Solomon Dessie

Designing a New Car Rental Service Using Location-Based Services

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Preface

"The more one knows, the luckier he is, for knowledge is the greatest gift in life." - L. Frank Baum

This program was challenging and difficult, yet very interesting and exciting. First and foremost, I would like to express my deepest gratitude to my teachers and thesis instructors, Dr. Juha Haimala and Zinaida Grabovskaia (PhL), for your remarkable and continuous support towards the completion of this study. I learned a lot. It has been a challenging task, but your dedication and effort made it possible. I would also like to thank my teachers, Dr. Marjatta Huhta and Dr. Thomas Rohweder for your valuable comments and improvement suggestions in this study.

To the CEO of the case company, thank you very much for taking your time out of your busy schedule to sit down and discuss solutions to the many questions I had. I am also grateful for the documents and contacts you gave me to complete this study.

To the classmates I met during the beginning of my studies and who ended up being my very good friends, you made my academic year more than a study period. It was pure awesomeness. Thank you for your insights in this study and the overall collaboration you showed. We laughed and complained, we were on the same boat, and now we got to our destination through hard work and dedication.

I would also like to thank my Gracie Barra Jiu-Jitsu team and my coach who taught me that physical wellbeing is a key element for good thinking and kept on supporting me.

To my mother who raised me up by repeatedly telling me that the sky is the limit if I work hard, thank you from the bottom of my heart - I agree with you. It has been a tough year, but I made it through your continuous encouragement. A big Thanks to my siblings, Teddy and Lulit, and all my friends who gave me a tap on my shoulder when I needed it most.

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This thesis concentrates on improving the car rental services offered by the case company by introducing location-based services. For many years, the company has conducted a rental business in a similar manner with other car rental companies, and now it is introducing a new service system based on online interaction and location-based services.

The outcome of the study is a blueprint for the case company regarding the design of a car rental service using location-based services. This study is based on the interviews with the case company, suppliers and customers, benchmarking competitor offerings, and utilizing best practice in location-based service design for building the proposal for the company. In addition, the proposal includes recommendations for the case company in putting the suggested service design into practice.

To propose this blueprint, the study explored the intended service from three perspectives: the customer's, the company's, and the service design perspective. The study showed the cost and benefits for these participants and analyzed possible technology architecture of such a service. For the case company, the proposed service increases the customer value, availability, convenience and reduces the costs for both the customer and the company by utilizing the location-based type of rental services. Similarly, the case company benefits from introducing the fully automated system which also improves the speed and accuracy of the service.

Keywords	Car rental, location-based services, service design

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1 Introduction

> *"In 34 years, I've never seen a more volatile business environment than the one we are operating in today. Technology and social media have completely changed the concept of competitive advantage."*
>
> *(Mark Frissora, Hertz CEO, 2013)*

The current technological advancement has become notorious for its speed, and it has also affected the car rental industry. The competition to acquire more customers is stronger and therefore, any service offering to reach the majority gives a service provider a competitive advantage.

Presently, customers are looking for more flexible and convenient methods of conducting car rental. Although the companies in the car rental business are operating, as before, by renting cars to customers, the working environment is changing to more IT and internet based solutions. If previously the car rental services were handled in a traditional manner, i.e. all enquiries and services were conducted by phone and emails, now the car rental industry is increasingly looking for new approaches.

This study focuses on outlining a new service model for conducting car rental business based on the increased online access utilization and the notion of Location Based Services. The target groups for this model are a wide customer group basically representing any customers who have a valid driver's license and use the internet technology.

1.1 Case Company Background

The case company considered in this study is a Finnish car rental franchise company. The company operates in 30 locations nationwide and employs about 150 people in Finland. Its physical product offerings range from the smallest to luxury cars, vans and trucks, and the duration of the rental varies from a few hours to months. Similarly, its service offerings are also customized to fit customer preferences. The case company has a wide customer focus; however, the two main customer segments are the private customers and the corporate customers. Private customers rent vehicles for personal purposes and pay for it

themselves. Corporate customers, on the other hand, rent vehicles for work-related businesses and payments are taken care of in the form of billing to the company.

Currently, the case company is interested in more innovative solutions which addresses the changing customer needs and deliver more convenience, flexibility and mobility to the service. Therefore, the company has started looking into upgrading the traditional approach to the car rental services.

