naming it as microfoundational view. Through this theory the idea of service ecosystem affecting the whole value co-creation process can be perceived.

## **4.2 The actor engagement as a microfoundational view for value co-creation**

Storbacka et al (2016) introduced the actor engagement as a microfoundational view for and value co-creation. They stated that the value co-creation is difficult to observe empirically whereas actor engagement was observable, so they introduced a framework where value co-creation occurs by actor's engagement in service-for-service exchange and in related interactions that lead to resource



integration. The point was that if there are no actor engagement, it means that no resource integration happens, and no value can be co-created (Storbacka et al. 2016). To understand this collective phenomenon of how individual-level factors impact organizations, how the interaction of individuals leads to emergent, collective and organization-level outcomes and performance, and how relations between macro variables are mediated by micro actions and interactions (Felin et al 2015), we need to understand the constituent parts that makes it happen: The individuals and their social interaction (Storbacka et al. 2016).

When talking about microfoundational concept, it is important to realize the logic of the Coleman bathtub (Coleman 1990), where the macro - micro levels and their links between each other are presented. It describes macro-macro levels by social facts that leads to social outcomes and micro-micro levels by conditions for action that leads to observable actions. After this approach several researchers have brought up their point of view of this "bathtub" like Hedström and Swedberg (1998) and Jepperson and Meyer (2011). However, from these all can be seen the logic of the Coleman bathtub, including the social mechanisms and the macro-meso-micro levels of analysis, that are the cornerstones for generating a microfoundational view of value co-creation. As Storbacka et al (2016) pointed out in their framework, it can be used to investigate actor engagement as a microfoundation of value co-creation within a service ecosystem (Storbacka et al, 2016). For my research, I have used this framework to identify the connection between the customer engagement and value co-creation and/ or value co-destruction in the context of DSR service.

Storbacka et al's (2016) framework of actor engagement describes well the idea of how engagement leads to value co-creation and what requirements are there for value creation to occur. The following figure shows the elements of each steps. The levels "macro", "meso" and "micro" describes well each level: Macro as the ecosystem and institutional logic, meso as the sets of actors and their resources and micro as actor engagement.

The logic of this model proceeds as follows (see figure 2). The arrow number 2 shows the institutional logic of service ecosystem that creates engagement context, which enables actors to engage with their resources on engagement platforms. The situational mechanisms, which are conditions for actor engagement, forms the meso level conditions for action. These have influence to the engaging actor (see arrow 3) and together with the actor's disposition to engage, the step 4 (arrow 4) will be reached which is engagement activities. From this level the observable engagement properties can be characterized. The arrow 5 shows the next situation, when many actors has been engaged and emerged various resource integration patterns on the meso-level. As a result of this, it transforms the extant resource configurations of the actors and leads to value co-creation (see arrow 6). The most crucial area in this model has been marked with dot lines, which describes the stage when the actor engagement happens. There is a possibility also that service ecosystem leads straight to the value co-creation (see arrow 1). Overall, this model explains the actor's engagement process through two different actions: the disposition of actors to engage, and the

activity of engaging in an interactive process of resource integration within the institutional context provided by a service ecosystem (Storbacka et al., 2016).

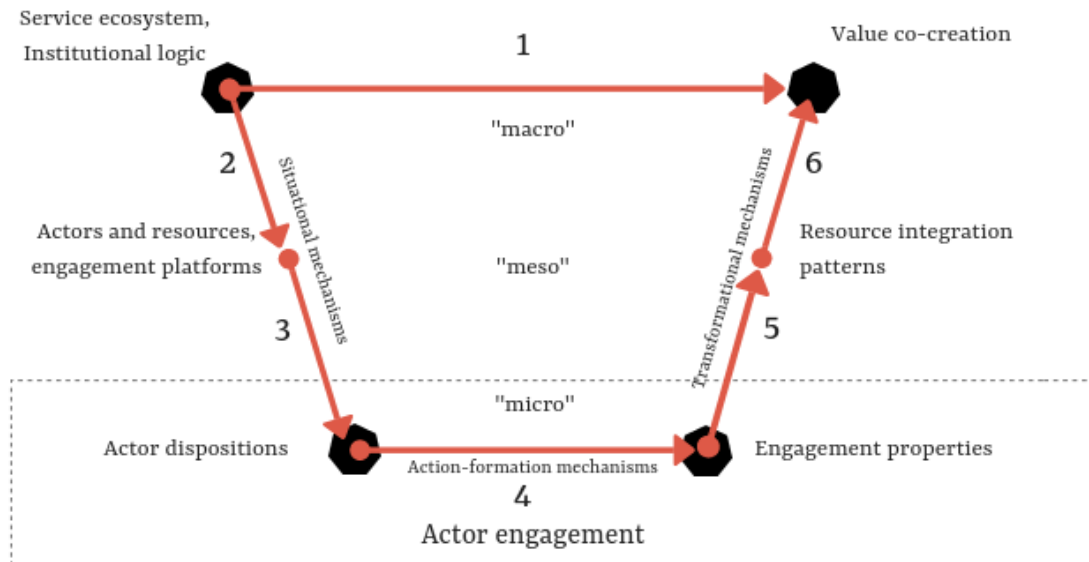


FIGURE 2 Actor engagement explains value co-creation (Storbacka et al., 2016)

#### 4.2.1 Multilevel design framework

Grotherr et al (2018) has used this Storbacka et al's (2016) model as the bases to create multilevel framework which helps in designing these service systems. (See figure 3) They stated that as the value co-creation is a complex phenomenon which is difficult to observe, it is even more challenging to design. This model helps to understand how design activities, decisions, and interventions with the engagement platform and individual actors at the micro level impact with the institutional set-up of the service system at the macro level. As the design activities has to be responsive to the changing context, this framework provides better understanding for how the interaction of service systems' design leads to the emergence of service systems. They stated that one thing that leads to the service system success depends on actor engagement (Grotherr et al., 2018).

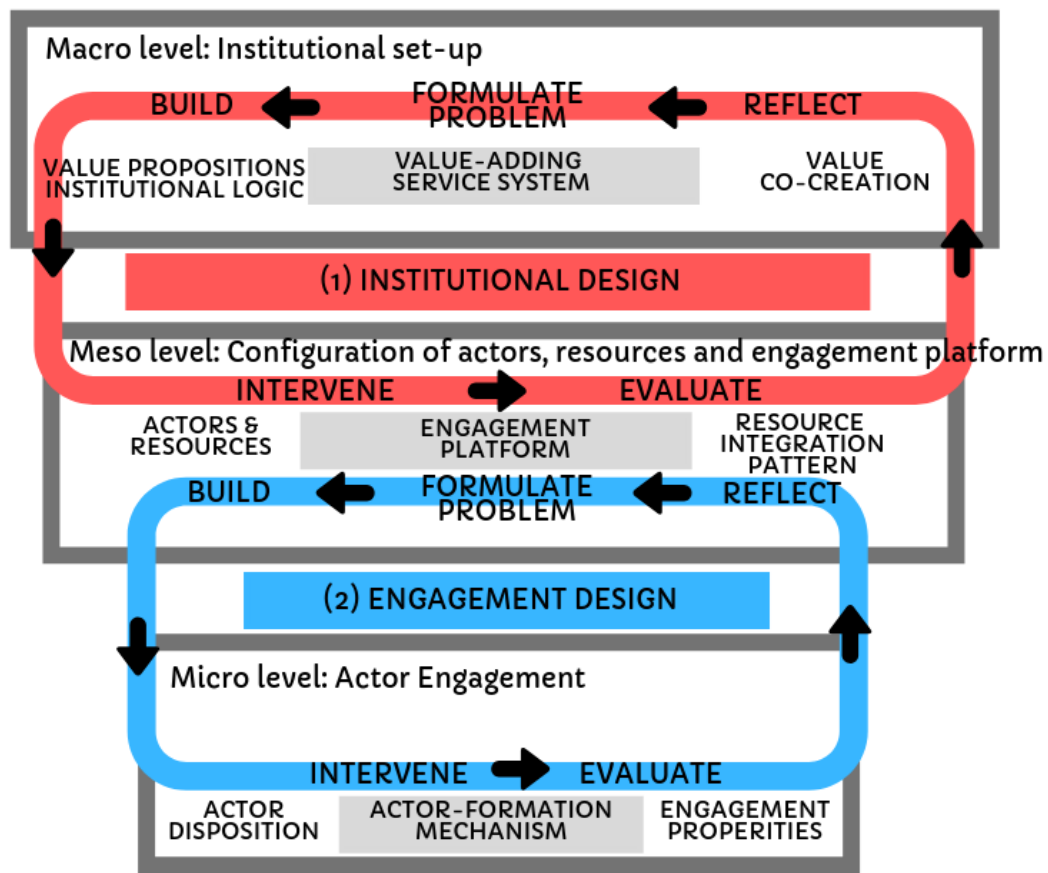


FIGURE 3 Multilevel design framework for service systems (Grotherr et al, 2018)

Grotherr et al's (2018) framework is based on two theoretical foundation, which are the iterative and validating design process that eliminates the unpredictability's of designing sociotechnical service systems in highly dynamic environments. The other foundation that they used is the multilevel perspective, which is the combination of the goal of value co-creation and the corresponding context with observable phenomena and designable elements that is based on microfoundations for value co-creation (Grotherr et al, 2018).

This framework provides insights into the dynamics of service systems design by linking abstract value co-creation and observable actor engagement with the corresponding design activities. They have combined to the theoretical framework the design activities to uncover the interdependence between macro, meso, and micro levels and upwards from the micro to meso to macro level and the dynamics in service systems design and evolution. This framework is split in two independent design cycles that are (1) the institutional design and (2) the engagement design (Grotherr et al, 2018).

In this first level the main thing is to find the right configuration of actors and resources that represent effective resource integration patterns and lead to value co-creation. Building these resource integration patterns; the main thing is to take care of the institutional set-up of the service system that provides the

frame in which service system are designed and operated. The iteration of the institutional design cycle refines the institutional set-up and related components, such as the value proposition and configurations of actors and resources. The first thing is that the value proposition of the service system creates a frame that shapes the engagement design and willingness of actors to engage. The second thing that Grotherr et al (2018) pointed out was that substantial refinements of modification of actors facilitates resource integration by reducing, for example, engagement barriers of actors at the micro level (Grotherr et al, 2018).

The meaning of the (2) engagement design level is to build and instantiate sociotechnical components in a context that enables actor engagement with various dispositions for resource mobilization, thereby facilitating the emergence of resource integration patterns. As Grotherr et al (2018) pointed out in this level is necessary to engage multiple distributed actors within the service system for reaching the successful value co-creation. To facilitate value co-creation at the macro level, the effective resource integration on the meso level engagement platform is needed. Also, the engagement platforms need to provide mechanisms that facilitate action-formation mechanisms so that it enables the value co-creation to occur. There might come some challenges with determining the design of service systems and engagement supporting sociotechnical components such as engagement platforms as the actors' disposition to engage is difficult to determine (Grotherr et al, 2018).

Grotherr et al (2018) pointed out that several engagement-supporting mechanisms that are intended as action-formation mechanisms for facilitating resource integration must be applied to the engagement platform to stimulate actor engagement. These will reduce engagement barriers and instructs actors on how to engage within the platform. It is said that these engagement patterns motivate actors to engage, have a positive impact on actor dispositions and facilitate resource integration, which leads more and more often to value co-creation (Grotherr et al, 2018).

These two models (Storbacka et al, 2016; Grotherr et al., 2018) that describes service ecosystem through engagement process till value co-creation, will be used as the bases in this study of value co-creation in the context of DSR service. From these theories a framework has been created that describes engagement process in DSR service, which will be used as a lens in interpretation of the results of this study. This framework has been presented in the following chapter.

### 4.3 Creating a Lens

Helping to interpret the results in the findings chapter, the framework should be created. In this sub-chapter the lens will be presented, which will be used later in this research.

As these most important theories have been presented, the framework can be created. Considering the purpose of the study and the research problem in which the answer is sought, this model has been built. In this framework the

theories of Storbacka et al (2016) and Grotherr et al (2018) were utilized, as they clarified the importance of engagement and the integration of actors in the overall value co-creation process. To understand this DSR service context, the service ecosystem is worth to be described. The following figure (figure 4) shows the two phases of service ecosystem that is based on the previous studies of Puikkonen & Raati (2018).

In the first phase, there are three main actors in the service ecosystem: grid company (GC), independent aggregator (IA) and households (HH) (see figure 4). GC informs to the IA about the needs to reduce consumption in certain area of the country. As the need is urgent, the reduction will happen in seconds as the IA will take the capacity off from the certain HH groups. This pictures the normal situation. When we moved on the phase 2 and to the time, when HH have their own energy storage systems and own production, it changes the markets more. It gives an opportunity to the HH to sell direct to other HH. When more actors come in picture, it might increase the possibility to value co-creation. It may complicate the process of the original business idea, but also increase the competition when new players enter the market.

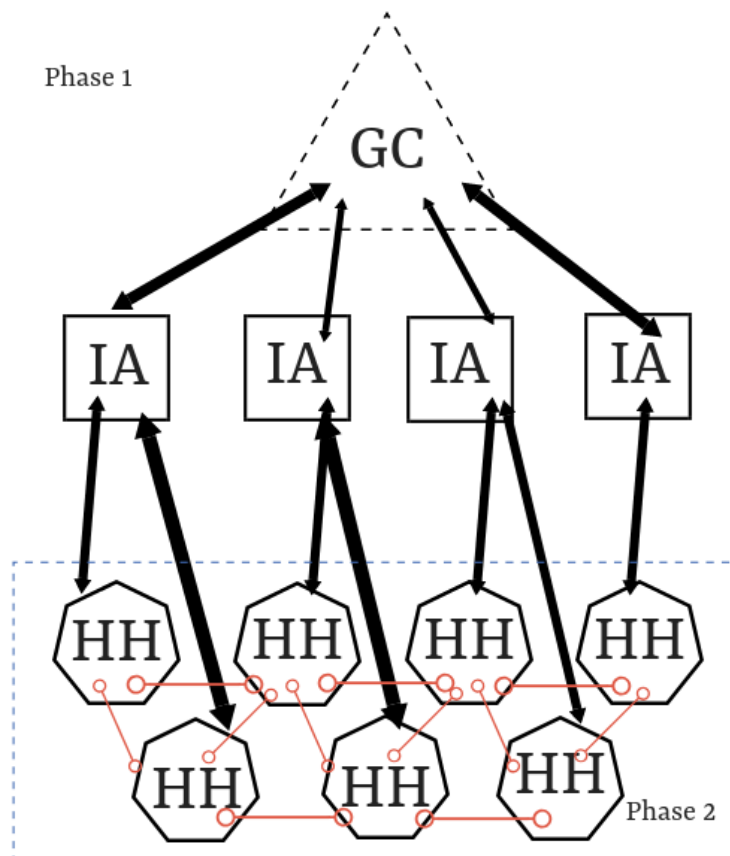


FIGURE 4 Main actors in service ecosystem

As this service ecosystem includes different kinds of actors, it sets specific requirements for the institutional design in the background. The institutional design makes the engagement platform possible and taking care of the engagement design, the actor engagement to happen. The platform in the background should be one that allows actors engagement. The rules and norms of the service ecosystem shapes the engagement platform, which enables actors and resources to integrate.

What are the actor's dispositions and engagement properties that leads to resource integration pattern? In this concept, it means that actors (GC, IA, HH) and resources (for example time and knowledge) should be in balance together so that the system works. If the connection with these AI and HH stops or these actors does not integrate with resources, the whole service ecosystem stops working and no value will be co-created. Also, if there are some adversities between these, the value co-creation will not happen and may lead to value co-destruction. In other words, if there are some problems with actor disposition or the engagement properties will be ignored, there is a risk that integration will not occur, and value co-creation will not happen. As the service ecosystem includes value propositions, when it is perceived as value adding, it may lead straight to the value co-creation.

The possibility of value co-destruction comes in picture at the latest when HH start the own production and storage and start to sell it further. The original idea of the service ecosystem changes and there will be no guarantee that the main need will be satisfied totally. Overall, every step in this framework includes possibilities of value co-destruction. The critical point is in the integration phase, when the connections will be formed. Although the engagement has been happened but if the operating methods differ or are distrusted, it may still lead to value co-destruction at this stage. In this context it means that if the HH does not allow the reduction in consumption or if they feel the service unreliable, they might by their own actions influence the value co-creation potential of the whole service ecosystem. In the following figure (figure 5) the created framework of value co-creation through actor engagement has been presented. This will be used later when construe the final findings of this research.

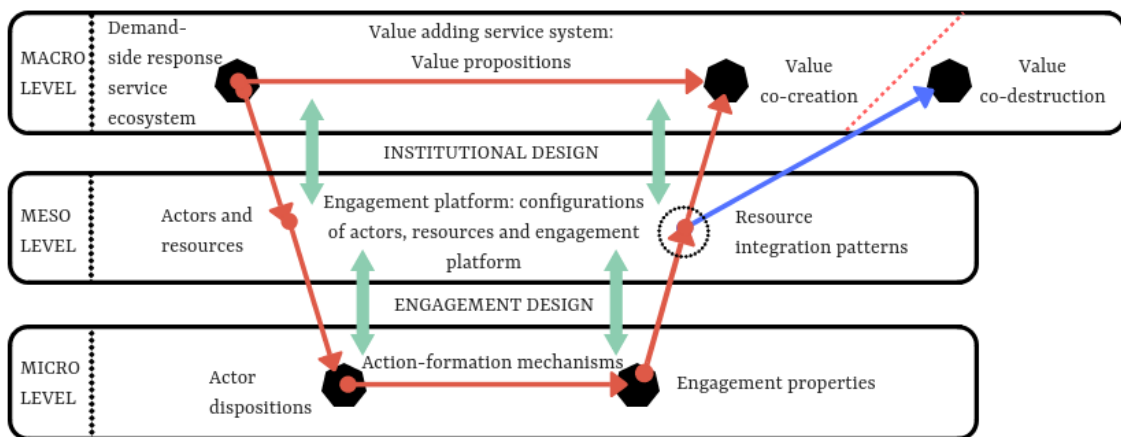


FIGURE 5 Actor engagement leads to value co-creation or value co-destruction

As can be seen from this figure, the equal opportunity is as value co-creation than value co-destruction. What kind of features are affecting in this context, can be sought out by making the field study. It is important to find out these features behind as these can be used when designing and developing this new service. From this field study valuable data can be received. The next chapter explains in more detail what kind of research methods have been used to get the needed information.

## 5 RESEARCH METHODOLOGY

This chapter explains in more detail the research method used in this study. Why this method has been completed and what research strategy will be used to solve the research problem. The chapter also briefly explains how the research data is collected and how it will be analysed at the end of this thesis.

The research question and the problem to be solved defines the research method for this study. The research strategy is created to help with this process. As this study search the field of value co-creation in DSR services, the study will be empirical, qualitative research. The next sub-chapter describes more about this research approach.

### 5.1 Research approach

The phenomenon to be investigated determines the research method used in the study. In the Information Systems field, both quantitative and qualitative research methods have been used. As this research focuses on studying the cognitive characteristics of a human being in connection with the deployment of a new service, the qualitative research method is the most appropriate. The main purpose is to get acquainted with the thoughts, emotions and motives associated with the phenomenon being studied. According to Myers & Avison (2002), as the qualitative research method has been developed in social science to help understand people and the social and cultural contexts within which they live, it also helps best in this study when investigating the value co-creation in the context of electricity demand-side response service for households (Myers & Avison, 2002).

It is important to understand the philosophical perspectives that relate to the underlying epistemology which guides the research. It refers to the assumptions about knowledge and how it can be obtained. These philosophical assumptions are dealt in three categories that are positivist, interpretive and criti-



cal. It is important to know what these assumptions means in order to conduct qualitative research (Myers & Avison, 2002).

Myers & Avison (2002) stated that positivist research is based on the assumption that reality is objectively given and can be described by measurable properties. In these kinds of studies, the theories are tested to increase the predictive understanding of the underlying phenomena. What differs to the interpretive researchers, they think that access to reality is possible only through social constructions such as language, consciousness and shared meanings. That is why in these interpretative studies the idea is to understand phenomena through the meanings that people assign to them. Understanding the whole process whereby the information system influences and is influenced by the context is worth to understand as it describes the whole underlying phenomenon. As for critical researchers, they concentrate mainly on oppositions, conflicts and contradictions in contemporary society, and seeks to be emancipatory. They think that social reality is historically constituted, which people has produced or reproduced. They maintain the social critique, whereby the restrictive and alienating conditions of the status quo are brought into light (Myers & Avison, 2002).

The chosen perspective to this research is the interpretive approach as the main idea is to find out what influence the value co-creation. In order to find out the effects, it is important to understand the user's requirements and the ones that influence the final selection in the service deployment.

## 5.2 Research strategy

This research strategy section defines more detailed references to this research. The chosen strategy to this study is case study as it best explores a contemporary phenomenon within its real-life context. According to Myers & Avison (2002), this method is suitable especially when the boundaries between phenomenon and context are not clearly evident. The case defines the underlying phenomenon, which will be investigated in the research. It can involve single or multiple cases and numerous levels of analyses. Data collection can be made by archives, interviews, questionnaires and observations (Myers & Avison, 2002). As case studies explores within its real-life context, its suites well to accomplish various aims like providing descriptions, testing theories or generating new ones. That is why it is also commonly used qualitative method in information systems field. (Eisenhardt, 1989) The following table compares the case study to another suitable related strategies.

TABLE 1 Case research characteristic comparison with related strategies (Cavaye, 1996)

	Case research	Field study	Action research	Application description	Ethnography
Use of case method	X	X	X	X	X
Aims for understanding of context	X		X	X	X
Does not defines a priori constructs	X		X	X	X
Topic defined by researcher	X	X		X	X
No intent of interference in phenomenon	X	X		X	X
Attempts to contribute to knowledge	X	X	X		X
Relates findings to generalizable theory	X	X	X		
Interpretation from researcher's point of view	X	X	X	X	

As the chosen perspective to this study is interpretive approach, its meaning in case study is presented as follows. According to Walsham (1995) human interpretations concerning computer-based information systems are of central importance to the practice of information systems which has been recognised increasingly. In these studies, the focus is on human actions and interpretations surrounding the development and use of computer-based information systems. It requires the researcher to combine grounded theory with insightful analysis and collection of in-depth case study data. It helps also in the generalizability of the research results as it can be generalizable to theoretical propositions (Walsham, 1995).