1.2 Key Concept

Location-based services (LBS) are services that are tailored to the customer needs and are tied to the physical location utilizing GPS (Global Positioning System) based on the use of a user's mobile device. Thus, by increasing the accuracy based on these three key ingredients, LBS services form a new type of services and provide a specific solution. The service provider gets access to the location of the user by utilizing the in-built GPS on the user's device. In a location-based car rental system, the user benefits by locating and renting the closest car from the customer's location. In practical terms, for the service provider, it means that the car can be rented from any place the customer wants it; and also left after the drive in any place the customer chooses to leave it in. For the customer, it means that they can reach to the vehicle easily and conduct the car rental process using LBS. In addition, LBS include a wide range of applications in areas of navigation, weather, entertainment, and various mobile applications (Dhar & Varshney 2011: 122). As seen from this example, the current technological advancements have opened new opportunities and the car rental industry is now actively innovating new solutions.

Service design is the process of creating a new service which contests of many steps. The user's perspective of service design places stress on ensuring the usability and desirability of the designed services. Approached from a new perspective, service design is carried out by applying the knowledge and skills in the related service area, management and process engineering (Stickdorn & Jakob 2011: 29-30). For the case company, *service design* also includes the assessment of the business impacts of a new service by analyzing the costs and benefits of the new service to both the users and the company. Therefore, in this thesis these perspectives are specially considered.

1.3 Business Challenge

The competition to acquire more customers is stronger and therefore, any service offering to reach the majority gives a service provider a competitive advantage. Thus, the case company wants to explore and test the feasibility of a new LBS-based service for potential use in their car rental services. By introducing a new mode of conducting can rental, the case company expects to expand and use the new system as a competitive advantage amongst the rival car rental companies. The LBS is able to serve customers using the customers' geographical location with the aid of a mobile device. This system has proven to be successful abroad but so far has been launched by only one company in the car rental industry in Finland.

Even though companies are in a leading position in the market, and the new solution have been tried somewhere, the new offerings are not necessarily doomed for success in a new environment, unless they are carefully considered and fit all aspects of the case company. Moreover, the new solution should also be compelling for customers and, wherever possible, newer methods should be clearly communicated as bringing better services to customers. Finally, when introducing new services, the positive experience from the existing services should not be forgotten, so that not to hurt the loyal customers by removing what they are used to. Therefore, the development of a new service requires a careful consideration and needs to be approached with a clear plan in mind. By introducing a new mode of conducting can rental, the case company expects to create a competitive advantage amongst the rivals and expand its customer base. Therefore, this thesis focuses on a possible outline of the new services for the case company that wishes to introduce the LBS services in the passenger vehicle group.

1.4 Objective and Scope

The objective of this research is to design an initial proposal for the new car rental service based on utilizing the location-based service technology (LBS). During the study, value of LBS and the need of this new concept are discussed. The outcome is an outline of a new car rental service based on a wide online access and utilization of location-based services. This proposal is done from two perspectives, the customer perspective and the

company perspective, and it also takes into account the need for suppliers for the new service. Therefore, this study also investigates the offers from the two suppliers to illustrate how the case company can build the new service and how to collaborate the practices in designing a platform for the new service.

The scope of this study is limited to the following areas. First, the research focuses in the Helsinki metropolitan area leaving out other cities in Finland. This is guided by the case company experience which shows that the majority of short-term rentals, especially those with an immediate access and need for flexibility of the service, arise from this area. Second, the customer group for the new service discussed in this thesis focuses only on customers who reside in Finland. The reason behind is the fact that the new proposed system needs layers of authentication methods for security reasons, which tourists do not necessarily have. In the future, an easy and fast access for tourist will be suggested separately.

This thesis is written in 7 sections. Section 2 describes the method and material used regarding the research approach and design of this study. Section 3 discusses the current state analysis based on interviews conducted with customers and a benchmark of a competitor company. Section 4 analyzes the existing knowledge and best practice used in this research. Section 5 presents the proposal of the new LBS implementation plan to the case company. Section 6 discusses the validation of the proposal and provides recommendation to the final implementation plan. The last section concludes the study and summarizes the results.

2 Method and Material

This section describes the method and material used in this study. This section first introduces and defines action research, the research approach used for this study. Second, it describes the research design and explains the data collection and analysis methods used. Finally, this section discusses the validity and reliability plan for this study.

2.1 Action Research

The research approach used in this research is action research. Action research is a type of research methodology focusing on research through the process cycle including diagnosing, planning action, taking action and eventually evaluating the action (Coghlan & Teresa 2005: 22). In action research, elements of the study actively participate in the process and work towards the change in the real life environment. The goal in conducting action research is to make the findings more effective and acquire knowledge through the research process. The reason why action research was selected as suitable for this specific study is because of the fact that the results and the research process are considered as equally important. By involving the researcher as a practitioner, rather than an observer, action research aims not only to explore but also bring change to the organization (Coghlan & Teresa 2005: 4).

A typical action research cycle consists of four stages of diagnosing, planning action, taking action and evaluating. *Diagnosing* is the first stage concerned about finding the problem issues. The issues identified during the diagnosing stage make the basis foundation for the planning stage. *Planning* is the second stage which mainly focuses on producing a plan how to treat the diagnosed problem. This stage requires the development of an action plan which is designed by using the action research cycle. The third stage is *Taking action*. In Taking action, the planned course for solving the problems found in the diagnosis stage are executed. Eventually, the actions carried out to address the issues are *evaluated (*Coghlan & Teresa 2005: 4-6).

A similar approach and logic are used in this research to assess the applicability of LBS in the car rental industry. The researcher and the key stakeholders identified the concept of LBS in the car rental industry and search for the opportunity to implement the LBS features into a new service. Based on the findings of the research, solutions will be proposed

and executed. In the course of the study, solutions are planned, evaluated and prepared for implementation.

2.2 Research Design

According the action research logic, this study consists of four deliberate and cyclical stages. First, the current situation is diagnosed using the interviews with customers, map of the current service offer, and benchmark of a competitor (Data 1). Second, action planning is introduced based on the findings from the earlier stage. The action plan in built based on the input from the case company (Data 2) which in this case included the CEO interviews on the intended service design and LBS, as well as evaluated the solution offers by IT companies, and drew from the findings on best practice formulated into the conceptual framework of this study. Third, the planned action is evaluated in a validation interview is carried out with the CEO. In the scope of this study, the implementation is not included since the study set the aim at outlining the new service. Therefore, the implementation may only be possible after a more detailed service design (which will be discussed later in Section 4). Figure 1 below demonstrates the main stages and data collection points in the process.