Walsham (1995) introduced four types of generalization from interpretive case studies which are the development of concepts, the generation of theory, the drawing of specific implications, and the contribution of rich insight. Although these are well-defined ways to generalize the results, it is worth remembering that we should not be misled into too narrow a view of the generalizations. These categories should not be mutually exclusive (Walsham, 1995). In this thesis, the grounded theory with insightful analysis and in-depth case study data will be used getting the rich insights to help in developing new concepts and understanding better the effect of actor engagement in the process of value co-creation in service ecosystem.

Using case study as a strategy in this thesis, I hope to find an answer that will enable households to engage in the future electricity DSR service. The results of this research will help to develop this new service, creating it the most user-friendly service as possible while facilitating the deployment of a new service. It is also better able to guarantee the continuity of use, when considerations that lead to a possible value co-destruction are taken into account in the study. To obtain the desired results, an interview survey was chosen as the data

collection method with a special Laddering-technique. In the next sub-chapter, the base of Laddering technique is presented.

### 5.2.1 Laddering – technique

As personal values research in marketing has increased, more and more researchers are interested of in-depth profiling of consumer and his or her relationship with products. According to Reynolds and Gutman (1988) this personal value perspective to the marketing of consumer products can be classified as “macro” and “micro” approaches. Macro approach represents sociology, where the respondents are categorized into predetermined clusters or groups where products and their positioning strategies are then directed to appeal. As this macro approach does not give the overall value orientation of target segments, the micro perspective gives the psychological perspective that is needed. The micro approach concentrates to the linkages between the attributes that exists products (called “means”), the consequences for the consumer provided by the attributes and the personal values (called “the ends”) that the consequences reinforce. In this theory the premise is that consumers learn to choose products containing attributes which are instrumental to achieving their desired consequences. By this theory, it easy to determine why consequences are important, especially personal values (Gutman, 1982; Reynolds and Gutman, 1988).

Interviewing techniques examine the meanings the respondents have in relation to the features being studied. Respondents are asked to choose the things they consider most important for them, which will be discussed in more detail. As specific questions about features, "why it is important to you" is used. The questions are continued step by step up to the ultimate value factor (Reynolds and Gutman, 1988).

This interview technique requests the special interview environment as the respondents need to be focused for getting the most realistic answers as possible. According to Reynolds and Guttman (1988), the environment should be such where respondents are not threatened and wiling to be introspective. The purpose is to get them look inside their perceptions to get the underlying motivations behind. They said that the respondents can be guided by saying that there are no right or wrong answers, so that they could feel more relaxed. The goal for these questions is to understand the way the respondents sees the world surround them. This method helps the respondents critically examine their common daily behaviours and context. The vulnerabilities that might come later within the interview, can be accomplish by stating that the questions may seem obvious or stupid, in spite of that the interview should follow the certain specific guidelines (Reynolds and Guttman, 1988).

How this Laddering method has been used in this research will be described more detail in the sub-chapter 5.4.

### 5.3 Research case

The case study research includes specific tasks that should be taken care of before starting. It is a process that precisely defines the case that will be investigated. According to Eisenhardt (1989) building theory from case study research starts at defining the research question and then with selecting cases. The case means the specified population. It is very crucial for the study as it defines the set of entities from which the research sample will be taken. It also helps in controlling the extraneous variation and defining the limits for generalizing the findings. Selecting cases can be made based on theoretical point of view, randomly or by sampling. In this thesis the case has been chosen relying on theoretical sampling (Eisenhardt, 1989).

The theoretical sampling means that the cases has been chosen from theoretical reasons. Those can replicate previous cases, extend emergent theory, fill theoretical categories or provide examples of polar types. In this thesis the selected case is to find out the factors that influence value co-creation in the household's future DSR service. This will naturally continue the research of Puikkonen & Raati (2018) of business models for this service.

DSR service for households means that in future the most powerful household appliances are connected to a remote-controlled device, which is managed by a new operator in the electricity market called an independent aggregator. The service has been created to ensure the flexibility of the power grid in sudden changes in consumption, thus creating a more secure electricity supply. This also means that it is not necessary to launch expensive and environmentally-non friendly power plants if the compensation for the electricity grid is obtained through households. Compensation for the power grid would be remote controlled by home appliances, turning off the power supply. The breaks would only be momentary, but they would be able to offset the load on the power grid for the next hours.

This case emerged as a result of the earlier research from Puikkonen & Raati (2018) on business models of this service. National electricity network operators saw the challenge of getting households to engage in this service because, after all, the benefits the households receive are scarce. The need for this service rises purely to the needs of the industry and the end user may not be able to see the ultimate benefit. The need for this service is particularly evident when moving to a greater extent to electric cars. Also, the increase in electricity consuming equipment will cause its own challenges. Moving towards a carbon-neutral production mode, the inflexible production mode increases. However, these forms of production are not able to respond quickly to meeting the needs of the power grid.

In this research, the focus on what factors influence the value co-creation in such a service ecosystem. It will be also search if there is a possibility to value co-destruction in that context. The possibility of value co-destruction is noticeable, because this service requires the engagement of hundreds of households

and household groups to make the service successful and possible. In other words, value co-creation does not happen if households do not engage to the service. Also, the service will not work without this engagement. Therefore, it is important to find out which user's value drivers will affect in the background.

Although this case study investigates one single case instead of multiple cases, it can derive valid results and can be generalizable. Since this case examines households with electrical consuming devices, it is easy to choose the participants to this research from this group. The following subsection explains in more detail how participants have been selected for research.

### 5.3.1 Participants

In this case, the population is selected according to the features that best describe the potential service user. The participants have been selected by sampling as those have to meet the requirements of the service user. This is to ensure that the final results are as reliable as possible and can be utilized in the development of the service itself. Thus, participants are selected according to a framework that covers the widest possible range of potential service users.

Participants in the study consisted of both men and women. They had either detached resident or terraced resident whose main heating mode was electric heating, or they had other high-consumption equipment such as an air heat pump, water heater or electric car. The data collection was made by interviewing the participants. The aim was to interview 20-25 people who were suitable for the target group, and 24 people participated in the interview. The following table shows the demographic details of the participants.

TABLE 2 Demographic details of the participants

Gender	
Male	11
Female	13
Age	
30 - 39 years	10
40 - 49 years	5
50 - 59 years	6
60 and over	3
Marital status	
Non married	4
Cohabitation	7
Married	13
Education	
Primary school / vocational education	8
Lower level education (polytechnic etc.)	8
Higher level education (master's degree etc.)	8

When potential people were listed, the participants were contacted personally to agree on the interview time. An adequate time for the interview was about 45 minutes to get the theme presented first and then continued with the interview. The participants did not have to prepare in advance in any way as all the necessary information was given at the beginning of the interview. The technique that were used in the interview was Laddering-technique. More about this technique is described in more detail in the section 5.4.

### 5.3.2 Case description and presentation of the themes to the participants

To get an overall view of the subject, the short presentation with figures of the service's features and its purpose to the participants were worth to present (appendix 1). The first figure (figure 14) illustrated the situation in the near future, without a flexible household, where the simultaneous consumption causes peak periods in electricity network. This picture illustrated the basic need for this new service.

The second figure (figure 15) illustrated with a brief description about a flexible household and how it works in the future electricity market. With the brief description, the participant got an idea of what role they have in this chain, what flexibility means at all, what kind of breaks are expected and how they are informed about it. I also introduced the remote-controlled device that will be installed in households. What kind of home appliances can be connected to it and how it controls those? The service interface was also outlined.

At this point, the participants were able to ask questions about the service activities. The reason why this service is important was not given, only the first picture described the need for the service. Only for what purpose the service is created was outlined. The intention was to avoid too much control of the respondents in a particular direction but given the opportunity to build their own opinion. This ensures that the final answers are as realistic as possible.

Next, participants were presented with seven different themes (appendix 2) related to the service itself. Since the study was intended to raise value factors affecting user choices and ultimately engagement, the themes were built according to what are the most affecting factors on deployment or usability of the new service. The subjects of these themes covered the whole functionality of the service, which was to be discussed in detail with the participants. One of the themes was the so-called additional theme, in which the respondent was able to define the topic to be discussed. In the data analysis section, themes are named as stimuli. The list of stimuli themes is briefly presented below. The whole list of stimuli themes can be found in more detail in Appendix 2.

- 1) Impact of service environment on user experience
- 2) Accessing information and information flow in the service
- 3) The ability of the user to influence the service functions by participating through the device or application itself.
- 4) User's own role in the chain

- 5) Effects of the use of service (flexibility of electricity consumption) on everyday life.
- 6) User goals and value factors
- 7) Additional theme (respondent can decide).

The themes were presented to the respondents with own A4 paper, which everyone could read through. They were then asked to choose from the list two of the things they felt most important to themselves. When the participants had decided on the most important topics, they were asked to list their priorities. After that, the interview was started by first discussing the most important topic and then the second most important topic. The following section describes in more detail the interview technique itself and how it works to get the requested results.

## 5.4 Data collection

The data collection method in this qualitative research has been made by structured interviews, using Laddering technique. The technique is an in-depth, one-on-one interviewing technique which helped to understand how participants translated the attributes of service into meaningful associations. This technique follows carefully the Means-End Theory (Gutman, 1982) which was introduced in sub-chapter 5.2.1.

According to the article of Reynolds and Gutman (1988) the Laddering method focuses on the linkages between the attributes that exists in the products or services, the consequences for the consumer provided by the attributes and the personal values the consequence conformed. It helps to understand how consumers transfer the attributes from services into meaningful association with respect to self. Laddering uses the tailored interviewing format with series of directed probes: For example, by the "Why is that important to you" - question, with the express goal of determining sets of linkages between key perceptual elements across the range of attributes, consequences and values (Reynolds & Gutman, 1988). The results will be published with figures and their scripts.

In this case research 24 people participate in the interview. Participants were interviewed personally, in a quiet state, so that everyone had the opportunity to focus on the interview. Most of the interviews were done face-to-face, with the exception of one that was implemented through Skype video conferencing. Each interview was recorded in order to make it possible to check the answers at a later stage. After the presentation of the service, participants were asked to list the most important stimuli that would be discussed next in more detail starting with the most important theme. The following table (Table 3) describes how the stimulus themes were distributed among respondents.

TABLE 3 Selected stimulus themes and their distribution among respondents

Stimuli name	Quantity	1.	2.
1) Impact of service environment on user experience	8	4	4
2) Accessing information and information flow in the service	8	7	1
3) The ability of the user to influence the service functions by participating through the device or application itself	12	3	9
4) User's own role in the chain	9	5	4
5) Effects of the use of service (flexibility of electricity consumption) on everyday life	6	3	3
6) User goals and value factors	3	1	2
7) Additional theme (respondent can decide)	0	0	0

The stimuli themes number 3 and 4 were the most popular. No one choose the theme number 7, where they could themselves define the topic to be discussed. The most important theme for respondents was the theme number 2 which related to the information flow. The second topic that they mostly choose to be discussed was theme number 3 which was related to the user's ability to influence the service functions by participating with the application. At least the participants wanted to discuss their own goals and values in relation to the service, which could be due to the fact that the service was not very familiar to them. Only three participants choose this topic.

The interview section began by asking the participant first to name the things he / she felt were the most important them in this theme (stimuli). After that, we started to dismantle these important things by refining the answer with the question of "why is that important to you?" These "why" questions raised the consequences of attributes that created a chain together. The aim of the chain was to find out the ultimate value factor that influences the final decision-making. For each chain, the final value factor was not necessarily reached, but the chains could branch into new attributes that were refined in the same way as the others.

Table 4 shows one example chain in which the respondent has been asked questions related to the theme. In this chain, the participant perceives himself / herself as the most important thing in accessing information in the service. One of the most important things he/she defined was the information about the duration of the break that was marked in the chain as attribute (A). After that, the issue was clarified with the question of "why it is important to get information about the break". These answers were marked as consequences (C). After laddering down with consequences, the ultimate value factor came out, which in this case was its own well-being. These values or goals were marked with the letter V. These letters perform as codes that facilitated the data analysis in the final phase as the data was processed using excel.



TABLE 4 Example chain from one of the participants

Interview H4, chain 3	
Stimulus	Accessing information and information flow in the service
Attributes (A)	How long the break will last
Consequences (C)	That the heating does not get too much lower
	To make your own operations run smoothly
	To make every day routines clear
	Achieving a better state of living
Values / goals (V)	Own well-being

Of 24 interviews, a total of 173 individual chains of data were received, representing an average of 7.2 chains per participant. From these chains, total 1540 individual statements were received, which constitutes about 64 statements per participant. According to Tuunanen et al. (2004) the amount of data in the interviews is sufficient, as it corresponds up to twice as many chains and statements per person as in other studies available in similar techniques.

When the interviews were completed, the next step was to refine the data and after that make the analyses of it. The next chapter describes how data was analysed and formed in thematic maps.

## 5.5 Data analysis

The Laddering technique also includes instructions for processing data. The first task is to content-analyse all of the elements from the ladders. To the separate coding form, the entire set of ladders should be recorded across participants. After that the next phase is to develop a set of codes that reflect everything that was mentioned in interviews. This work is facilitated by that each answer is categorized into three A (attributes), C (consequences) and V (values) categories, and then each response to its own summary codes. It should be remembered that the summary codes must not be too broad, in which case too much meaning will then be lost (Reynolds & Gutman, 1988).

The main focus on this level of analysis is the relationship between the elements, not the elements themselves. When these summary codes have been finalized, numbers are assigned to score each element in each ladder. After that the graphical maps can be created to represent the overall map of aggregate relations.

### 5.5.1 Thematic analyses

Since the data from the interviews is huge, it is worth dividing it into appropriate themes. These themes are not the same as those used in the interview as stimulus but as topics which raised through interviews. This meant that each statement had to be clustered according to its purpose, giving them common labels. After this the quantitative clustering was used to cluster these statements into approximately 5-10 clusters. The final phase was to use these clusters to create graphical theme maps (Reynolds & Gutman, 1988).

In order to get the interview data into different themes, each chain had to go through in detail. The themes were created based on the topics that raised from the answers and the answers were divided into themes based on common features. Seven different themes were identified from the data on the basis of which the final themes were created. The following table (table 5) presents the themes with descriptions that were generated from the data.

TABLE 5 Created themes and descriptions

Themes	Descriptions
Reliability of the service	Operational reliability, work as promised, assurance, available
User involvement in the service	Can control itself, possibility to own production / storage, can make own breaks, possibility to refuse
Availability of the service	Ease of use, co-partnership, interactive
Producing a common good with the service	Save on consumption, renewable energy sources, synergy
Financial factors of the service	Save money, price monitoring, economically reasonable
The Influence of information content on service usability	Beginning of break, consumption details, duration of breaks, intelligibility of information
The timing of information influences service usability	Timely information, time to react, ensuring comfort living, making own plans

After creating these themes, the next phase included sorting data for these different themes. In other words, the chains were checked through in detail and divided into their own themes. The next subchapter tells in more detail how this phase was done.

### 5.5.2 Placing chains into themes

This phase included that every single chain had to be go through and categorized into their own theme. The division was made in accordance with the

meaning that emerged from the chain and in what particular context it was associated. These chains were marked with a special code that facilitated the sorting of data at a later stage. The context may also have varied within the chain, whereby these points were checked as branches in another context. In particular, these points were of interest for the study as they could play a key role in value co-creation. The following table (table 6) shows how many chains were attached to each theme.

TABLE 6 The chains divided into the themes

Themes	Number of chains
Reliability of the service	163
User involvement in the service	340
Availability of the service	325
Producing a common good with the service	241
Financial factors of the service	121
The Influence of information content on service usability	178
The timing of information influences service usability	172

Most content was delivered into themes that were related to user involvement and availability of the service. Also producing a common good with the service came up with quite many answers. After all the chains had been broken down into themes, the next phase included clustering analysis. The next subchapter describes how these individual answers were divided into congruent attributes, consequences and values.

### 5.5.3 Clustering analysis

At this point, the chains were reviewed by theme and the purpose was to find similarities with the meaning of the answers. Similarities were sought for the attributes (A), consequences (C), and values (V) of each chain that were used to classify responses to groups. These groups also got their own code titles. To make this work easier, each theme was reviewed as a whole.

As an example, if we go through the theme "Producing a common good with the service, the attributes related to this theme repeats the same topics. Those related mostly to own controlling, synergy and energy production issues. After creating attribute codes for these chains, the consequence codes were on next. These codes were a bit more difficult to define, because the chains entered a lot of data about the consequences. At the same time, it had to be remembered that the categories should not be too broad and not too detailed. It was also important to find links between these meanings as they should be defined in the next step on maps. Otherwise it would complicate the following steps.

After defining the consequence codes, the final phase in this part was determining the value codes. This phase was perhaps the easiest part because the

respondents were fairly transparent about their own values. However, not all chains may have ended up in value factors or goals, whereby these chains were terminated in the consequence section. However, in order to reach the final value factors, it required the researcher to be immortalized, as in many cases after a long discussion, the fundamental values were opened up. This also explains why so much individual statements was obtained. The whole data processing work was made easier as the results were clustered using Excel program. It allowed that each individual code could be sorted according its own code, starting with attribute codes and moving toward the final value codes. The following table (table 7) shows an extract from the internal classification of one theme for attribute (A), consequence (C), and value (V) codes.

TABLE 7 Example of the internal classification of one theme

Interview	Stimuli name	Sub chain	Theme code	A	C	V
H22	User's own role in the chain	4	4	synergy	generating shared prosperity	economy
H22	User's own role in the chain	4	4	synergy	generating shared prosperity	environmental well-being
H22	User's own role in the chain	4	4	save on consumption	to support environmental well-being	environmental well-being
H22	User's own role in the chain	4	4	save on consumption	save money	own well-being

### 5.5.4 Building thematic maps

This next phase includes presenting the themes created in the previous section as graphical maps. These maps show the main characteristics of each theme (attributes), the factors that influence them (consequences) and the final goals that affect the background (values). Each of the seven themes created their own independent theme map, where the attributes were placed to the left, the consequences in the middle and the values on right. Connections between these features were marked using arrows. For each feature, a weighting was set according to how much this feature appeared in the responses. The higher the number reported for the feature, the more often the issue occurred in the responses. It can also be deduced from this that the importance of the feature in question is relevant.

The charts have also been marked with important (green), challenge (orange), and potentially value co-destruction (red) factors with color-codes. This facilitate to take into account the priorities between different features. Maps

were built using Microsoft PowerPoint. In order for the data to be clearly legible, the different features were placed in their own boxes and arrows between them so as to have as few intersecting arrows as possible. The following figure (figure 6) in the next page shows an example of one thematic map.

After each theme had its own theme map created, it was time to compare these thematic maps with a previously created lens (figure 5). This lens explored potential nodes in the value co-creation process as well as points that would contribute to it. These essential points were marked on the map with the color-codes mentioned above, which clarifies the interpretation of the map. The magnitude of the significance of each attribute is multiplied by the associated number, which is formed by the frequency of the responses, creating a focus factor for it. This additional information makes the thematic maps more readable and much more informative for presenting finally the findings. In the next chapter each of the thematic maps has been presented in more detail.

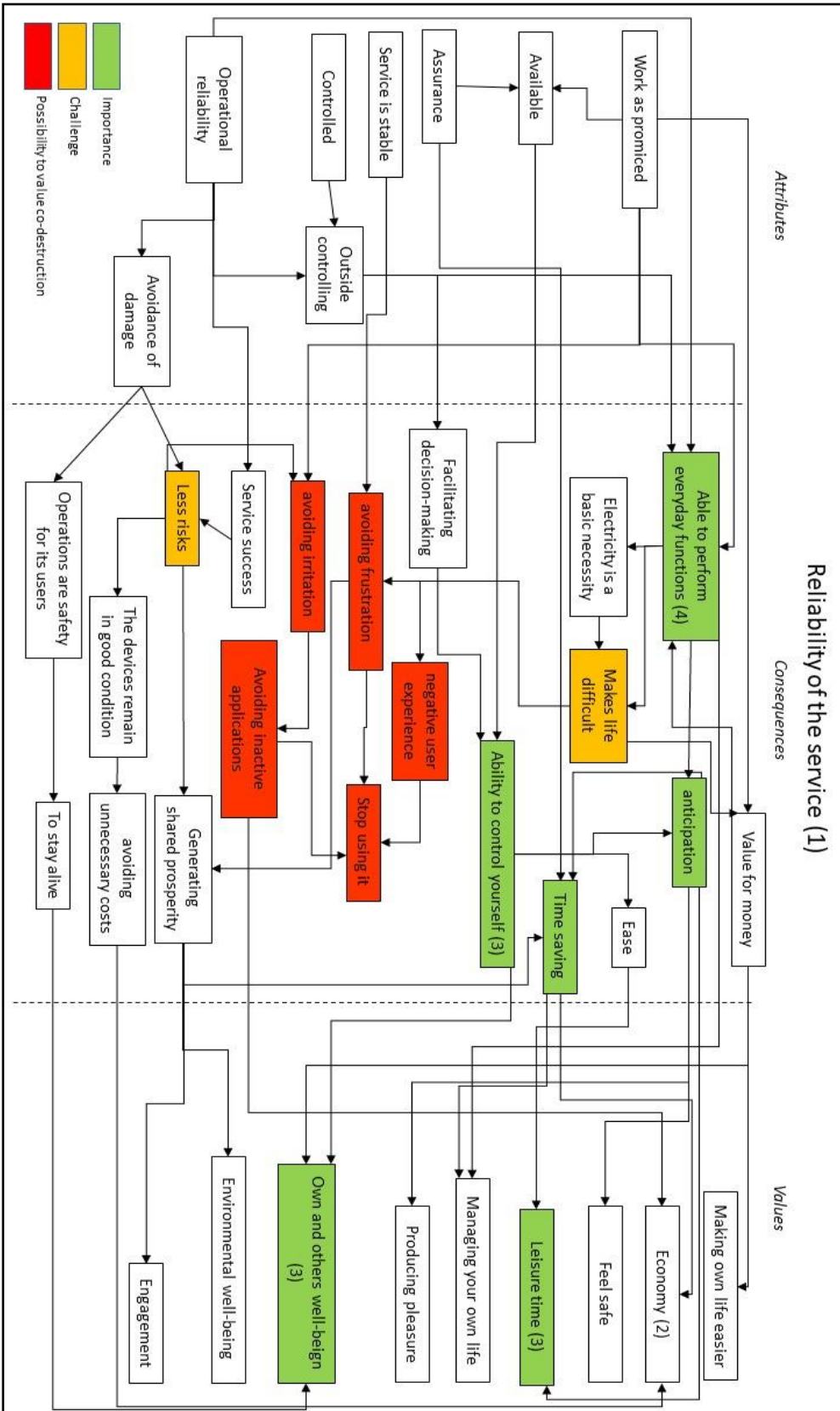


FIGURE 6 Example of thematic map

## 6 THEMATIC MAPS OF THE CASE STUDY

In this chapter the each of the seven thematic maps are presented. These thematic maps describe what aspects of individual interviews emerged and what impact they have on value co-creation in that context. Each thematic map will be reviewed with as an own sub-section, thus creating a clear picture of each topic. By exploring relationships between attributes, consequences, and values, it helps to identify which consumer behaviours are most relevant for solving the problem in the context. The attributes, consequences, and values of each map have been discussed in more detail.

### 6.1 Reliability of the service

This map describes the reliability of the service and what kind of features the participants felt were most important the usability and convenience of the service. The relationships between these features are also important, because by interpreting them, we can anticipate possible factors leading to value co-destruction. Comprehensive service reliability became one of the most important issues in the use of the service, which made this topic a theme.

**The attributes** that were raised in this topic were mostly related to the reliability of the service in terms of its functionality. The service should work as it has been promised to work. The external control came up for consideration for the respondents because the service should not damage the home devices, and its control should otherwise act as inconspicuously as possible. The user should be able to rely on the service provider if they control remote home devices. It must be controlled, safe and not harmful to home appliances. Service assurance and stability were seen also important. These attributes were mostly related to the user's ability to perform their everyday tasks. This will clarify in more detail in the consequences part.

**The consequences** include the functions which are derivatives of attributes. This was also one of the themes that raised a lot of potential discontinuation. If the use of the service causes uncomfortable feelings, it can lead to the value co-destruction. Among the respondents, they were most likely to be con-

sidered the possibility of performing their own functions (=43), which related mostly to anchoring and organizing one's own actions, in general, managing one's own time.

Respondents considered it important that the service should not hamper normal operations, but on the contrary it should have an increasing impact on leisure time. If time were wasted because of the service, it would cause irritation that directly affects the use of the service. The respondents also argued that access to electricity is a fundamental right of everyone, which should be able to control (=19). This meant above all that when electricity was needed it should be available. Respondents were very strict about having their own rights preserved and exercising their authority. Although most of the responses related on the benefit of an individual user, they also saw the importance of the user's role in the whole service ecosystem, which creates success for the service and gives the opportunity to produce a common good for everyone.

The negative users' experiences rise from the time management. If using the service complicates everyday life, it causes negative user experience and can lead to cessation of use. Also, if the service does not work as agreed, it causes frustration and irritation, which result is that the use of the service is avoided. The more users experience disappointment, the more likely it is to value co-destruction. The reliability of the service also raised the issue of avoiding damage. Respondents felt it important that costs would not rise and that the service should not cause damage to both equipment and residents. After going through these consequences, the values were quite easy to realise.

**The values** that were most prominent in the answers were related to the well-being (=33) and leisure time (=33). The possibility of anticipation and the performance of one's own actions were felt to be a factor that adds free time, which directly affects leisure time and, in general, the maintenance of well-being. Although operational reliability was not considered to increase the cost savings economically, the third largest value factor was, however, defined by financial considerations. Other value factors related to service reliability and own well-being were defined as managing own life, making own life easier and producing pleasure. Also feeling safe and environmentally well-being was considered important. All these features have been presented graphically in the following figure (figure 7) in next page.



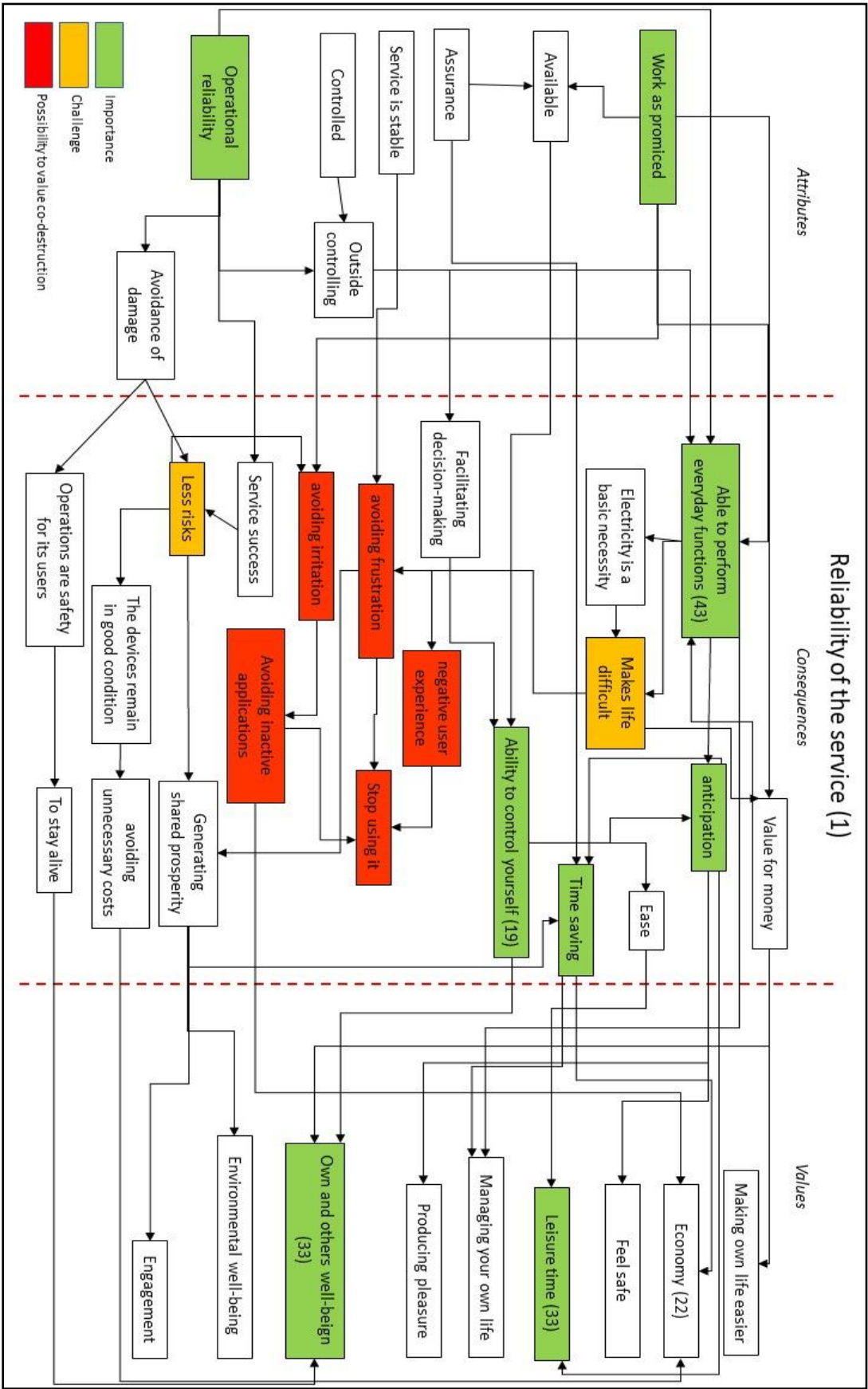


FIGURE 7 Thematic map of the reliability of the service

## 6.2 User involvement in the service

This thematic map relates to the user role and involvement in the service. As many of the respondents find very important their own ability to influence, this naturally created own topic for theme. This theme collected the most individual statements compared to others, which explains the importance of the topic. Next, the attributes, consequences, and value factors of this single theme are explored.

**The attributes** that were related to the user involvement in the service handled mostly about the possibility to control itself (=38=). Like in earlier theme, these related to the possibility to perform everyday functions and preservation of own rights. The controlling had several meanings in this issue, as most of the respondents considered it important, for example, making their own breaks (=23). On the other hand, the others felt that the refusal (=15) should be possible in order to make the service enjoyable. Hence, for many respondents it meant that they could decide on their own breaks either by doing more or alternatively refusing them if it did not fit into their own schedules. It was also important to have the possibility of own energy production and / or storage (=18). Most of the respondents saw their own involvement in the service from their own benefit, rather than from the point of view of generating a common good.

The respondents also had those who simply thought that their own control allowed them to be involved in the service process without its more specific purpose. Environmental welfare issues also emerged. Own participation would thus be a way to support energy production in a sensible and sustainable way. However, these matters were as significant as own benefit. One of the features that emerged as a rather big factor was the change in one's behaviour. However, respondents were willing to change their own behaviour, although many considered it important to maintain their own rights. This result is a very good notice for this study. This feature is important to consider in terms of the result of this research.

**The consequences** included quite many features that were marked as a challenge. The biggest features of relevance were also in this theme preservation of own rights (=25) and ability to perform everyday functions (=23). For the first time, the feature that raised up as one of the most important things was saving money for other purposes (=25). Especially if the service would save on electricity bills, more users would be encouraged to have this service. The issues related to the preservation of one's own rights were mainly based on habit. Respondents did not want to be at the mercy of others but would rather retain their own control.

The features that were classified as challenge were based on the question of avoidance. These features were avoidance of extra work, unexpected surprises, damages and additional investments, which almost all related to economy issues. In addition, all these features, if realized, tend to lead to value co-

destruction. For example, according to the respondents, if the breaks were forced and there was no decision-making possibilities regard this, it would cause negative user experience and frustration. When such feelings occur during use, it does not lead to value co-creation and therefore the function of entire service ecosystem is at risk. If these features are taken into account when building a service ecosystem, it will most likely lead to value co-creation among users.

**The values** that arise from the consequences were related also in this theme to own and others well-being (=33). Also, the economic issue emerged quite heavily (=20). Other value factors that related to well-being were leisure time, producing pleasure and generating meaningfulness. Values related to the production of common good were environmental well-being, generating shared prosperity, fellowship and equality. Equality meant that everyone would have the same opportunity to participate in the service regardless of their competence or financial situation. It would increase the number of service users, which in turn would guarantee a functioning service. Other factors of value that were raised in the interview related to this theme were ease, independence and business image. The following figure (Figure 8) presents all these above-mentioned features with their relations to others.

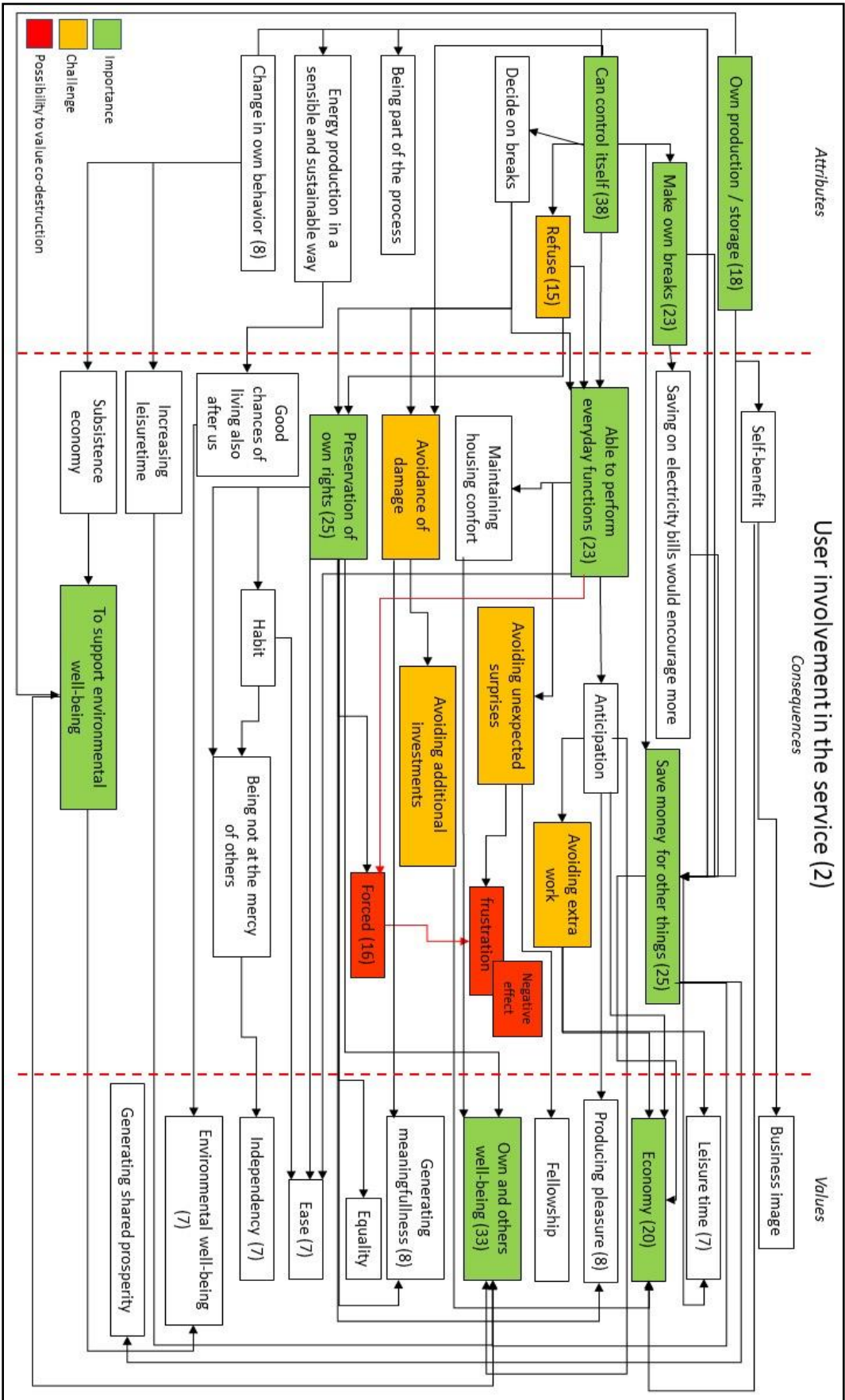


FIGURE 8 Thematic map of the user involvement in the service

### 6.3 Availability of the service

The third thematic map describes of the availability of the service. This theme collected the second most individual statements. It dealt mainly with factors related to the use of the service, which the respondents felt important to themselves. This theme also shared opinions, as it contained the most distinct individual features of consequences and value factors. The attributes were very unanimous as they mainly deal with ease of use.

Things that emerged from **the attributes** on the top were related to service usability. The service should be easy to use (=86), and the user should not have to bother themselves with it. The interactivity (=14) of the service was also seen as an important feature. The service interface could include, for example, a chat service or some other kind of communication channel where you could get help in real time. The ability to communicate in real time would create operational safety and comfort. Cooperation also emerged from responses when discussing key features.

In this theme there could be found many kinds of **consequences**. The respondents felt that the most important was that they do not have to bother themselves with the service (=33). It should work automatic (=11) and with less effort (=11). If the system would not work as agreed, it would cause stress which ultimately complicates the use of the service and its continuity. Also, if the service does not require operations from its user, the user can concentrate to other things (=14) that finally affect to his / her own well-being.

Another consequence that raised quite greatly was “usability is independent of capability and age” (=17). As in earlier theme, this meant the equality between the users. Everyone should have the same rights to be the service user, which created finally the feeling of fellowship. If the user feels difficulty to use the service, it ultimately causes reaction to stop using it. The other thing that relates to this issue is that the information should be readily available, otherwise it interferes to user which ultimately can lead to nervous condition. If this happens, it will not lead to value co-creation, but rather to value co-destruction.

In this context, ease also means that the user is able to perform everyday functions. This feature was not so important in this theme, but rather from time saving point of view. The users do not want to have extra responsibilities as they would have then more time to concentrate to other things like leisure time. The consequences that related to the interactivity and real time information were important as the respondents were willing to have possibility to communicate with the service provider. They require timely responses to changing situations, so that they would not have to stress with it. The communication possibility creates reliable environment and the worries would be away. If the respondents feel the service unstable, they would stop using it. As we can see, there is also a danger of value co-destruction in this theme. If these features of consequences do not materialize, it does not necessarily lead to value co-creation.

**The values** that emerged from this theme were related again mostly to own well-being (=14). Also, leisure time (=14) and ease (=14) were top of the value factors, but they can also be regarded as contributing to your own well-being. From this theme also values like “managing your own life” and “own successful” could be found. One of the value factors that raised from these responses were related to economy (=11). This was due to the fact that if the use were equal for every person, it would bring more users to the service and thus it would also be economically viable for everyone. Therefore, getting the financial benefit from the service would it drive people to use the service more likely.

From these values could also be found the environmental issues that that were important to respondents. This was due to the fact that if use of the service were easy, it would bring more users to the service and this would also be seen as an environmentally friendly thing increasing its well-being (=8). However, cooperation was seen as a key factor to this issue. Therefore, a functioning service ecosystem could be seen as producing environmental well-being. Other individual value factors that emerged from the discussions were “feeling safety”, “peace” and “reliability”. The following figure (figure 9) in next page describes these attributes, consequences and values in graphical way.

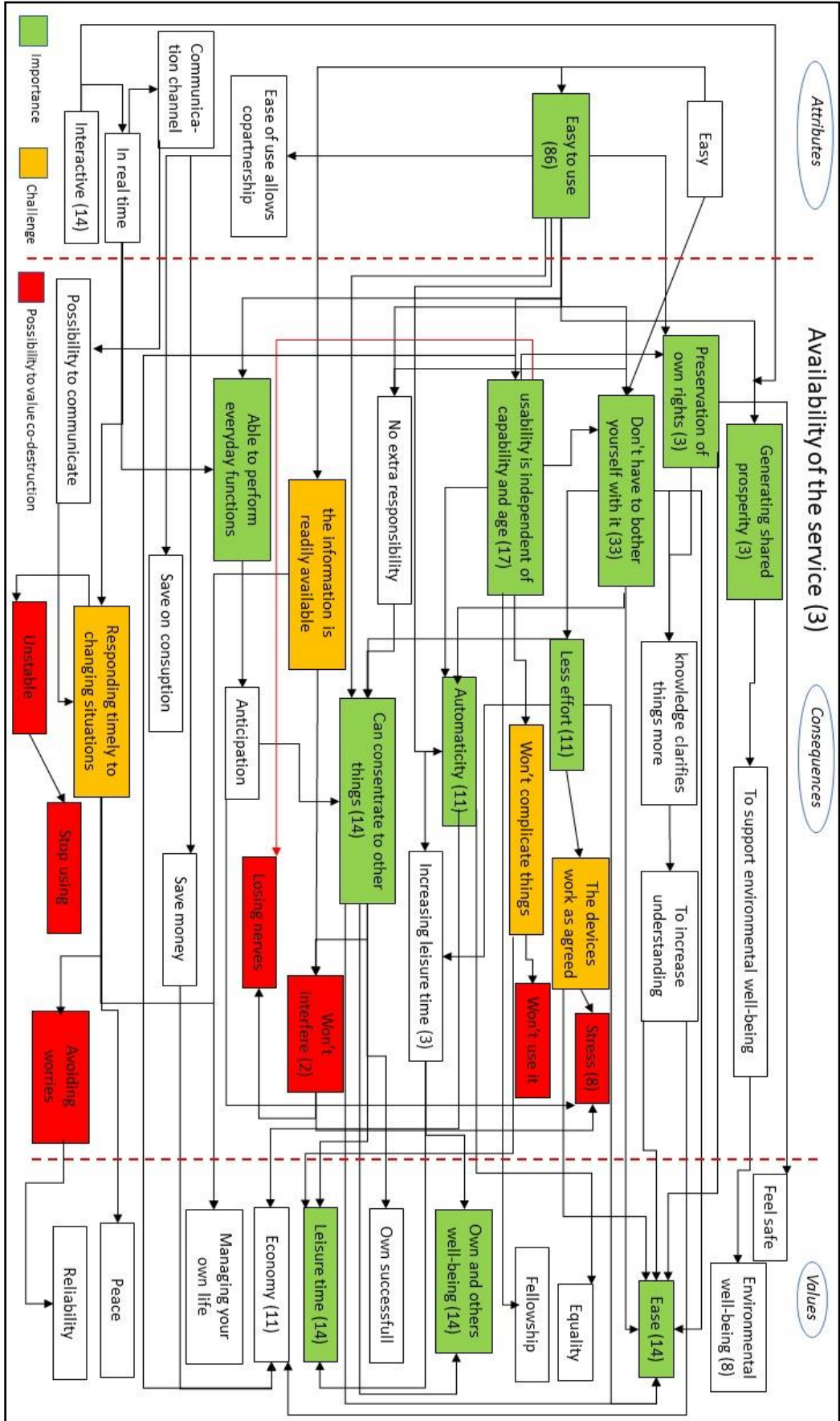


FIGURE 9 Thematic map of the availability of the service

## 6.4 Producing a common good with the service

The fourth thematic map describes the possibility to produce a common good with the service. As the factors arise from the responses, it was important to find out what values are behind this issue. At the same time, the importance of this feature could be specified. Although this topic appeared secondary in several other themes, it gathered the third most individual statements.

Most of **the attributes** related to saving on consumption (=28) and renewable energy sources (=24). Saving on consumption was based mostly on the possibility of optimizing own consumption and on monitoring consumption in general. These were mostly related to the willingness of the respondents to change their own behaviour. Renewable energy sources were seen as the second most important, and especially the solar cell system and its own energy production emerged from the responses. In this theme also, the possibility to control itself (=12) were considered important especially for the execution of own breaks (=8). Synergy (=12) was the other feature which was felt to be significant. This was seen as affecting the success of the entire service ecosystem chain, and thus benefited the user as well. In addition, it was perceived as a more holistic influence through community. At the same priority stage was ecology (=12). The respondents thought they would be able to cope with less energy consumption. They felt that they would be ready to change their behaviour and be like role model.

**The consequences** that raise up from these attributes continued the environmental well-being issue, which were derived mainly from the consumption-saving attribute. The respondents felt that supporting environmental well-being (=28), they contribute the continuity of human existence (=20). They thought that if people do not develop the functions, the continuity is not secured. Also, by supporting the environmental well-being, they could contribute to maintain good living conditions by avoiding polluting production methods which straight affect to environmental well-being. The respondent saw the possibility to change own behaviour (=12) by taking part to this service through optimizing own consumption. By this way they could be as role models (=16) to other people.

By favouring renewable energy sources, the respondents felt that, in addition to supporting the well-being of nature, they would benefit from the economic benefits that, for example, would be generated by their own energy production. When the consumer benefits (=12) from the service, it generates shared prosperity (=32). This feature was the most common answer from the interview which indicates the importance of the issue. Respondents did not directly experience the optimization of consumption for the well-being of nature but rather knowing the conditions of their own equipment. This feature was based on purely economic factors ("saving money") that ultimately affect one's own well-being. The attribute "synergy" that rose up from the responses shared two kinds of vision: from the perspective of your own position and of the service



success. However, both aspects were based on the benefit to the consumer. The respondents felt that the benefits of the service should be demonstrated to the consumers so that they will start using it, otherwise they would not use it. This has been marked to the map as a challenge as it might lead to the value co-destruction.

Other challenges in this theme is the motivation (=12). The respondents thought that with some motivator, they could change their own behaviour. Keeping the possibility to control itself could be one of the motivators. In any case, the service should be reciprocal and in the interest of the user. The motivator could help more to use the service making it "easy to use", which directly affect to generate shared prosperity. Respondents thought that if the service was perceived to be difficult or it would be forced (like in law), the service would become compulsive and therefore it could create resistance to change. This is also marked as challenge, because it directly leads to value co-destruction.

**The values** that emerged from the responses to this theme were largely concerned the environmental well-being (=48). The next biggest value factors related to own well-being (=20) and economy (=12). Ultimately, many of the interviews ended eventually to the value factors of own / others well-being, although much of the environmental issues were discussed. The economic value factors were seen to emerge through shared prosperity generation. After all, more value seemed to be on financial than the welfare of environment. The other values that emerged from the continuity of human existence were equality and that the energy supply is secured. As in previous themes, this equality meant that everyone had the same opportunities and possibilities, no one is discriminated against. By the meaning of "energy supply is secured" they meant that as population will grow, there will be a risk of inadequate energy supply. If we do not develop these systems further, there will be a risk for that. Therefore, this new service could be a step towards a more secure energy supply system.

The other, smaller value factors that emerged from these all features were the one that has been found also in earlier themes. Those are fellowship, that emerged from "generating shared prosperity", and generating meaningfulness. The respondents felt that they could be more meaningful if they could get opportunity to influence through the service. The following figure (figure 10) in next page describes these features in graphics.

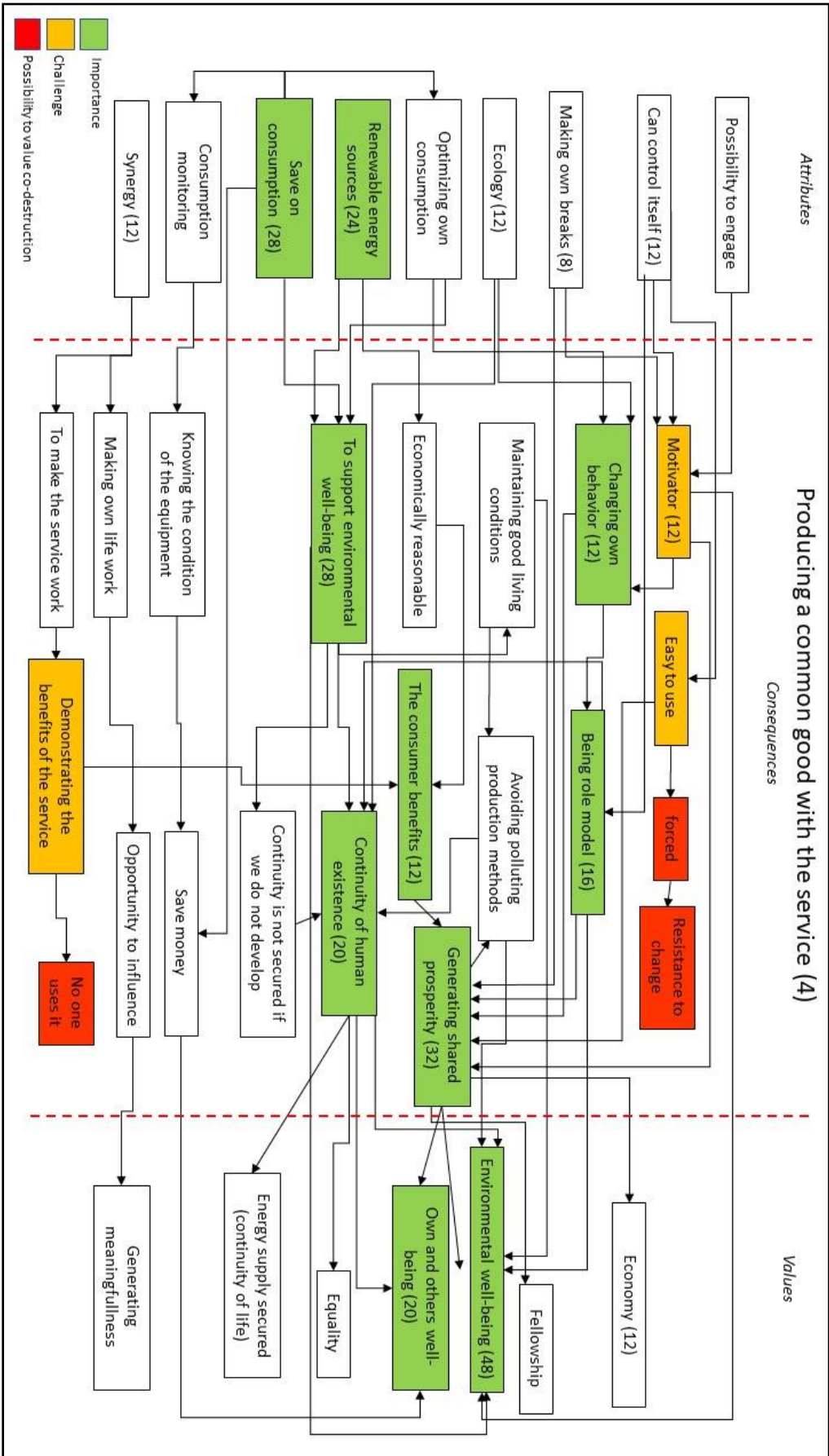


FIGURE 10 Thematic map of producing a common good with the service

## 6.5 Financial factors of the service

The sixth thematic map describes the importance of financial factors of the service. Although the importance of the economic features emerged in each theme, this topic, however, did not collect much individual statements. However, this was chosen as one of the themes, as the economy issues were very much involved in the respondent's value factors. This theme examines the impact of financial aspects on the use of this service.

**The attributes** that emerged from the responses related mostly to saving money (=57), which even more than half of the responses addressed this issue. In particular, the saving money was meant to have an impact on the electricity bills by reducing it. Also, the respondents thought that through price monitoring they could have some savings. Price monitoring (=21) was the second most important thing in this theme. One aspect that rise from this theme was that the service should be economically reasonable (=14). By this they meant that everyone should have the same possibilities to join this service. It meant that the service does not require expensive equipment or some kind of know-how, which automatically cuts out for example the elderly.

In this theme also the possibility to own production and storage emerged. Respondents saw the potential income in this, which could be received from resale of energy. The economic factor of the service also highlighted the idea of saving consumption and, above all, optimizing our own.

**The consequences** that emerged from these attributes were related idea of well-being. Most of the features dealt with the idea of using money for something else (=43). Respondents meant by this that saving money on this service, they could use money for something else for example getting better quality of life or taking care of other economically (=29). If their economic is on balance, they do not have to stress. Feeling stressed have been marked as challenge, because it might complicate the value co-creation. The respondents also felt that if they would save money to have the possibility to use for something else, it would increase their motivation to use the service.

In this theme also the feature "able to perform everyday functions" (=14) emerged. Planning your everyday functions was reflected through price monitoring, meaning that if you knew when the consuming is cheap, you would be able to schedule your own activities for these hours. This related heavily also to the consumption optimization. All this means that respondents are willing to change their behaviour (=14) by increasing self-sufficient economy and by that way making more money (=14). Some of the respondents though that they could change their behaviour and could even pay more of the service, if they knew that the methods, they use are environmentally friendly. The others only looked for financial gain for themselves.

The issues that related to the equality were about the service usability. It should be regardless of capability and age. People should be teched to act as desired (=14) to get them engaged (=14) to it. Some respondent even ponder

that could the service be mandatory to all people. However, this feature was identified as a challenge, as previous maps revealed that, when people are forced to this service, it will cause resistance and thus value co-creation will not happen. The resale of energy was seen as getting financial gain for self but also avoidance of polluting production methods. This feature repeats the same as in earlier themes that by avoiding these polluting methods, the continuity of human existence and environmental well-being are secured.

**The value** factors that emerged from these above-mentioned consequences, related in this theme also to the own and others well-being (=43). Although money was related to most of the discussions, its fundamental value factor was influenced by the own welfare aspect. Concerning the discussions, in many cases the well-being of the economy brought overall well-being to themselves and others. The value factor "leisure time" (=21) was the second most popular in this theme. It emerged from the features of "getting better quality of life" and "increasing motivation". This value factor can be also derived from factor that increase own well-being. Although these discussions related to financial factors, the economy (=14) was only third most popular value factor with environmental well-being (=14) which emerged from the idea of making more money. The other value factors that came up from the responses were "equality" and "self-direct learning". These issues emerged from the idea of engaging people to this service. The following figure (figure 11) in the next page describes these financial features that relates to the use of the service.

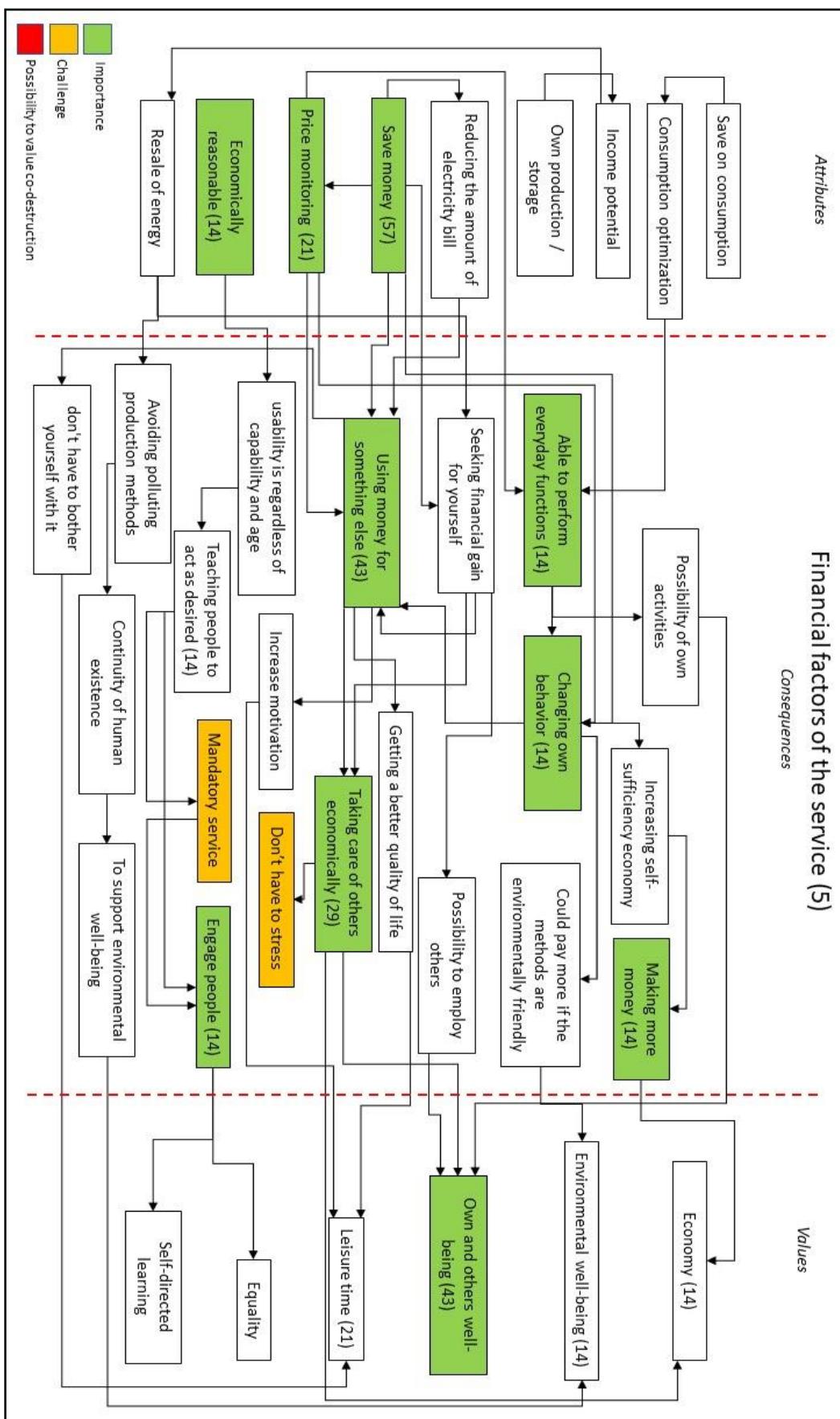


FIGURE 11 Thematic map of the financial factors of the service

## 6.6 The Influence of information content on service usability

This thematic map describes the influence of information content on service usability. As most of the participants felt that the information flow was the most important issue in the service, raised this issue as two own topics. The subchapters 6.6 and 6.7 will concentrate to these information related topics, in order to find out which fundamental value factors most affect the use of the service.

**The attributes** that emerged in this theme related all to the content of information. The issues that respondents found the most important was the information about beginning of break (=45). The idea behind was that they could have time to refuse or make their own schedule by considering this. The second important thing was the information about their own consumption having the money saving benefit on mind. Some respondents also thought that by getting the information about consumption they would get some reasoning for themselves which would facilitate their decisions. Also, by knowing of the consumption, they would know more about their home devices which contributes to remain in good condition. The third important thing was to know about the duration of breaks (=14). This related mostly to the possibility to perform everyday functions. The respondent felt also important the intelligibility of information. By keeping the information clear, you do not have to bother yourself with it and you have time to perform your everyday functions.

**The consequences** of this theme included many challenging features. Due to the fact that there are some ambiguities or shortcomings in the content of the information, it may in the worst-case result in value co-destruction. In this theme, the consequence that emerged the most from the results was the ability to perform everyday functions (=32) which mainly related to the possibility of anticipating activities (=18). If the users get information of beginning and duration of the break and that the information is intelligible, it contributes to carry out everyday activities. This information also helps in adapting to the changing situations (=14). The consequence that related to the information of consumption considered the idea of saving money (=18). The respondents felt that if they could get some savings, it could work as a motivator in this new service and it could help in changing their own behaviour. The consumption details also could help them to support environmental well-being by realising the magnitude of own consumption.

The consequences that got the challenge mark considered quite same features as in the earlier themes. "To preserve own rights" emerged also from this theme by which they meant that "electricity should be available when needed". They could see the worst vision that citizens could suffer which directly would end this service. On the contrary, the service should "generate benefits to its users", otherwise they "will not use it". This scenario would definitely lead to the value co-destruction.

The information content also meant for respondents that getting details on time, they could avoid practical problems and other damages. If there were

problems with use, it would cause anger and discomfort. They found it important that the home devices remain in good condition, so that they could avoid unnecessary costs. The operator should bear responsibility for any damage caused by the control. Otherwise it could affect to the use of the service. If many users perceived neglect, it would lead to value co-destruction in long-term.

**The values** that emerged from this theme related mainly to own and others well-being (=32). As most of the consequences related to personal activities, it was to be expected that the biggest value drivers also associated with these issues. The other value that get the second most results related to economy (=23). As from results emerged, the motivator could help in this service use. The best motivator would be "saving money". By this way the respondents would have money for something else, which probably increased their own well-being.

The other value features that emerged from the consequences related also on the personal issues. These were "managing your own life", "making everyday life easier", "own authority" and "feeling safe". Of these attributes, the value "ease" could be found, so in the end, the respondents sought easy life in addition to their own well-being. In summary, the three important values of this theme are: own well-being, economy and the ease of life. The following figure (figure 12) in next page illustrates these features in graphics.

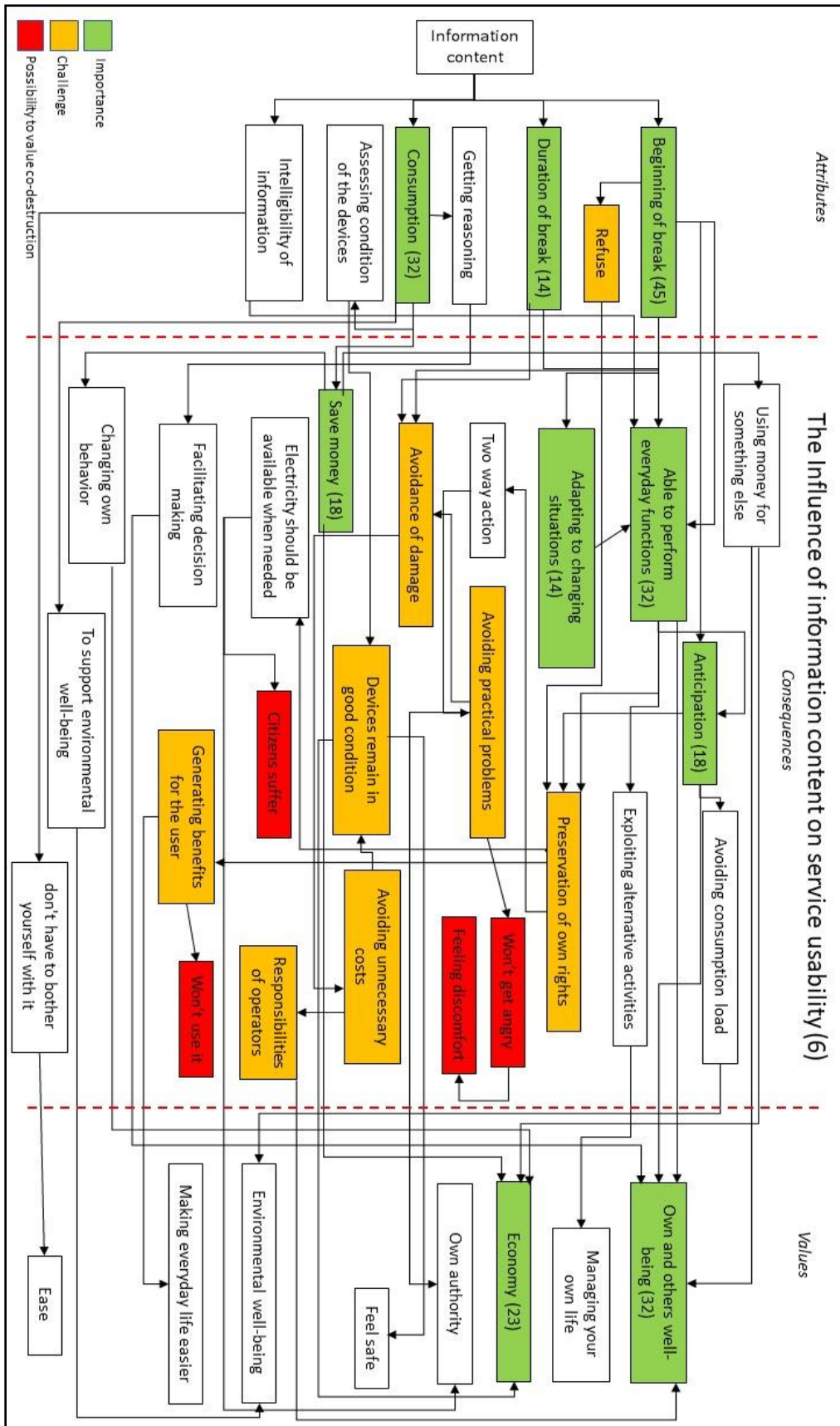


FIGURE 12 Thematic map of information content



## 6.7 The timing of information influences service usability

This last thematic map describes the influence of information timing to the service usability. As this service controls the home devices which may influence their own activities, the respondents felt that the timing of information is very crucial. This issue emerged from several responses and that is why it created own theme.

**The attributes** that respondents defined to be most important in this issue were “making own plans” (=63), “timely information (=26)” and “ensuring comfort living (=11)”. More than half of the respondents felt it was important that the timing of the information was important especially for the making their own plans. The features that heavily relates to this issue is “ensuring the comfort living”. By making own plans respondents keeps their own schedules and habits, and by that way also they are able to perform everyday functions. Also, for the plan making the information of prices would help more, which directly affects the changing own behaviour.

The respondents felt important also that the information should be timely. By that way they would have time to react, be prepared and even change their own schedules. They also considered important that they would have “the possibility to refuse” if the becoming break did not suite for them. This feature has been marked as challenge, since if the refusal is not possible, it could negatively affect the use of the service.

**The consequence** that emerged strongly form the responses in this theme was also about “the possibility to perform everyday functions” (=53). Because electricity is perceived as basic human needs, respondents are afraid that even small breaks will harm their own activities. If they have time to react, they will be better able “to adapt their own operations to the changing situations” (=21), by taking the breaks into account. In this issue the anticipation was also mentioned as important (=11), otherwise it might cause stress.

In this theme also, the respondent saw the possibility to change their own behaviour (=11) by seeing the environmental well-being effect in saving on consumption. However, in this theme, most of the factors were strongly related to the importance of their own well-being factors and the functionality of the service. Respondents considered it important that the service works as agreed, otherwise it would complete things. With timely information, the users would also “save their time” (=11) and not waste it, which is strongly influenced by listening to their own “habits” (=16). Therefore, stress would also be avoided. Habits are greatly influenced by the ability to “keep their own schedules” and to “increase their free time” (=11) by saving time. Respondents also considered “avoiding extra work” as a free time factor. If the information about the breaks would come on time, it would help them to plan their own work better and therefore “they would not have to wait” in vain and could then “concentrate to other things”. The preservation of one's own rights was also reflected in this issue, as the respondents felt that if they have to pay for the service, they should

retain their right to the decision. Maintaining the overall harmony in these all situations, it would contribute to the value co-creation. In contrast, it would be able to destroy it.

There were also negative effects in this theme, which in their own part could lead to the value co-destruction. If users could not retain their own decision-making, it would create "the feeling of discomfort". What comes to the possibility to perform everyday functions, if the breaks interfere these functions, they probably would lose their nerves. To feel the discomfort in use, it causes reduced use and after that the value co-destruction. Also, "the operational reliability" was mentioned together with negative effects. The service operations should be reliable so that it does not cause any financial loss for the users. In this situation, too, the use would end very quickly, eventually causing the value co-destruction in entire chain.

**The two value factors** that emerged most from this theme were "own and others well-being" (=42) and "leisure time" (=11). As mentioned in earlier themes also in this one these values related mostly to the personal issues. Other value factors referring to personal characteristics were found to be "producing pleasure", "managing your own life", "independency" and "generating meaningfulness". Time related value factors were "orderliness" and "time management". Also, the feature "managing your own life" could be found as time related value factor. The environmental issues did not emerge as big as in earlier themes but also in this theme it could be found. The following figure (figure 13) in the next page describes all these above-mentioned features in graphical way.

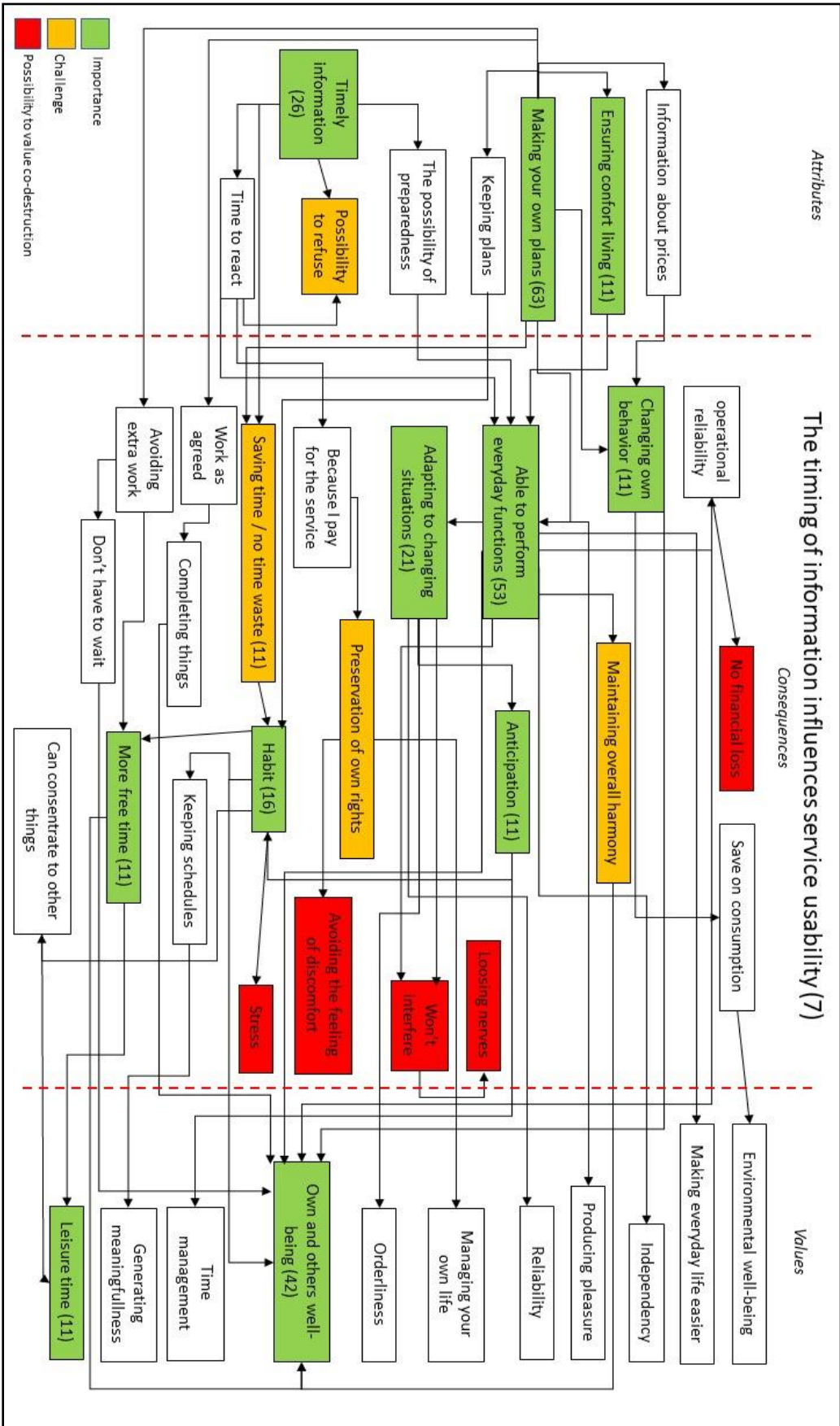


FIGURE 13 Thematic map of information timing

## 6.8 Chapter summary

In this chapter the seven individual thematic maps have been presented. These maps provide a more in-depth look at the results of the study in the next chapter, mirroring to the previously created lens. As we can already see on the basis of these results, the respondents saw that the greatest value factor that related to the use of the service was related to their own benefit, which would also support their own well-being. The other main thing was that the use should support their financial situation somehow, but even behind this feature, there was a glimpse of own well-being.

It was very important that the answers also highlighted possible threats that could lead to the value co-destruction. These issues are also discussed in more detail in the next chapter, thus creating the most comprehensive view of value co-creation and value co-destruction in this context of demand-side response service.

## 7 FINDINGS

In this chapter, the results of the previous paragraph are discussed in more detail, taking into account the lens of the previously constructed theory. In particular, the sub-categories focus on the value drivers of each theme and the factors that may potentially affect the value co-creation. Also, the factors that may be causing the value co-destruction will be examined in more detail. Themes are dealt with in the order in which they received the answers: most individual statements received first, and least individual statements received last. Finally, a conclusion is drawn from the findings of the study. The following figure (figure 14) illustrates the framework that have been used to interpret the results.

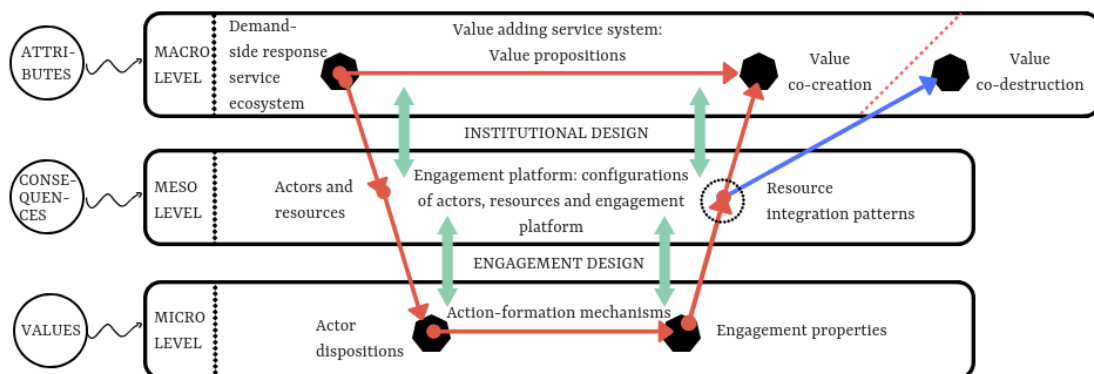


FIGURE 14 The framework of engagement process in DSR service

If we look at the figure above and its different levels, we will be able to detect the similarities which presented in the thematic maps of the previous chapter. **The attributes** can be seen as value propositions in *macro level* as those are the issues that the respondents were able to show clear and which they felt to be the most important for this service. These features are very important to be noticed and useful when creating the service. When we go down to *meso level* there can be seen similarities with **the consequence** level in thematic map. Here the actors and resources together are in key role and how they work together, ensures

better conditions for success in the service. In this level, the main role is for the consequences. The features that the actors feel in these configurations with resources and engagement platform, plays in a big role for value co-creation. These feelings and behaviours can be described as consequences which emerged from the interviews and are presented in thematic maps.

At *the micro level*, the factors that influence users are their **value factors** and goals. These features have been described in this figure as engagement properties. As the interviews showed, the respondents also felt the possibility of engagement if their goals were met. If this happens, the possibility to value co-creation is one step closer. Although the actor would engage to use the service, it does not alone guarantee a successful service ecosystem. When an actor is engaged to the service, it still needs the engagement of other actors and the cooperation of them all. This means that considering as many “consequences” (see thematic map) as possible and ensuring that they work together enables the value co-creation in the service ecosystem. It means that not only the relationship between the service provider and the user (=actor) works but that the relationship between the different users also works.

As the interview responses showed, the respondents felt that communality would also act as a motivator for the use of the service. Thus, the service would require the success of users' casual relationships. This is especially the case when users start to act as sellers themselves. All in all, therefore, it can be concluded that in order to succeed in value creation, the role of each individual member is of paramount importance and their preference. In worst case, if these factors are not met, will it lead to the value co-destruction and ultimately to the end of the service use. These thematic preferences and features are discussed in more detail in the following sub-chapters.

In the following sub-chapters, the main features of **attributes**, **consequences** and **values** have been introduced that affects to these three levels of *macro, meso and micro* and its actions there. The framework has been used to clarify the results of each theme. With the help of each result features the possibility to value co-creation has been described in each theme. In the end of each sub-chapter also the possibility to value co-destruction has been introduced. Each theme will be described from the macro to micro level by considering the main actions at each level where the features of **attributes**, **consequences** and **values** are affecting. The final sub-chapter will combine these all themes and their features together creating the overall picture of the results of this phenomenon.

## 7.1 User involvement in the service

### *Attributes / macro level*

If we look at the macro level in this theme, the attributes that mostly affects here are the possibilities to 1) control itself, 2) make own breaks 3) have own production / storage and 4) refuse. The table below (table 8) describes all the features

that emerged from the interview in this theme. If these features have been taken care of, it will help in the process value co-creation. These features allow the user to participate in the production of the service, which the respondents felt most important in it.

TABLE 8 The most important attributes relating to user involvement

Attributes	Weight	Amount
Can control itself	37,5 %	15
Making own breaks	22,5 %	9
Own production / Storage	17,5 %	7
Possibility to refuse	15 %	6
Change in own behaviour	7,5 %	3

#### *Consequences / meso level*

The consequences that arise from these attributes are presented in the table next page (table 9). When moving on the meso level, these consequences will affect there when speaking of user involvement. The respondents felt that preserving their own rights they can engage to the service better. As they think that electricity is a fundamental right for everyone, it should be available whenever the need arises. Most of all, they consider the possibility of success in their own daily activities, if the breaks cause certain activities to be impossible to perform or have to do more work themselves to replace the electricity supply (for example, heating the house with woods).

In this theme also the financial features emerged. The respondents thought that if they took part to this service, they should gain financial benefit. It could even work as a motivator to participate this service. Also, the attributes like own production / storage predicts financial gain more than environmental issues which in turn has a relatively small role in this theme.

If we think about the service ecosystem with these features marked in yellow, in meso level the actors and resources should work together obtaining these features so that the personal value factors could be reached. If the system works between these actors and resources, the user feels to be part of the service and possibly also generates value for others involved in the service. In other words, by participating in the service, at the same time the actor also creates opportunities for value creation for other users, thus enabling together the value co-creation in the whole service ecosystem.

TABLE 9 The most important consequences relating to user involvement

Consequences	Weight	Amount
Preservation of their own rights	25 %	10
Save money	25 %	10
Able to perform everyday functions	22,5 %	9
To support environmental well-being	10 %	4
Avoiding extra work	5 %	2
Avoidance of damage	2,5 %	1
Company image	2,5 %	1
Increasing leisure time	2,5 %	1
Get value for money	2,5 %	1
Self-benefit	2,5 %	1

#### *Values / micro level*

The values that helps in user engagement in this theme relates mainly to the own and others well-being (see table 10). If the actor feels that the service supports its own well-being, it might directly to lead on engagement and value co-creation. If the actor is in doubt to start using the new service, for example by knowing the facts that they can preserve the possibility to make own decisions and even save some money, would it help in introduction of the new service. Then they would be able to see that with the service they would increase their own well-being and get financial gain. In micro level by identifying these value factors it helps the actor to engage the service and being one step forward to the value co-creation of the whole service ecosystem.

TABLE 10 The most important values relating to user involvement

Values	Weight	Amount
Own and others well-being	32,5 %	13
Economy	20 %	8
Producing pleasure	7,5 %	3
Making everyday life easier	5 %	2
Independency	5%	2
Generating meaningfulness	5%	2
Environmental well-being	5%	2
Leisure time	5%	2
Generating shared prosperity	2,5 %	1
Equality	2,5 %	1
Fellowship	2,5 %	1
Easy going	2,5 %	1
Business success	2,5 %	1

#### *Value co-destruction*

The consequences that were marked as challenge were thought to lead in some situations to value co-destruction. It might come in question if actors and re-



sources did not work together as expected at the meso level. This kind of situations might come if there would come up some unexpected surprises, additional invests or extra work. These kinds of features would affect to the actors negatively causing frustration. Also, if the actors would not have possibility to refuse the breaks, the service adoption would be as bad. If these negative effects arise between the users, it would lead to value co-destruction.

However, it should be noted that this theme is just one part of the success of the entire service ecosystem. There are still six themes to go through where to create a comprehensive summary of the results and its influential characteristics. In any case, this theme was one of the most significant ones the respondents felt to be important in the use of the service. The following sub-chapter present the second important theme.

## 7.2 Availability of the service

### *Attributes / macro level*

The availability of the service got the second most individual statements. The respondents felt that the service should be easy to use so that users would not have to bother themselves with it. More than a half of the respondents considered this to be most important feature. Also, the ease of service emerged, meaning that the service should be unobtrusive and do not require extra work. On the contrary, its use should make it easier for everyday activities, bringing more free time. The attributes with weight values are described in the following table (table 11).

TABLE 11 The most important attributes relating to availability of the service

Attributes	Weight	Amount
Easy to use	56 %	20
Easy	30 %	11
Interactive	11 %	4
In real time	3 %	1

These features should be taken into account at macro level, when considering the availability of the service. If the actor feel that the service is easy to use and ease in every way, it increases the possibility to engage to the service. At the very least, it increases interest in the service, which in turn creates the opportunity for the integration of actors and resources in meso level.

### *Consequences / meso level*

When we look at the consequences that are affecting in the background, the idea of “do not have to bother with it” emerged the most from the responses. Also, the idea of “usability is independent of capability and age” were thought

to be important. Taking into account this “usability”- feature in particular, it should be emphasized as it would make it possible for many people to participate in the service. That creates better opportunities to the service and bigger possibility to the actor and resource integration. The table 12 in the next page describes the features of consequences that emerged from the interview.

*Values / micro level*

Going down to the micro level, the actor has already gained some experience from the service. Thus, at this level, he / she has the opportunity to engage to the service what the value drivers are greatly affected. In this theme the values that emerged from the responses were scattered to several different values. As the easiness emerged from the attributes, also in values this was one of the main features. In this theme the value drivers dealt mainly with own and others well-being as easy going and leisure time can be perceived as a matter of welfare. This was also one of the themes that did not receive value factors. It means in this theme that 14 % of statements did not advance to the value factors. At these points, the subject matter usually fell into another, whereby the value factors of the original thought were missed. It was also possible that the discussions did not go to the ultimate value factors, but those situations were really rare. The table 13 shows the value factors that affects in the background in this theme. As there can be seen, the same values the same value factors are also repeated in this theme.

TABLE 12 The most important consequences relating to availability of the service

Consequences	Weight	Amount
Don't have to bother yourself with it	30,5 %	11
Usability is independent of capability and age	19 %	7
Able to perform everyday functions	8 %	3
Increasing leisure time	8 %	3
To support environmental well-being	5,5 %	2
Responding timely to changing situations	5,5 %	2
Save money	5,5 %	2
Can concentrate other things like work	3 %	1
Generating shared prosperity	3 %	1
Making the use easy	3 %	1
Preservation of their own rights	3 %	1
Raising awareness	3 %	1
Save on consumption	3 %	1

TABLE 13 The most important values relating to availability of the service

Values	Weight	Amount
Easy going	14 %	5
Leisure time	14 %	5
Own and others well-being	14 %	5
No value	14 %	5
Economy	11 %	4
Environmental well-being	8 %	3
Managing your own life	5 %	2
Fellowship	5 %	2
Peace	3 %	1
Reliability	3 %	1
Success at work	3 %	1
Feel safe	3 %	1
Equality	3 %	1

With these value factors the actor can be engaged to the service. As the actor continues the use, it needs a successful experience of actors and resources integration. In this integration, again, the consequences play in a big role. When we look at the consequences that has been marked as challenge, those might be detrimental to a successful user experience and actors and resources integration.

#### *Value co-destruction*

As we can see from the following table (table 14), if the service is causing problems to perform the user's activities, for example, intelligibility of the information, add it stress and worries of users, which in the end lead to the discontinuation of the service. In addition, if the user does not receive information on time to varying issues, this will eventually lead to discontinuation. Therefore, the service must be stable in every respect so that it does not interfere too much. In this meso level, where these possible challenge features may arise, determines whether a value co-creation or value co-destruction occurs. If these challenges are not considered in time, it may lead to the value co-destruction and ultimately the end of the service use.

TABLE 14 The features that may lead to value co-destruction

Challenge	Possibility to value co-destruction	
The service does not work as agreed	Stress	
Service complicates things	Will not use it	
The information is not clear enough (readily available)	Interfere	Loosing nerves
Do not respond timely to the changing situations	Unstable, more worries	Stop using it

### 7.3 Producing a common good with the service

The third important issue in this service is the possibility to produce a common good. Although the respondents felt that they must benefit themselves, they also want others to get the benefit of it so that it would produce a common good to all its members. That is good sign as to succeed in this service, everyone should be able to work together and create success together. That means everyone should have the opportunity to benefit from the service.

#### *Attributes / macro level*

The attributes that emerged from this theme related mostly on the consumption savings and renewable energy resources. They considered this theme mostly on the environmental well-being point of view, which in the other themes did not get so many attentions. What this means in the macro level, is that with environmentally friendly operational methods, the customer can get interested in the service more easily and thus also commit to the service if the features of consequences are taken into account. The attributes are listed below significance in order. (See table 15).

TABLE 15 The most important attributes relating to ability to produce common good

Attributes	Weight	Amount
Save on consumption	28 %	7
Renewable energy resources	24 %	6
Can control itself	12 %	3
Ecology	12 %	3
Synergy	12 %	3
Making own breaks	8 %	2
Possibility to engage	4 %	1

#### *Consequences / meso level*

When an actor is attracted to the service, the next major role is at meso level. The features of consequences will help in this stage. When we look at this “producing a common good”- theme, the respondents thought that by supporting environmental well-being they could contribute to the continuation of human life. Also, generating shared prosperity emerged heavily from these responses. Respondents saw that they could be as role models in this service and even they could change their behaviour to meet the goals. By being part to this service together, everyone will benefit and finally produce a common good to us all to increase our own well-being. If the actors noticed these features when using the service, it will help to get closer to the possibility of engagement in micro level. The main consequences have been described in the table (table 16) below.

TABLE 16 The most important consequences relating to ability to produce common good

Consequences	Weight	Amount
To support environmental well-being	40 %	10
Generating shared prosperity	36 %	9
Save money	12 %	3
Changing own behaviour	8 %	2
Making your own life work	4 %	1

#### *Values / micro level*

When an actor has met their claims for action, they have the opportunity to engage more easily to the service. At this point, the ultimate value factors of the user help to commit, which the most significant in this theme are environmental well-being and own / others well-being. If the actor feels that by his / her own action, he / she can produce common good which helps to prevail the environmental well-being, will help in the engagement to the service. After that only the actor and resource integration have the power to change the direction from value co-creation to value co-destruction. The following table in the next page (table 17) illustrates the main value factors that the respondents felt in this theme.

TABLE 17 The most important values relating to ability to produce common good

Values	Weight	Amount
Environmental well-being	48 %	12
Own and others well-being	20 %	5
Economy	12 %	3
Fellowship	8 %	2
Energy supply secured	4 %	1
Generating meaningfulness	4 %	1
Equality	4 %	1

#### *Value co-destruction*

In this theme, there were not so many challenging features that could lead to value co-destruction. Those mainly related to the issue of motivator. The respondents felt that there should be some motivator in this service so that it helped more people to engage with it. If motivation for use is not clear in mind, the use may be very low or in the worst case no engaging to the service will not happen. Respondents could see that easy use could motivate people more but if they feel forced to use, they will be resistance against it. That definitely leads to value co-destruction. The use of the service also ends if the actors will not see the benefits. The integration in meso level will not happen and it does not lead to value co-creation.

## 7.4 The Influence of information content on service usability

This fourth theme describes the importance of information content when using the service. The respondents felt that by knowing what is happening all the time, it creates more reliability against the service. Also, by knowing what is going on all the time, they can plan their own schedules by considering these factors.

### *Attributes / macro level*

The attributes that emerged mostly from their responses concerned the information about the beginning of breaks and consumption. By knowing the right time when the breaks will start, they can better schedule their activities. When developing this service, it should be taken into account as it might be the one thing that affects when starting use the service. When these factors have been taken care of at the macro level, the actor interest in the service is revived. The following table (table 18) describes the main attributes that arise from the interview which are considered to be the most effective features when talking about the effect of the information content on the service use.

TABLE 18 The most important attributes relating to the influence of information content

Attributes	Weight	Amount
Information about the beginning of breaks	45 %	10
Information on consumption	32 %	7
Information on the duration of the breaks	14 %	3
Intelligibility of knowledge	9 %	2

### *Consequences / meso level*

After the actor has become interested in the service and starts using it, the features of the consequences that emerged from the interview are meaningful for the continued use of the service. In this theme the most significant features were related to the respondent's ability to perform everyday functions. Also, the possibility to save money would motivate the users more. In this meso level, where actors and resources meet for the first time, it is especially important to get a positive user experience right from the start, which can be guaranteed by the features of these consequences.

When looking at these results, it can be seen that the respondents felt little bit uncertainty about the use. Although the duration of the breaks is usually less than one hour, they feel that the success of their activities might be failed. Also, the possibilities to damages and unnecessary costs scares them, which may affect the finally use. If some of these threats happen, it may have a lasting impact on usage. It should be remembered the fact that, if the user feels the service interfering his or her daily activities, it may well lead to the end of use.

That is why this meso level is important, either the actor gives the opportunity to engage with the service or the use ends altogether. The following table (table 19) describes the main features of consequences that emerged from the responses when talking about the information content, for example “Why it is important to get information of the beginning of the breaks”.

TABLE 19 The most important consequences relating to the influence of information content

Consequences	Weight	Amount
Able to perform everyday functions	32 %	7
Save money	18 %	4
Avoidance of damage	14 %	3
Adapting to changing situations	9 %	2
Do not have to bother yourself with it	4,5 %	1
Avoiding unnecessary costs	4,5 %	1
Facilitating decision-making	4,5 %	1
Preservation of their own rights	4,5 %	1
To support environmental-well-being	4,5 %	1
Save on consumption	4,5 %	1

#### *Values / micro level*

If the actor is comfortable with the use, the micro level can be reached. The value factors that influence background in this theme, related to own and others well-being and economy. The respondents felt that by getting the right details, they could plan their own activities by taking into account the breaks and by that way they would be able to perform their daily functions, which increases their well-being. Being able to anticipate and adapt to changing situations, gives them a feeling of well-being that all functions are accomplished.

The respondent could see the money as a value factor that influence to the use the system. By getting information about own consumption, they could change their behaviour by using the electricity when it is cheapest. This way they could save more money and use it for something else. When examining the impact of consumption information on the use of the service, there is more influence on things that refer to the economic values of the user than environmental values. This result is very much based on the fact that the value of the user's personal well-being rather than the well-being of the environment is more behind. After all, the user chooses the service that promotes his own well-being. The following table (table 20) describes the value features that emerged from this theme. Having achieved these value factors at micro level, the engagement can be reached.

TABLE 20 The most important values relating to the influence of information content

Values	Weight	Amount
Own and others well-being	36,5 %	8
Economy	23 %	5
Own authority	9 %	2
Environmental well-being	9 %	2
Feel safe	4,5 %	1
Easy going	4,5 %	1
Anticipation	4,5 %	1
Making everyday life easier	4,5 %	1
No value	4,5 %	1

### *Value co-destruction*

In this theme there were several challenging features that might be a threat for the value co-creation. The feature that were behind these all was the issue of preservation of own rights. This comes up to the question right from the start, because if the service does not have the ability to refuse breaks, it may make it difficult for the whole service idea to succeed. In addition to maintaining your own rights, generating benefits for the user can also be classified as a challenge. If the user cannot see the benefit of the use, he / she will not use it. If there are many such situations, it will definitely lead to value co-destruction.

The respondents thought that using this service might increase problems to their life. If they could not maintain the ability to influence, the practical problems could arise, which would cause angry and discomfort feelings. By the practical problems they also meant that more damages would come. As their devices are controlled outside by someone else, they do not know all the time what is happening there. They feel that the risk of devices breakdown increases with the service. If their devices do not remain in good condition, unnecessary costs increase. If these challenging issues happens, the user feels that they suffer from the use of the service, and soon or later the use ceases. All in all, the information in service should be understandable and satisfying the needs of users so that the service is very discreet and does not interfere too much. In this way, it best supports the user's own well-being.

## **7.5 The timing of information influences service usability**

In this fifth theme, the main idea was the timing of the information. The respondents felt that getting the information on time, it will help them to plan their own activities better. By this way, they can take better in part to the service which increases their meaningfulness in the service.



*Attributes / macro level*

The timing is one of the important things as it gives to user time to react. If the timing has been taking care of, the users are able to make their own plans and perform the needed activities. From timely information, the user can better prepare and also refuse. From all these features the idea of saving time emerged which finally affect the possibility to own well-being. The respondents agreed on what meant the most important to them in this case. These factors should be taken into account at this macro level to ensure that the user is interested in using this service. The following table (table 21) shows the attributes that emerged from the responses.

TABLE 21 The most important attributes relating to influence of information timing

Attributes	Weight	Amount
Making / planning your own plans	74 %	14
Timely information	26 %	5

*Consequences / meso level*

What helps in this actor and resource encounter and later in integration phase at meso level, these consequences that emerged from the interview has a main role. Taking care of for example that the actor has the possibility to perform daily functions and probably save time by using this service, helps it them to engage better. Through these opportunities, they can maintain overall harmony, keep their habits and get some extra leisure time. These all will increase their feeling of well-being. Although the respondents were very precise about the preservation of their own rights and habits, they saw the possibility of changing behaviour due to the service. However, the service must be reliable to make the change possible. The following table (table 22) describes the features that emerged when talking about the reason why timing of information is important.

TABLE 22 The most important consequences relating to influence of information timing

Consequences	Weight	Amount
Able to perform everyday functions	58 %	11
Saving time	16 %	3
Avoiding extra work	11 %	2
Acting as promised	5 %	1
Preservation of their own rights	5 %	1
Save on consumption	5 %	1

*Values / micro level*

When the actor experiences this encounter in meso level successful, he / she is one step further to engagement to the service. The value factor that affects behind this timely information are related mainly to own and others well-being. If

we look at all these value factors at the table (table 23), we can see that almost 79 % of the statements dealt with things that related to own well-being. Others were related to timing and environmental features. When these have been considered when developing the service, it created the better possibilities to actor to engage with the service. After that, the actor and resource integration are possible and then also the value co-creation. If there are situations in which the actor does not feel that his or her values are fulfilled, it can lead to value co-destruction.

TABLE 23 The most important values relating to influence of information timing

Values	Weight	Amount
Own and others well being	43 %	8
Leisure time	12 %	2
Environmental well-being	5 %	1
Generating meaningfulness	5 %	1
Independency	5 %	1
Making everyday life easier	5 %	1
Managing your own life	5 %	1
Orderliness	5 %	1
Producing pleasure	5 %	1
Reliability	5 %	1
Time management	5 %	1

#### *Value co-destruction*

The features that in this theme could lead to value co-destruction related mostly to fulfilment of their requirements. Like in earlier cases, if the service waste their free time or they cannot maintain their own rights, sooner or later it leads to the feeling of discomfort and stress. They might even lose their nerves to that kind of service. Also, if there are no operational reliability, that will lead to financial lost and finally to the end of use. Like in earlier themes, these features are marked as challenge as these might lead to value co-destruction in this context, otherwise value co-creation is possible.

## 7.6 Reliability of the service

#### *Attributes / macro level*

The reliability of the service emerged as a sixth important theme. All these responses were about the operational reliability, so the attributes did not vary much. In the thematic map of this theme, these features were described as “work as promised”. The respondents did not see that the service would be harmful from the cyber threat point of view but rather that it could harm their home devices. Actually, the idea of cyber threats, did not come at all from any of the responses. The most important things in this reliability were that the ser-

vice is available, assurance, stable, controlled and did not cause any damages. With these features the actor is interested to start to try the service. If macro level offers these features, the actor is willing to step forward to meso level where the consequences are in main role. The following table (table 24) describes the consequences that the respondents felt were the most important in the reliability of service.

#### *Consequences / meso level*

Like in earlier themes, the ability to perform everyday functions emerged the most. There can be seen also that the use of the service will end if actor feels the service is making life difficult. They are not ready to take risks in any case. Time saving issues emerged from these answers also, which foreshadows the importance of own well-being. In this meso level, these features should be taking care of reaching the opportunity to engage with the service.

TABLE 24 The most important consequences relating to service reliability

Consequences	Weight	Amount
Able to perform everyday functions	45 %	7
Stop using it	13 %	2
Avoidance of damage	6 %	1
Avoiding unnecessary costs	6 %	1
Can concentrate to other things like work	6 %	1
Don't have to bother yourself with it	6 %	1
Facilitating decision-making	6 %	1
Generating shared prosperity	6 %	1
Saving time for leisure	6 %	1

#### *Values / micro level*

As the actor has felt comfortable with the service resources, he / she is more closely to the engagement possibility in micro level. In this theme the most impressive value factors are also related to own and others well-being. Like in other themes, the leisure time is in second important and economy issues third. After these can be found the environmental issues. Also, feeling safety raised up, which is related to the operational reliability. The devices work properly, are intact and do not cause damage to other property. This means, for example, that a broken device causes a fire. Although, this "feeling safety" did not get attention from many respondents, only one such case of damage is enough when the reputation of the whole service crashes and leads then to value co-destruction. The following table (table 25) describes the value factor that emerged from the responses related to the issue of reliability.

TABLE 25 The most important values relating to influence of service reliability

Values	Weight	Amount
Own and others well-being	19 %	3
Leisure time	19 %	3
Economy	14 %	2
Engagement	6 %	1
Environmental well-being	6 %	1
Feel safe	6 %	1
Fulfilment of promises	6 %	1
Making everyday life easier	6 %	1
Managing your own life	6 %	1
Producing pleasure	6 %	1
No value	6 %	1

#### *Value co-destruction*

The challenging features that emerged from this theme related to the issues of making life difficult and taking risks. As the respondents feel most that this service could affect their everyday activities by complicating them, it could be one that leads to value co-destruction. The feeling of frustration and irritation gets the respondents to give up using the service. Negative user experience leads to value co-destruction. Respondents thought also that if the applications are inactive, they will avoid these kinds of applications. Therefore, it does not do good for the whole service and value co-creation will not occur.

## **7.7 Financial factors of the service**

The last theme describes the importance of financial factors of the service. As there could be seen that economy issues affected in many of these cases, this issue was seen one of the most important features that the service should take into consideration.

#### *Attributes / macro level*

To get the actor interested of the service, they should get financial savings through the service. Over half of the statements dealt with "saving money" features. Also, the respondents thought that the service should be economically reasonable, so that everyone could have opportunity to participate to the service. By that way, it would help more in engaging the people to use the system. Respondents thought also that with own production or storage, they could see some benefits for their income. That could be one way to motivate people more. As these attribute-features has been taken into account, it will get the actors interested more to use the service. The following table (table 26) describes these important features.

TABLE 26 The most important attributes relating to influence of financial factors

Attributes	Weight	Amount
Save money	58 %	8
Economically reasonable	14 %	2
Change in own behaviour	7 %	1
Own production / storage	7 %	1
Resale of electricity	7 %	1
Save on consumption	7 %	1

#### *Consequences / meso level*

The consequences that emerged from these attributes above, related mostly to the fact that with this extra money from savings they could use it for something else. Also, the possibility to perform everyday functions emerged from these responses. Although these responses related mostly to the benefits of actors itself, there were signs of environmental well-being. Some of the respondents were ready to change their own behaviour, by knowing if they could support environmentally friendly energy production methods. They could even pay more of this kind of service. However, the majority of respondents hoped the service would bring economic benefits to the user, for example, in the amount of electricity bill. If the actor will find these features from the service while taking the first encountering with service resources in meso level, will it make more interested against the service. In the following table (table 27) can be found the meaningfulness features in this financial theme. The most important features are marked as light yellow.

TABLE 27 The most important attributes relating to influence of financial factors

Consequences	Weight	Amount
Using money for something else	30 %	4
Able to perform everyday functions	14 %	2
Making more money	14 %	2
Teaching people to act as desired	7 %	1
To support environmental well-being	7 %	1
Usability is independent of capability and age	7 %	1
Changing own behaviour	7 %	1
Don't have to bother yourself with it	7 %	1
Able to employ others	7 %	1

#### *Values / micro level*

When interest in the service is reached, the actor is ready for engaging to the service. The features which affect in this level are the personal value factors. When we look at this financial theme, the values that emerged from the responses related mostly to the own and others well-being. Although this theme considered the financial issues, the economy feature did not emerge so much. Although the respondents felt that financial savings motivated them to use the

service and were also one of the most important things, behind this all was their own well-being as the strongest value factor. Thus, it can be concluded that the financial balance and the extra money give the respondents a feeling of well-being.

By considering these value factors (table 28), the actor can be engaged with the service, which creates a better base for value co-creation to occur. After the actor has engaged with service, the possibility to destroy it all is for the actor and resource integration in meso level. To succeed in value co-creation, each actor must be satisfied with their own value factors to make the service work. If many actors feel disappointed, it will complicate the overall value co-creation process and may therefore result in value co-destruction. Integration does not happen if actors are not fully satisfied with the features offered by the service ecosystem. That is why these values below should consider when designing the new service ecosystem.

TABLE 28 The most important values relating to influence of financial factors

Values	Weight	Amount
Own and others well-being	44 %	6
Leisure time	14 %	2
Economy	14 %	2
Environmental well-being	14 %	2
Equality	7 %	1
Self-directed learning	7 %	1

#### *Value co-destruction*

This theme did not directly raise any negative issues that would directly lead to the value co-destruction. There were some challenging issues, which, if realized, could pose a threat. However, those were the same things that came up in other themes as well. The respondents felt that getting stressed with the service, could complicate things and the service use. Also, if the service is mandatory, it could share opinions on convenience of use. These are not directly threatening the service use but should be considered when designing the service ecosystem. As these responses in every theme concluded many same features that influences the decisions of the actors, to the next sub-chapter the comprehensive view of value co-creation in this service ecosystem is collected. This will create a holistic view of the factors that can achieve value co-creation.

## **7.8 Value co-creation in DSR service**

This sub-chapter briefly summarizes how value co-creation can be achieved in this DSR service. Because each theme has the same features as influencing factors, it creates a reliable foundation for the accuracy of the results. These can be

well used in service design and development. The lens built in the theory part also review the essential elements of service design. When designing the service, these results from the study should also be considered. The following paragraphs summarize the results that affect both the design of the service and its use and continuity. The following table (table 29) describes the main features of attributes that emerged mostly from these all themes.

#### *Attributes / macro level*

The results show that users can get the most interested of the service if it seems easy to use, reliable, and they maintain the ability to control in the service. Also, the respondents have interest on own incoming possibilities trough the service like making more breaks and to have possibility to own production / storage. What seems to be affecting in background is the power of money, although it did not emerge straight at this level. The results were also expected to have a significant environmental impact on the selection of using the service, but the results showed that, at least as a priority, it was not considered to be important. From the ninth place can be found first environmentally related feature. When thinking about the design of the service, these factors that emerged the most from the responses creates the basis for the development of the service ecosystem. These features help the actor get interested in the service and possibly try it, after which the resources of the service have their own role to make the operator a longer-term user, i.e. to engage with the service.

These attributes (see table 29) provides a direction for progress in service ecosystem development. By taking care of these features, the actor is more interested in experimenting with the service and possibly also continuing to use it. In this meso level, the encountering with the resources first time has the main role in the service use continuing. If the service meets the expectations of the actor, the engagement in the micro level is possible.

#### *Consequences / meso level*

If we look at these results of consequences in page 89 (table 30), the biggest weight is on the feature of "ability to perform everyday functions". As mentioned in previous chapter, the respondents felt that the service could harm their schedules. Electricity is perceived as a basic necessity and a right for everyone, so it should be available whenever there is a need. Also, they thought that for getting money saving by using this service, it would motivate them more to use it. Although the environmental issues did not emerge when talked about attributes, in consequences this feature could be seen. The environmental issues were considered to be the third most important factor in this value co-creation process. The other main features related generating shared prosperity, which can be seen as connection to environmental well-being. Also, the avoidance of bothering yourself with the service pondered the respondents. As these consequences has been taken care of, the process is closer to the value co-creation.

TABLE 29 The main features of attributes that emerged mostly from these all themes

Attributes	Weight	Amount
Easy to use	12 %	20
Can control itself	10 %	18
Reliability	9 %	15
Making / planning own plans	8 %	14
Making own breaks	6 %	11
Easy	6%	11
Information about the beginning of break	5,8 %	10
Own production / storage	5 %	8
Save money	5 %	8
Save on consumption	5 %	8
Information on consumption	4 %	7
Possibility to refuse	3,5 %	6
Renewable energy sources	3,5 %	6
Timely information	3 %	5
Change in own behaviour	2 %	4
Interactive	2 %	4
Information on the duration of the breaks	1,5 %	3
Synergy	1,5 %	3
Ecology	1,5 %	3
Intelligibility of knowledge	1 %	2
Economically reasonable	1 %	2
In real time	<1 %	1
Possibility to engage	<1 %	1
Resale of electricity	<1 %	1
Avoidance of damage	<1 %	1

#### *Values /micro level*

How to help in the actor engagement, these value factors in table 31 (see page 89) are affecting in the base of value co-creation. If the actor feels the value factors filled, it creates the opportunity to value co-creation. The actor engages with the service and gives the opportunity to actor and resource integration.

When we look at these results, we can find that own and others well-being affect the most to the final decision to continue the service use. The respondents felt also that getting the financial benefit could motivate them more. The service should create some benefits to its users. The environmental factors emerged as the third most important. Although the main features related to actors own personal wellbeing factors, the environmental issues could be seen. By revealing environmental well-being, they could also by that way affect their and their offspring's well-being. These features can be considered as the most effective factors in value co-creation.



TABLE 30 The main features of consequences that emerged mostly from these all themes

Consequences	Weight	Amount
Able to perform everyday functions	23 %	39
Save money	11 %	19
To support environmental well-being	10 %	18
Don't have to bother yourself with it	8 %	14
Preservation of their own rights	7,5 %	13
Generating shared prosperity	6 %	11
Usability is independent of capability and age	5 %	8
Avoidance of damage	3 %	5
Increasing leisure time	2 %	4
Avoiding extra work	2 %	4
Using money for something else	2 %	4
Can concentrate to other things like work	1,5 %	3
Changing own behaviour	1,5 %	3
Save on consumption	1,5 %	3
Facilitating decision-making	1 %	2
Making more money	1 %	2
Avoiding unnecessary costs	1 %	2
Saving time for leisure	1 %	2
Adapting to changing situations	1 %	2
Responding timely to changing situations	1 %	2
Acting as promised	<1 %	1
Company image	<1 %	1
Making the use easy	<1 %	1
Making your own life work	<1 %	1
Otherwise I won't use it	<1 %	1
Raising awareness	<1 %	1
Saving time / no time waste	<1 %	1
Self-benefit	<1 %	1
Stop using it	<1 %	1
Teaching people to act as desired	<1 %	1
To get value for money	<1 %	1

TABLE 31 The main features of values that emerged mostly from these all themes

Values	Weight	Amount
Own and others well-being	28 %	48
Economy	14 %	24
Environmental well-being	13 %	23
Leisure time	7,5 %	13
No value	5 %	8
Easy-going	4 %	7
Making everyday life easier	3 %	5
Producing pleasure	3 %	5
Equality	2 %	4
Fellowship	2 %	4
Generating meaningfulness	2 %	4
Managing your own life	2 %	4
Feel safe	1,5 %	3
Independency	1,5 %	3
Own authority	1 %	2
Reliability	1 %	2
Anticipation	<1 %	1
Business success	<1 %	1
Energy supply secured	<1 %	1
Engagement	<1 %	1
Fulfilment of promises	<1 %	1
Generating shared prosperity	<1 %	1
Orderliness	<1 %	1
Peace	<1 %	1
Self-directed learning	<1 %	1
Success at work	<1 %	1
Time management	<1 %	1

If we look at this process in its entirety, the things that support the actor's personal well-being help most in their engagement to the service. If many actors engage to the service, and the interactions between actors and resources are successful, it leads to value co-creation. If in the integration part there is a drawback and the user experience become negative, it will quickly lead to the value co-destruction. Therefore, each service actors and resources have a vital role to play in the success of the service. The actor may also experience the fulfilment of their values at an early stage. If the value drivers meet the actor's own value factors, it may lead directly to the value co-creation.

## 8 DISCUSSION

This chapter will discuss the results presented in previous chapters and how it supports earlier literature and the theoretical model which is used as a guiding factor in this research, especially the lens which through the results were mirrored.

The purpose of this study was to find out how the value is co-created in this DSR service and how much actor's engagement is involved in that process. Also, the possibility to value co-destruction was subject to research. By that way the answer to the research question can be given. The study focused on the exploration of value factors affecting future electricity demand-side response service, which would allow the operator to commit to using the service and thus to the value co-creation. These value factors were excavated using a special laddering interview technique.

### 8.1 Research question

The purpose of this study was to find out how the value co-creation occurs in this future DSR service and how engagement affects the whole process. By that way the answer to the research question can be found as we can then understand better what are the features in background affecting this service use. This research investigates the answer to the question of :

1. *How households can be engaged to the future electricity demand-side response service?*

To clarify the answer to this question, the theory of actor engagement and value co-creation helped in this. The research was then carried out as a case study, which would allow the best solution to the problem solving. As the main idea was to find out the ultimate value factors that will affect in the background, the chosen interview method was special laddering technique. By this way the right components to value co-creation in this context could be found. After that the

results were mirrored to the theoretical model (lens) that were created from the base of the theory. To understand this whole system, the idea of service ecosystem must be noticed.

As Lusch & Nambisan (2015) pointed out, the possibility to value co-creation is in resource integration. This resource encompasses all actors in the service ecosystem, so it can be thought that each actor is both an innovator and a potential value co-creator. It can also be concluded from this that every actor can also be value co-destroyer (Lusch & Nambisan, 2015). As Prior and Marcos-Cuevas (2016) described in their research, the possibility to value co-destruction is near when activities and actor requirements do not align. If the actors feel negative experiences with the service or when they rest on incomplete or misinterpreted information, which is the result of decline in a customer's well-being, it is found to lead value co-destruction (Prior and Marcos-Cuevas, 2016). That is why, this research also investigated the possibility to value co-destruction in this DSR service. The sub-question for this research was:

*1a. Can the actor engagement lead to value co-destruction?*

The basis for identifying these research problems was used both theories of Storbacka et al (2016) and Grotherr et al (2018). Combining these theories, the framework to this research could be created. In this model, the best qualities of both theories were combined to investigate the problem of research in this context.

It is important to notice the basic starting point for the process of value co-creation in service ecosystem. Like the statement of Lusch and Nambisan (2015), who introduced the idea of value-in-use, where organizations don't have possibility to deliver value. They can only offer value propositions as an invitation to engage with them. As we can understand from this, the service provider can only deliver value suggestions to attract users to the service. Eventually, the user's own value factors with the value factors of other users create an opportunity for common value co-creation. The more different value factors involved in encounters, the more challenging it is to achieve value co-creation. This also proves that the greater the chance of getting a negative user experience there is and thus, the value co-destruction to occur (Lusch and Nambisan, 2015).

As Lusch and Nambisan (2015) pointed out, the role of actors in this context is significant as they can proactively support the process of value co-creation by establishing new organizational mechanisms and making appropriate changes to their internal processes. In this DSR service context it means that by letting the actors to participate to the service, they can better support the development of the entire service ecosystem. If they succeed, they can together create an increasingly functional service ecosystem and thus create common good. It is also important to note that use can create new value factors that should be taken into account. This requires constant monitoring and interactive action (Lusch and Nambisan, 2015).

As these factors are taken into consideration, it is easier to observe the effect of engagement on the common value co-creation. As Storbacka et al (2016)

pointed out, if there are no actor engagement, it means that no resource integration happens, and no value can be co-created. That is why it is important to investigate which factors are related to the possibility of actor engagement. To have the actor engage with the service, it is one step closer to value co-creation to occur. After the engagement, the resource integration will play in big role as it might still change the possibility to value co-creation. As earlier was mentioned, if actors and resources cannot integrate (i.e. values and requirements do not meet), the value co-destruction is possible (Storbacka et al, 2016). How Grotherr et al (2018) research completed this research was that they introduced the service design viewpoint (Grotherr et al, 2018). By taking this into account, this research can give the advices by the service design perspective i.e. what features should be taken care of that the service offers the best platform to actor engagement, resource integration and through value co-creation. The main findings of this research have been presented in the following table (table 32).

By taking care of these features in table 32 (see page 93), the value co-creation can be reached. Of course, a complete promise of value co-creation cannot be given, because the integration of resources and actors ultimately affects the value co-creation. It should also be noted that value co-creation is a continuous process that is influenced by an ever-changing environment of service ecosystem. Actors in this ecosystem contribute to the potential for value co-creation and co-destruction. Thus, the service provider must always be vigilant, developing processes to respond to an ever-changing environment and delivering the right value propositions to achieve engagement faster. From these features (see table 32) the right value propositions can be taken to help in the engagement process. The features that can be led to value co-destruction are presented in the table 33 (see page 94).

TABLE 32 The main findings of the research

Theme	Attributes	Consequences	Values
User involvement	Can control itself (38%)	Preservation of their own rights (25%)	Own and others well-being (33%)
	Making own breaks (23%)	Save money (25%)	Economy (20%)
	Own production / storage (17%)	Able to perform everyday functions (23%)	
	Possibility to refuse (15%)		
	Making own breaks (23%)		
	Own production / storage (17%)		
Availability	Easy to use (56%)	Don't have to bother yourself with it (31%)	Easy going (14%)
	Easy (30%)	Usability is independent of capability and age (19%)	Leisure time (14%) Own and other well-being (14%)
Producing common good	Save on consumption (28%)	To support environmental well-being (40%)	Environmental well-being (48%)
	Renewable energy resources (24%)	Generating shared prosperity (36%)	Own and others well-being (20%)
Information content	Information about the beginning of breaks (45%)	Able to perform everyday functions (32%)	Own and others well-being (37%)
	Information on consumption (32%)	Save money (18%)	Economy (23%)
Timing of information	Making / planning your own plans (74%)	Able to perform everyday functions (58%)	Own and others well-being (43%)
Reliability	Operational reliability (99%)	Able to perform everyday functions (45%)	Own and others well-being (19%)
		Stop using it (13%)	Leisure time (19%) Economy (14%)
Financial factors	Save money (58%)	Using money for something else (30%)	Own and others well-being (44%)
		Able to perform everyday functions (14%)	Leisure time (14%)
		Making more money (14%)	Economy (14%) Environmental well-being (14%)

TABLE 33 The main findings of features leading to value co-destruction

Theme	Challenge	Possibility to value co-destruction	
Reliability	Makes life difficult	Frustration	Negative user experience → stop using
	Irritation	Avoiding inactive applications	Stop using
User involvement	Possibility to refuse		
	Avoidance of damages	Additional investments	
	Unexpected surprises	Frustration	Negative effect
	Forced	Frustration	Negative effect
Availability	The service does not work as agreed	Stress	
	Service complicates things	Will not use it	
	The information is not clear enough (readily available)	Interfere	Loosing nerves
	Do not respond timely to the changing situations	Unstable, more worries	Stop using it
Producing common good	Not easy to use	Forced	Resistance to change
	No benefits	No one uses it	
Financial factors	Stressed feeling		
	Mandatory service		
Information content	More problems	Devices get damaged	Unnecessary costs
	Preservation of own rights	No benefit for the user - > citizens suffers	Will not use it
	Practical problems (damages)	Getting angry	Feeling discomfort
Timing of information	Operational reliability is shaken	Financial loss	
	Changing situations	Interfere the user	Loosing nerves
	Preservation of own rights	Discomfort feeling	
	Time waste	Will get stressed	

## 8.2 Theoretical implications

This research demonstrates how value co-creation occurs in a service ecosystem. To understand the prevailing context, the theory of DSR has been presented. In order to get a comprehensive picture of the entire process, the actor engagement to the service is an integral part. Therefore, the research has utilized the theories of Storbacka et al (2016) and Grotherr et al (2018), creating an overall image of value creation in DSR service. The framework which is built on this theory is compared to the results of interview surveys. Because the interviews were conducted using a special Laddering technique, it produced valuable data for solving the research problem as this technique is based on the study of the fundamental value factors of individuals.

This sub-chapter will describe the implications on research and practise by taking into account these three theoretical viewpoints : Demand-side response, actor engagement and value co-creation / value co-destruction. These have been presented in three main steps, that has to be taken into account when reaching the ultimate value co-creation.

### **8.2.1 Implication 1: The DSR service should work as a service ecosystem, thus creating the basis for the value co-creation**

In order to better understand the entire field of DSR service in the value co-creation context, the concept of service ecosystem should be well aware as it creates the base to the whole process. As Wieland et al (2012) has pointed out in their research, service ecosystem must be considered as open systems where by sharing or applying resources the state of other system can be improved and by acquiring external resources its own state can be improved. In the service ecosystem the main thing is to achieve shared goals by interacting with each others (Wieland et al, 2012). As Akaka and Vargo (2012) pointed out the value co-creation is constructed through the exchange and application of operant resources like knowledge and skills, among multiple actors which have created network with institutions (in this case electricity companies or individual aggregators) that guide them (Akaka and Vargo, 2012).

When we think about DSR, independent aggregators and individual households together form a service ecosystem. In this ecosystem, electricity network companies and the transmission system operator also have a role to play, even though they are not directly connected to the final users. The way the actors work together and understand the obligations and rules imposed by the institutions will affect what kind of service experience actors experience. A functional service ecosystem creates the foundation and is to ensure that value co-creation is possible. Although it is not able to directly guarantee it, it provides a working platform for the integration of actors, which is a prerequisite for the whole value co-creation process. In a service ecosystem, institutions are able to send value proposals to get the actors interested against



the service and contribute to engage them with the service and ultimately integrating with other actors and resources.

Without this concept of service ecosystem, value co-creation is difficult to achieve. As Prior and Marcos-Cuevas (2016) pointed out in their research, the influence of service ecosystem on value co-destruction is important to understand as it provides a platform for all members with different kinds of requirements, which at the same time it provides a basis for conflict (Prior and Marcos-Cuevas, 2016). As the DSR service works as a cloud service and brings together several actors to succeed in it, the service ecosystem model is the most appropriate way to implement it. It creates an opportunity for actors to engage with the service and thus create a workable service package that meets their value expectations. Taking into account the results of the interviews, these can be used as value propositions for engagement, accelerating the value co-creation. It is also important to take these considerations into account when creating institutional guidelines and rules. As the research has already shown, users expect a lot of the content and timing of the information. These values can also be taken into account in these matters. The seven themes created from the interview responses will provide a direction that will help develop this particular service ecosystem.

### **8.2.2 Implication 2 : By engaging the actors in the service ecosystem, the value co-creation is possible to achieve**

A functional service ecosystem creates a platform where the actor's engagement with the service is possible. Positioning and encountering the actor with resources creates the first image of the service. Through positive experience, the engagement is possible. By understanding the users better and taking them into consideration, value co-creation can be achieved. As Lusch and Nambisan (2015) suggested, institutions cannot directly influence the engagement of the actors, but through value propositions that they can send (Lusch and Nambisan, 2015). The results of the interviews can be used well either as value propositions in this engagement process or as a help in developing a service ecosystem further.

As Lusch and Nambisan (2015) pointed out in their research, the service ecosystem is an ever-changing platform where actors with relationships are shaping the field of action further. Therefore, it creates challenges for the value co-creation in common, because if the value expectations of the actors are not met or the expectations of the actors and resources do not align, it creates the difficulty of generating value (Lusch and Nambisan, 2015). In this situation, it is particularly important to take into account the results of the interviews about the fundamental value factors of users and what leads to them, as they can anticipate potential challenges. The seven themes that emerged from the interviews created a direction to achieve the engagement of the actors. As in the framework created by Storbacka et al (2016), it is possible to achieve the value co-creation through the actor engagement. If the engagement does not happen, the value co-creation is difficult to occur. Through actor engagement, the actor

is closer to the integration of resources and actors, and hence also the value co-creation. In other words, mere engagement does not yet guarantee the value co-creation, but it is through the integration of resources.

The commitment of the actors facilitates the value co-creation, and guides you towards the next stage, which is the integration of actors and resources. Only at this level can the final value creation be achieved. By taking into account the value factors that emerged from the interview responses the engagement process of the actor can be facilitated by sending the appropriate value propositions. If an actor feels that the proposals are relevant, it will help them to engage themselves with the service and will therefore be ready to continue using it. Therefore, he/she also gives the opportunity to actors and resources integration. The next sub-chapter explains more detail this implication on practice.

### **8.2.3 Implication 3 : The relationships between the actors and the integration with the resources ultimately determine the realization of the value co-creation**

As pointed out in the two earlier implications, the last phase in this value co-creation is the success in actor and resource integration. As Prior and Marcos-Cuevas (2016) described in their research, the value co-creation cannot be achieved if this integration does not happen. If there are some negative user experiences or activities and user's requirements does not align, the possibility to value co-destruction is more closely to occur. What is even more challenging about this is that the service ecosystem is an ever-changing platform where institutions have no major impact on value co-creation (Prior and Marcos-Cuevas, 2016).

As Grotherr et al (2018) pointed out, the institutions take care of the institutional design creating the value-added service system with their value propositions. Considering the ever-changing field of action, designing this service system requires an iterative approach to react quickly to changes. In this institutional design the bases for the service will be created. Also, the engagement design will be created using the iterative approach where the engagement properties will be taken care of to get the actors connected to the service use. These two phases bind together these three levels of macro, meso and micro creating a working platform for the entire service, enabling actors to integrate with resources (Grotherr et al, 2018).

When we look at the results of interviews, the effect of the service as a factor contributing to its own well-being is the best way to value co-creation to occur. If the actors feel that the service increases their own well-being for example getting more free time or facilitating daily activities, the positive user experience is easy to achieve. It is also important that actors are able to carry out their day-to-day operations effortlessly through a carefree service, which gives them a feeling of well-being. This carefree service is easy to take into account in institutional design, but it is more challenging to find a solution to increase

leisure time as it is influenced by both personal characteristics of performance and current service situations. In any case, considering these key factors, the integration of resources and actors can be facilitated and hence the ability to value co-creation is possible. However, the challenge is that as the number of actors increases and the service evolves, value expectations will also change, and therefore the service should strive to meet these ever-changing expectations to achieving the value co-creation. As Prior and Marcos-Cuevas (2016) described the service ecosystem provides a basis for conflict at the same time as platform for positive integration. Letting the situation to the stage of conflict, it means that value co-destruction will occur (Prior and Marcos-Cuevas, 2016).

At the same time, when the service has the opportunity to value co-creation, there is also possibility to value co-destruction if expectations do not align. The more actors there are in the field, the more expectations you have to meet and the more complex the value co-creation process can be. However, this study shows that at this stage the value factors of actors are very similar. Thus, we can assume that by taking these value factors into account when designing the service, value co-creation can be achieved, and the actors engaged with the service. Taking advantage of the iterative development model, it is always possible to respond to ever-changing needs and thus ensure the possibility of value co-creation also in the future.

### 8.3 Implications on practice

In the earlier sub-chapter the implications on theory has been given with the help of the results of this research. Instead, in this sub-chapter the implications on practice will be described considering the basis of the interview survey results, i.e. how can the results of this research utilized in practice?

The Laddering method that were used in this research to found out the ultimate value factors, helped to understand the whole process of value co-creation in actor's point of view in this service ecosystem. It also enabled to understand the meaning of actor and resource integration, and how they together are the main key elements in ultimate value co-creation. Every chain from the interview had own specific meaning in building these results, by revealing the values that are affecting in behind the actors decisions. With the help of this content, the results of this study is more easy to utilize and convert into practice.

The following three statements of results introduces the idea of what kind of implications these results have on practice.

1. *The results can be used to develop a service that meet the needs of the consumer*  
These results will help better to understand the individual user (in this case, the household) in connection with the introduction of the service. With the help of the actor's ultimate value factors the organizations can better influence the characteristics of the new service in its development phase, by creating a service

that better meet the consumer needs. In other words, organizations are able to deliver the best possible value drivers compared to actor's own value factors and that way getting the actors engaged with the service. Therefore, the most important value factors can be taken into account in the development phase, thus creating the most interesting service.

This research will also help to understand how the planned DSR service will be experienced at this stage. Especially what kind of pre-assumptions households have with regard to this service. These things can also be well utilized in the new service development phase, thus creating the most reliable image of the service.

2. *The results help to understand how the value creation can achieve a permanent customer base that together creates the value of this service.*

This research will help to understand how a permanent customer relationship can be achieved with this DSR service. By responding to the value expectations of households, the interest of this service can be achieved and thus also engaged them in the use of this service. By understanding the field of activity of this service ecosystem as an ever-changing environment, it puts its organizations in their own challenges to keep the service as interesting as possible. Here, the constant monitoring of the field of action and the updating of the value promotions helps in meeting the current expectations. The causal relationships that found in this research help to anticipate and adapt to these changing situations.

3. *The results help to understand how vulnerable the chain is: only by meeting expectations can the value co-creation be achieved.*

As the results show, value co-destruction is also possible with this service. Taking the challenges of research into consideration, it helps prevent the potential value co-destruction in advance. However, considering the fact that the field of activity is always changing and its members (actors) themselves act as value co-creators and co-destroyers. This research also propose that when the field of activity changes to the situation when the actors produce, storage and sell energy themselves, the value co-destruction can occur easier. This requires special attention from the service when creating the rules, as the change in the role of the actors may also lead to more neglect and misunderstanding of actors.

## 9 CONCLUSION

This last chapter brings together the entire study, summarizing its main features by presenting the conclusion of this research. First, the brief summary has been presented with the research objectives and questions. After that the contributions to the research and practice has been conducted. The last part of this chapter includes the criteria of reliability and limitations of this study with the final recommendations for the future research.

### 9.1 Summary

The energy market will change in the near future, as the sufficiency of electricity is no longer guaranteed. New technological innovations are developing markets, but also contribute to increasing energy consumption. The rise of electric cars already brings their own challenges to the adequacy of electric network capacity. As going towards real-time electricity market, it poses the need for rapid regulation. When the amount of consumption peaks will increase, more regulation will be needed. Renunciation of fossil fuel power and transition to varying production methods creates its own challenges to lower these consumption peaks. The sufficiency of our country's electricity is secured by reserve power plants, but launching them is very costly and, above all, environmentally consuming. Responding to these problems, the future's demand-side response service (DSR) is one solution. How to engage these households to this service, is the main question for this research to search out.

The DSR service is not yet well-known among households, as we have had only some small pilot projects with households in this DSR service in Finland. The electricity companies and the transmission system operator have an interest in bringing households into this service, but their commitment is perceived as challenging. As this question has been emerged from the earlier study of DSR business-models, this research will search the answer to this matter. To understand the prevailing phenomenon, the theories of value co-creation (and co-

destruction) and actor engagement is worth embracing. But first the main idea of DSR is worth knowing.

The base of DSR service comes from the idea of the law of demand and supply, which creates the opportunity to succeed in the commodity market. When studying the construction of demand, it is greatly influenced by consumer needs, commodity prices, other commodity prices, and consumer income. In turn, supply is the direct result of the decisions of the companies producing commodities. The balance in the market consists of demand and supply. Over-production or -demand is not the target of either (Pohjola, 2018).

When we consider the electricity market, it is not so easy to keep the balance between supply and demand. The purpose is the same but balancing requires special arrangements. Especially as the rigid form of power generation increases, it is becoming increasingly difficult to meet demand and supply. As a result, the electricity market has also felt important for households to be able to absorb their demand (Pohjola, 2018).

Flexibility in demand means that, at peak consumption, households would be willing to flex in their own electricity consumption. DSR means transferring electricity from a high consumption to a more moderate consumption time or momentary change in the use of electricity, where this new service would be in the main role. As Muratori & Rizzoni (2016) described, to match peak demand, the seasonal and daily fluctuations have to be followed to ensure reliable operation of the electric power system. The capacity available from these households will provide the necessary extra for the electric power system (Muratori & Rizzoni, 2016). According to Siano & Sarno (2016), the main thing is to influence consumer's habits in their energy consumption to cover the needs of electricity grid. In order to succeed in this, it is useful to know how the value co-creation occurs as it is the best way to meet the expectations of the actors and influence their behaviour to engage them with the service (Siano & Sarno, 2016).

To get an understanding of value co-creation, the overview of dominant logic by Vargo & Lusch (2004) is recommendable. In this research the main focus is on intangible resources, the co-creation of value, and relationships where collaborating with and learning from customers and being adaptive to their individual and dynamic needs are the core thing. What Lusch and Nambisan (2015) brought later to this conception, related more to the actor-to-actor (A2A) relationships building a tripartite framework of service innovation which was formed of the components of service ecosystems, service platforms and value co-creation. What they described to be important to this service innovation perspective to value co-creation was that actors are constantly dropping and forming new connections, and the value experiencing is dynamic (Lusch and Nambisan, 2015). Vargo and Lusch (2004) defined this as value-in-use, where organizations don't have possibility to deliver value, which means that organizations can only offer a value proposition as an invitation to engage with them. This led to an interest in this study also to consider the factors leading to engagement, to better understand the whole value co-creation process. The most suitable theory

for this were provided by Storbacka et al (2016) and Grotherr et al (2018) by disclosing the microfoundational view for value co-creation.

As the value co-creation is difficult to observe empirically the actor engagement is observable, which is why Storbacka et al (2016) introduced a framework where value co-creation occurs by actors engage in service-for-service exchange and in related interactions that lead to resource integration. The fact was that if there were no actor engagement, the resource integration is not possible to happen. Without this integration, no value can be co-created where the relationship with these actors and resources are in key role. This research has been influenced by previous research the Coleman bathtub (Coleman 1990) that introduced the macro - micro levels and their links between each other.

What Grotherr et al (2018) brought more to this framework was the idea of designing these service systems. As this DSR service is not yet to be developed, this aspect was also considered in this study. When designing, it is important to take into account the value factors of the actors, as they help build a service with value propositions that work well. Grotherr et al's (2018) framework is based on two theoretical foundation of the iterative and validating design process that eliminates the unpredictability's of designing sociotechnical service systems in highly dynamic environments. The framework considers the ecosystem by two individual levels of (1) institutional design and (2) engagement design. This process starts with finding the right configuration of actors and resources that represent effective resource integration patterns and lead to value co-creation. After that the focus is on the necessity to engage multiple distributed actors within the service system for reaching the successful value co-creation. The main thing in this is to reduce engagement barriers and instructs actors on how to engage within the platform. (Grotherr et al, 2018) In other words, these engagement patterns motivate actors to engage, have a positive impact on actor dispositions and facilitate resource integration, which leads more and more often to value co-creation. The other possibility is value co-destruction.

As this research also searches the answer to the possibility of value co-destruction, this theory is worth for notice. In value co-destruction the actor's needs does not align with the supply. In other words, if the actor has felt negative user experience, it might lead to value co-destruction. The user needs to be satisfied with their needs all the time so that integration with the resources is possible and hence the value co-creation. These considerations should also be considered when designing the platform, as poor user experience more likely leads to value co-destruction. In order to create a successful service ecosystem, individual value factors play a role. Therefore, this study focused on finding out which value factors most affect the user's choice to use the service.

The study was conducted as a qualitative study by interviewing 24 people. In order to find out the respondents' fundamental values, a special Laddering interview technique was used. By using this method, the attributes that affected most to their decision making, their consequences, and the ultimate value factors were sought out. The data which received from these interviews were di-

vided into seven different themes to describe the most important features of the DSR service. These themes were presented as thematic maps to describe the relationship between these features. With the help of these results the answer to the research questions were presented. By considering these features, especially the value factors that got most of the responses, will create the possibility through actor engagement to resource integration and by that way also to value co-creation.

To get the households to engage with this service, the ultimate value factors are in a key role. By maintaining the possibility to perform the daily activities will create the actors the feeling of well-being. Also, getting the benefit from the use, for example some money savings, will motivate the actors more. By knowing the fact that the actor can generate some benefit for environmentally, emerged also from the responses. With these features, the value co-creation can be reached.

As this research also sought for possibilities to value co-destructions, these features were also presented. In this situation, the integration between actors and resources was also in a key role. Each theme contained elements for possible value co-destruction. The strongest point was that the service was feared to make own operations and daily activities difficult, which in turn causes frustration and ultimately leads to cessation of use.

Through these findings this research offers contributions to both research and practice by raising the awareness of the impact of value co-creation in the actor engagement process, by giving the main features that leads to value co-creation. It also helps to better understand the whole process of DSR service for households and what main value factors are affecting in the background. As this phenomenon is not so much investigated, it provides new information for the development of this service. It also assesses some limitations to this research as the results may not be transferred further. These can be used in this first phase of service ecosystem design, but as the environment is constantly changing, the value factors that affect behind, changes also. This framework does not give accurate advices for service design from the technical viewpoint either, so the recommendation for future research is to award this framework by considering these issues. For example, how to improve the possibilities of information flow in the service or how to make the service more real-time and faster to meet the future market needs? Also, more researches could be done by investigating user experience and integration by human-computer interaction point of view.

All in all, this research formed the answer to the research problem by creating also a new perspective on previous research. Its results can be well utilized in theory and practice. It also brought new perspectives for future research to be utilized.



## 9.2 Contributions to research and practice

This research has some contributions to both research and practice. This research raises awareness of the impact of value co-creation in the actor engagement process and what are the main features that leads to value co-creation. It helps to better understand the whole process in the context of DSR service for households and how can the main value drivers in this context to be found. By creating a lens based on earlier theories, the results could be better explored, thus also contributing to earlier research.

This research brought deeper insights to value co-creation as the context dealt with future DSR service that has not been studied for a long time. With these results it support the ealier studies of engagement and value co-creation (co-destruction) and demonstrated the possibility of applying previous frameworks as a base for investigating a new kind of service innovation bringing valuable data to engaging actors and integrating resources. The study was also able to prove that, in the worst case scenario, failure to achieve value expectations can lead to the value co-destruction. This came up with many responses, which were seen as a negative service experience and, at worst, an end to use. The study also showed that without value propositions, it is difficult for an operator to get interested in the service and thus not to commit to it. Only through commitment to the service, integration of actors and resources is possible. This could be seen also of the results, as the respondents felt that interest would come only through certain features and engagement was also possible if their value expectations were met. The service was also expected to work all the time considering their personal value expectations. This, in turn, also creates an opportunity to value co-destruction.

This research also highlights the importance of engagement in the value creation process of a service ecosystem. Especially in this context, it adds importance, because without the engagement of the actors, it is not possible to realize the whole service. Therefore, the study of engagement was the key issue of this study, to which personal value factors offered a response. Through the actor integration to value co-creation, it is possible to realize the service because only a few households are not enough to start the service, but several household groups are needed.

This research contributes to the understanding of the importance of future electricity needs. It also opens up the principles of how the energy market will change and how it will also contribute to our own electricity consumption. It also gives its importance to more sustainable natural resources, which will hopefully also open the door to understanding the importance of regulating consumption, where households are playing an increasingly important role in the future. This research helps to understand the importance of the role of households in the changing energy market, how the passive user become an active. Research will also help to understand what kind of attitude the households currently have towards the service and how they see a change in

their behavior possible. The results of the study provided valuable data on the value factors of households for the use of the service in question, which can be utilized well in practice.

The results of the study give a comprehensive contribution to the design and launch of the service. The results are mirrored from the point of view of service platform design and user engagement, facilitating value creation and thus making the service as successful as possible. The results of the study can be considered as valid and reliable, because the results were very convergent and the group of respondents was the most suitable for the service. The findings of this study can be utilized both research and practice.

### 9.3 Criteria of reliability and limitations of the research

When evaluating the research, the validity and reliability of its results are main thing. This research can be considered to be valid as it responses to the research question by given the answers to the prevailing phenomenon with the help of accuracy results. These findings have been compared with the earlier works and theoretical framework to find explanations and make the research more reliable.

According to Tuomi & Sarajärvi (2018) the reliability can be achieved if it fulfills the certain criterias. The criterias of reliability evaluation are credibility (does the researcher's results match to the respondent's original answers), transferability (can the results be transfered to another context), dependability (the research has been carried out in accordance with the guiding principles of scientific research) and confirmability (can the results be established in practice). To evaluate reliability and validity, there must be harmony between theoretical underpinnings and that there are no contradictions. Although this reseach can be seen to fill the requirements of reliability and validity of research, there can be also found some limitations. These limitations are described taking into account the reliability criteria in qualitative research. The limitation will be introduced on a subject basis, thus creating a holistic view of the limitations of this research. First the limitations to the DSR service is stated, then the limitations relating to the interview and finally the limitations according to the framework that were used in the base of this research.

#### *DSR Service ecosystem*

As the study searched the future DSR service that has not yet been implemented, to understanding it is somewhat difficult from a household perspective. The industry has already used this service for some time, but only a few pilot projects have been implemented for households. Thus, consciousness is still not very high among households. This posed a challenge to research, as the possibility of a negative service image was very readily available. Users' prejudices had the opportunity to confuse the reality of the

answers. However, this was taken into account in the interview, as prejudices and resistance were expected from other studies.

The DSR service ecosystem affected also to the sampling of respondents by limiting it. Respondents had to be chosen from those who had experience with electrically heated houses to get the most reliable answers. Reliability was increased by the fact that the respondents consisted of people of different ages, gender and educational backgrounds. The respondents' knowledge of the real need for a service was at the same level (did not know much about it), from which it can be concluded that the answers were very authentic and truthful.

The service ecosystem also assess limitations to the transferability of research results. Because DSR service is dissimilar than other services, the use of results for other research can be difficult to combine. However, the base in the background, i.e. the framework built in this research, is well available for other similar studies too. Still, when utilizing the results, it is important to check the suitability of the themes raised in this research into the new context as their relevance may be very different. Nonetheless, this research provides good insight into how to engage a user in a new type of cloud service.

#### *Data collection method*

In addition to the thematic list, the description of the service was used to create a neutral image of the service itself. What causes limitations on research is that users do not know how the service really feels and what it means to their own operations. In the interview, it was often necessary to point out that electricity does break down only from certain devices and only those who consume the most, because respondents very often started to think about a completely electric-loss time. However, in these situations, the respondents were directed in the right direction to get the most reliable results.

The limitations on research can be categorized as the fact that there is no actual user experience and the answers are based on the feelings of the respondents. However, since the study examined the underlying values factors, they can be considered reliable, because ultimately, the user's personal value factors influence the service choices and ultimately the use of the service. It must also be remembered that if the service changes its shape, the exploitation of the results may suffer. However, this is unlikely because the basic idea of the service remains behind and its significance was mainly examined in this study.

It should also be noted that the interview was conducted in Finnish and the answers were translated into English. This may also cause misunderstanding in the interpretation of the results. In the end, however, the results can be considered reliable, as the responses were very consistent and the method used advocated the accuracy of the results. As Tuunanen & Govindji (2011) stated about this Laddering technique, the independently sorting chains increases the reliability of the thematic analysis process. As the chains of individual respondents are thoroughly reviewed, it supports the assumption that the number of misunderstandings is very limited.

The interview situation also affects much to the responses. That is why the used Laddering technique also assess some limitations to this research. As the

interview environment was not same for all participants, it might have influenced to the responses. As the Laddering technique requires, the environment should be undisturbed. Sudden noise or extra people in the background may cause interference, which in turn hinders the reliability of the interview results. One of the interviews had to be done via Skype, so knowledge of the respondent's environmental interference is not guaranteed.

Respondents' attitudes and state of mind also have a great impact on the quality of the answers. If the respondent is nervous or tense, it can distort the results. The situation tensed some of the respondents, but the situation was reassured before the official interview section started. Most of the respondents had an open mind, which made it easier to get results. The interview technique itself may also annoy the respondents, so it may also pose challenges to the quality of the results. Therefore, the interview situation and its nature creates its own limitations, as not all individuals are necessarily capable to be interviewed because of their own ability. Even from these answers the frustration was well noticed.

#### *Framework*

The used framework also assessed some limitations for this research. The perspective that the framework offers to this research is from the value co-creation point of view. It can be well used for developing the new service, but as the technique requires constant observation, the results which have been received in this research are suitable only in this first phase of service development. After the actors have used the service for a while, the value factors may have changed. This requires constant developing process and observation to keep the service interesting all the time.

Furthermore, this framework does not take into account other factors affecting the deployment. Because this framework focuses more on exploring features affecting user behavior, actor's relationships and actor / resource integration in this service ecosystem, it does not give help to the technical features of the service. This model best helps to develop user behavioral characteristics and service marketing. To get a deeper analysis of this phenomenon with technical characteristics, the theory of human-computer interaction and computer science would have helped. That is why it can be found as limitation that this framework does not give much technical advices to the service design. It also does not give exact details to the each design phases itself.

## **9.4 Future research**

This research provides a good theoretical perspective on value co-creation in this DSR service with the light guidance of service design, which findings can be used in developing this kind of service. The field study gave valuable data for the development but through the pilot project, these results could be tested.

That is why this study suggest as a future research to carry out a practical pilot project in order to obtain real-life results. These results can be used for designing the service platform and thested these value factors in practice.

As this DSR service is not yet been designed, it is also important to notice the service system design viewpoint which Grotherr et al (2018) introduced in their research. For the future research, this viewpoint should be taken more into account. With the help of this framework the main functionalities of the system can be planned. Also in this future service design research the value factors that emerged from this study could be tested in practice. In particular, how can individual value factors be taken into account in service design, thus creating a successful service package.

In addition to this conception of service design framework, future research could take more into account the technical features of the service and examine their impact on, for example, user experience and the information flow in the service. As the importance of the information flow has been strongly highlighted in this study, this aspect could be taken into account in future research. How to improve the possibilities of information flow in the service? How to make the service more real-time and faster to meet the future market needs?

The theory of ecosystem service also provides an opportunity for further research. Especially in the case where households start to produce and store energy themselves and resell it to others. At this point, the transformation of the service ecosystem into a more active player field generates new dimensions and greater risk of value co-destruction. This may also affect the operation of independent aggregators, the impact of which should be further explored. This step will only be realized once the service has been launched, the households are engaged and used the service for while. After the start-up phase, new value expectations may also arise, which will lead to further research. Through these results, we can further develop the service and take better account of the new development of complex energy sales.

This research also offers an interest in further research on the integration of actors and resources. Since this stage is the most important in terms of value co-creation, this could be further explored when the DSR service is launched. Of particular interest is how value expectations change in a service when another actor is encountered. Does the service ecosystem cause competition such as in commodity markets or do operators act as equal players in the market? If there is competition, can it be a threat to the common value co-creation? The interest is also raised by the fact that the growth of environmental well-being is increasingly shaped by the service ecosystem or does the market continue to be the economic advantage? From the point of view of preserving nature's well-being, this service would attract many new research objects.

In order to keep the service functioning and the possibility to value co-creation, the service must be developed continuously, taking into account the value expectations of the actors. Therefore, it opens up the possibility for many new studies, especially when the service has been launched. This research

provides highly usable information on how households can be engaged to the future DSR service. It also provides perspectives on service design and how value co-destruction can become possible in this context as well. These results help to develop a service that takes into account the value factors, thus creating the opportunity for actor engagement, integration of resources, and hence value co-creation. The continuous iterative development of the service and the evaluation of the functions create a better opportunity for the service ecosystem and hence for a longer term to value co-creation.

## REFERENCES

- Akaka, M. A. and Vargo, R. F. (2012). Value Cocreation and Service Systems (Re)Formation: A Service Ecosystems View. *Service Science* 4(3), pp. 207–217.
- Akaka, M. A. and Vargo, R. F. (2015). Extending the Context Of Service: From Encounters To Ecosystems. *Journal of Services Marketing*, Vol. 29 Issue: 6/7, pp.453-462.
- Akaka, M. A., Vargo, S. L. and Lusch, R. F. (2013). The Complexity of Context: A Service Ecosystems Approach for International Marketing. *Journal of International Marketing*, American Marketing Association, Vol. 21, No. 4, 2013, pp. 1–20.
- Cavaye, A. L. M. (1996). Case study research: a multifaceted research approach for IS. *Info Systems Journal* (1 996) 6,227-242.
- Coleman, J. (1990). *Foundations of social theory*. Boston, MA: Harvard University Press.
- Echeverri, P. and Skålen, P. (2011). Co-creation and co-destruction: A practice-theory based study of interactive value formation. *Marketing Theory* 11(3) 351–373.
- Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *The Academy of Management Review*, Vol. 14, No. 4 (Oct., 1989), pp. 532-550
- Felin, T., Foss, N. J. and Ployhart, R. E. (2015). The microfoundations movement in strategy and organization theory. *The Academy of Management Annals*, 9(1), 575–632.
- Fingrid (n.d.). Kysyntäjousto. Retrieved 9.11.2018 from <https://www.fingrid.fi/sahkomarkkinat/kysyntajousto/>.
- Gkatzikis, L., Koutsopoulos, I. and Salonidis, T. (2013). The Role of Aggregators in Smart Grid Demand Response Markets. *IEEE Journal on Selected Areas in Communications*, Vol. 31, No. 7.
- Grotherr, C., Semmann, M. and Böhmman, T. (2018). Using Microfoundation of Value Co-Creation to Guide Service Systems Design – A Multilevel Design Framework. Thirty ninth International Conference on Information Systems, San Francisco.

- Gutmann, J. (1982). A Means-End Chain Model Based on Consumer Categorization Processes ., *Journal of Marketing*, 46:2 (1982:Spring) p.60.
- Hedström, P. and Swedberg, R. (1998). *Social mechanisms: An analytical approach to social theory* (pp. 1-31). Cambridge, UK: Cambridge University Press.
- Jepperson, R., and Meyer, J. W. (2011). Multiple levels of analysis and the limitations of methodological individualisms. *Sociological Theory*, 29(1), 54-73.
- Kim, Y. H., Kim, D. J. and Wachter, K. (2013). A study of mobile user engagement (MoEN): Engagement motivations, perceived value, satisfaction, and continued engagement intention. *Decision Support Systems* 56 (2013) 361-370.
- Lintula, J., Tuunanen, T., Salo, M. and Myers, M. D. (2018). When Value Co-Creation Turns to Co-Destruction: Users' Experiences of Augmented Reality Mobile Games. *Thirty Ninth International Conference on Information Systems*, San Francisco.
- Lusch, R. F. and Nambisan, S. (2015). Service Innovation: A Service-Dominant Logic Perspective. *MIS Quarterly* Vol. 39 No. 1, pp. 155-175/March 2015.
- Muratori, M. and Rizzoni, G. (2016). Residential Demand Response: Dynamic Energy Management and Time-Varying Electricity Pricing. *IEEE Transactions On Power Systems*, Vol. 31, NO. 2.
- Myers, M.D. and Avison, D. (2002). *Qualitative Research in Information Systems*. SAGE Publications, London.
- Nurmi, S. 2018. Välttämättömyydestä mahdollisuudeksi. Reilua Energiaa. Viitattu [20.10.2018] [https://www.energiavirasto.fi/reilua-energiaa/-/blogs/valttamattomyydesta-mahdollisuudeksi;jsessionid=0CC9DDD2C91C767BB301EE9418F1512A?\\_33\\_redirect=https%3A%2F%2Fwww.energiavirasto.fi%2Freilua-energiaa%3Bjsessionid%3D0CC9DDD2C91C767BB301EE9418F1512A%3Fp\\_p\\_id%3D33%26p\\_p\\_lifecycle%3D0%26p\\_p\\_state%3Dnormal%26p\\_p\\_mode%3Dview%26p\\_p\\_col\\_id%3Dcolumn-3%26p\\_p\\_col\\_pos%3D1%26p\\_p\\_col\\_count%3D3](https://www.energiavirasto.fi/reilua-energiaa/-/blogs/valttamattomyydesta-mahdollisuudeksi;jsessionid=0CC9DDD2C91C767BB301EE9418F1512A?_33_redirect=https%3A%2F%2Fwww.energiavirasto.fi%2Freilua-energiaa%3Bjsessionid%3D0CC9DDD2C91C767BB301EE9418F1512A%3Fp_p_id%3D33%26p_p_lifecycle%3D0%26p_p_state%3Dnormal%26p_p_mode%3Dview%26p_p_col_id%3Dcolumn-3%26p_p_col_pos%3D1%26p_p_col_count%3D3).
- O'Connell, N., Pinson, P., Madsen, H. and O'Malley, M. (2014). Benefits and challenges of electrical demand response: A critical review. *Renewable and Sustainable Energy Reviews* 39 (2014) 686-699.



- Plé, L. and Cáceres, R. C. (2010). Not Always Co - Creation: Introducing Interactional Co - Destruction of Value In Servicedominant Logic, *Journal of Services Marketing*, Vol. 24 Issue: 6, pp.430-437.
- Prior, D. D. and Marcos-Cuevas, J. (2016). Value co-destruction in interfirm relationships: The impact of actor engagement styles. *Marketing Theory* 2016, Vol. 16(4) 533–552.
- Pohjola, Matti (2018). *Taloustieteen oppikirja*. Sanoma Pro Oy, Helsinki.
- Puikkonen, M. and Raati, R. (2018). JouKo-joustava kotitalous projekti: Kysyntäjoustopalvelun liiketoimintamallit. Referred 7.1.2019 from [https://github.com/Teukka/FlexHomeElPower/blob/8f48b39104af95f29aa40c0c81716d259f7fb595/BusinessStudies/Business\\_Studies\\_Report\\_JouKo\\_in\\_Finnish.pdf](https://github.com/Teukka/FlexHomeElPower/blob/8f48b39104af95f29aa40c0c81716d259f7fb595/BusinessStudies/Business_Studies_Report_JouKo_in_Finnish.pdf).
- Reynolds, T. J. and Gutman, J. (1988). Laddering method, theory, analysis and interpretation. *Journal of Advertising research*, February / March 1988.
- Sawhney, M., Verona, G. and Prandelli, E. (2005). Collaborating to create: The internet as a platform for customer engagement in product innovation. *Journal of Interactive Marketing*, 19(4), 4–17.
- Siano, P. and Sarno, D. (2016). Assessing the benefits of residential demand response in a real time distribution energy market. *Applied Energy* 161 (2016) 533–551.
- Storbacka, K., Brodie, R. J., Böhmman, T., Maglio, P. P. and Nenonen, S. (2016). Actor engagement as a microfoundation for value co-creation. *Journal of Business Research* 69 (2016) 3008–3017.
- There (2016). Kysyntäjoustopilottiprojekti – loppuraportti. Retrieved 9.11.2018 from <https://www.fingrid.fi/globalassets/dokumentit/fi/sahkomarkkinat/ky syntajousto/kysynnanjoustopilottiprojekti-loppuraportti-julkinen.pdf>.
- Tuomi, J. and Sarajärvi, A. (2018). *Laadullinen tutkimus ja sisällönanalyysi*. Kustannusyhtiö Tammi.
- Tuunanen, T. and Govindji, H. (2011). Utilization of Flow Concept for Digital Service Requirements Prioritization. All Sprouts Content. 481. Association for Information Systems AIS Electronic Library (AISeL).
- Tuunanen, T., Peffers, K. and Gengler, G. E. (2004). *Wide Audience Requirements Engineering (Ware): A Practical Method and Case Study*. HeSE Print. Retrieved 9.4.2019 from <https://aaltodoc.aalto.fi/bitstream/handle/123456789/12306/isbn9517918887.pdf?sequence=1>

- Vargo, S. L. & Lusch, R. F. (2004). Evolving to a New Dominant Logic for Marketing. *Journal of Marketing* Vol. 68 (January 2004), 1-17.
- Vartiainen, T. and Tuunanen, T. (2016). Value Co-Creation and Co-Destruction is an IS Artifact: Contradictions of Geocaching, 49th Hawaii International Conference on System Sciences, 1266-1275.
- Vivek, S. D., Beatty, S. E. and Morgan, R. M. (2012). Customer Engagement: Exploring Customer Relationships Beyond Purchase, *Journal of Marketing Theory and Practice*, 20:2, 122-146.
- Wahlsam, G. (1995). Interpretive case studies in IS research: nature and method. Operational Research Society Ltd. *European Journal of Information Systems* 4,74-81.
- Wieland, H., Polese, F., Vargo, S. L. and Lusch, R. F. (2012). Toward a Service (Eco)Systems Perspective on Value Creation. *International Journal of Service Science, Management, Engineering, and Technology*, 3(3), 12-25.
- Ympäristöministeriö (2016). Paris Agreement. Retrieved 9.11.2018 from <http://www.ym.fi/pariisi2015>.
- Zeithaml, V. A. (1988). Consumer Perceptions of Price, Quality and Value. *Journal of Marketing*, 52:3, 2-22.

## APPENDIX 1 - DSR SERVICE PRESENTATION

### ELECTRICITY CONSUMPTION FLEXIBILITY IN HOUSEHOLDS

Figure of the current situation / future situation without a flexible household:

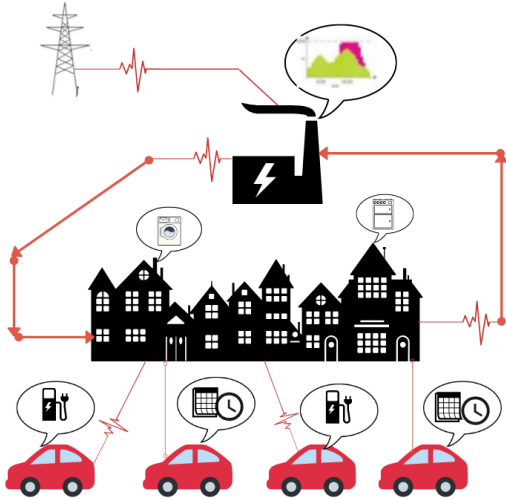


FIGURE 15 Current (/future) situation without flexible household

Figure of the flexible household in the future electricity market:

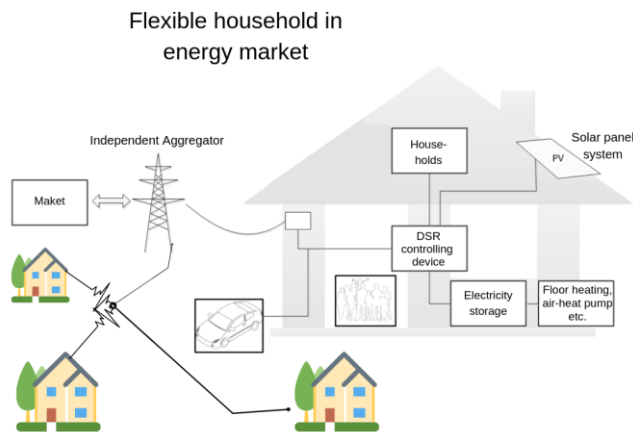


FIGURE 16 Flexible household in the future electricity market

The households will be flexible in their consumption by offering cuttings to their consumption for electricity network companies.

Flexibility refers to the momentary control of electricity consumption from hours of highest consumption to the next lower consumption time. The breaks are momentary, average breaks of one hour. Breakages can also be shorter.

When participating in the service, the household electric mainframe is equipped with a device to control household high-power appliances, such as floor heating, air heat pump, hot water heater or electric car charging. Only the power of these devices passes through this new controller device. Therefore, other electrical consuming devices in the home will work even if the break is done. The service uses its own secure network connection for the execution of breaks.

The service includes a user interface that provides the user information about, for example, the becoming breaks.

## APPENDIX 2 – STIMULI THEME LIST

1. **Impact of service environment on user experience.** How much of the platform that the service is operating affect the user's experience of service success? How the service environment works: Ease of use, convenience, reliability and security? The importance of the service environment for the user and for the availability of the service.
2. **Accessing information and information flow in the service.** Effects of information sharing and information flow on customer experience and convenience (from service provider to customer). For example, information on becoming breaks and electricity consumption. Intelligibility and usability of information. The importance of access to information for the user and for the usability of the service.
3. **The user's ability to influence the service functions by participating through the device or application.** For example, the user's ability to refuse becoming breaks. The user's ability to participate in the transmission of their own electricity consumption, for example, by making own breaks using the DSR device. Possibility of participation and its importance for the user and the usability of the service.
4. **User's own role in the chain.** The user's ability to influence and act as part of the service process. User capability for own production with solar cell system and its storage and resale. Active monitoring of electricity prices and optimization of own consumption. The importance of cohesion in the chain for the user and the usability of the service.
5. **The impact of the use of the DSR service in everyday life.** The effects of the service on daily routines when the connected home devices are for example floor heating, air heat pump, hot water heater and electric car. The importance of the use of DSR service in the daily activities of the user.
6. **User goals and value factors.** The service works according to the user's value factors and goals. The service follows the values that are important to the user, and the service achieves the goals which the user have been set. The importance of service functions to the user's personal values and goals.
7. **Additional Theme:** What else is important in this context? The most important features to yourself.