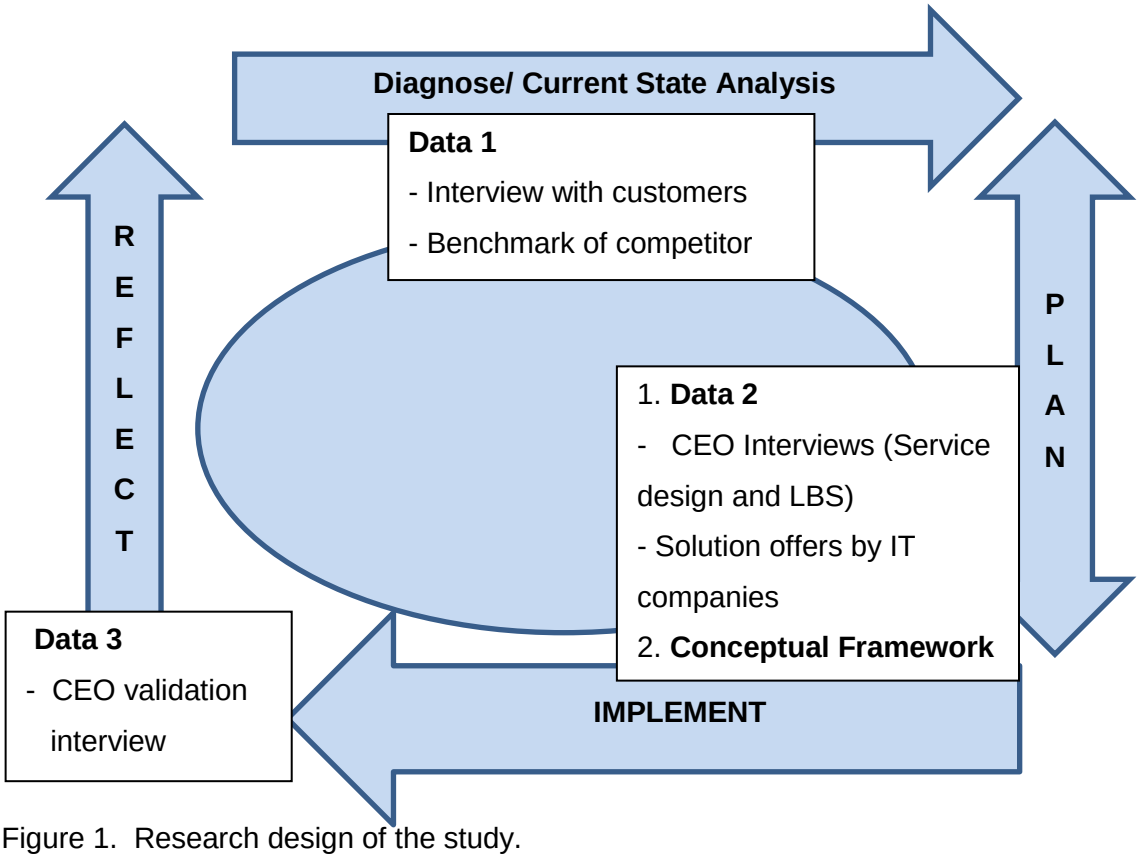

Figure 1. Research design of the study.

As described in Figure 1 above, the main four phases and data collection points (Data 1-3) are shown. In phase 1, the current state analysis stage, interviews were carried out with customers to understand their expectations from a new LBS car rental system. Similarly, a benchmark of a competitor company providing LBS car rental in Finland was assessed. In phase 2, the planning stage, an interview was conducted with the CEO regarding his vision for the service design of LBS. Since this stage was focused on building a proposal, it also analyzed the offers from potential suppliers, the IT companies providing the critical IT solutions to be integrated into a new service. In phase 3, the planned actions were assessed in a validation interview. Finally, the above mentioned phases were also reflected upon in the last stage. As seen from this description, this approach makes the researcher part of the study process (Corbin 2015: 15)

2.3 Data Collection and Analysis

The data collection and analysis method used in this study follow the methods used in qualitative research. Qualitative research, by definition, is a type of research methodology where the researcher collects and analyses the data which collects and analyzed qualitative data.

In this study, multiple sources of data were gathered and analyzed. Figure 2 below illustrates the data rounds and data sources utilized in this study.

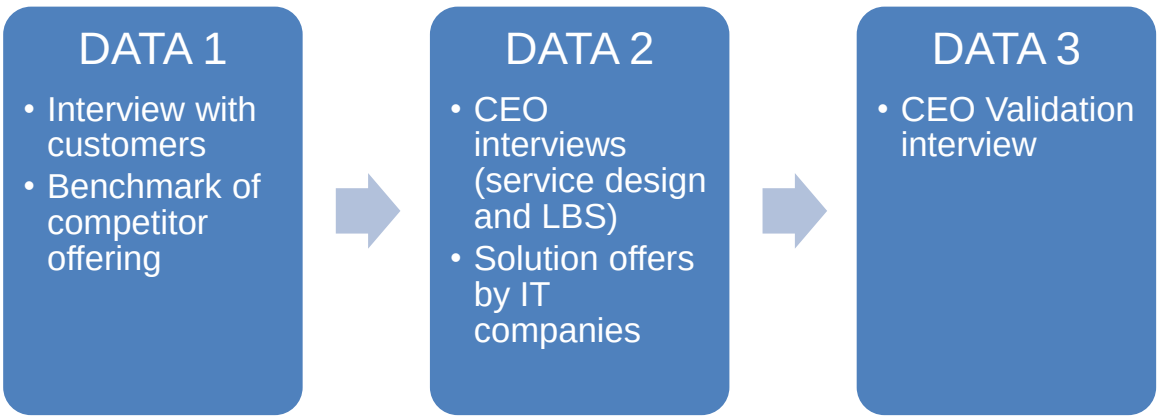

Figure 2. Data collections 1-3 in this study.

As described in Figure 2, there are three data collection rounds for this study. They are described in more detail below.

DATA 1. Customer Interviews and Benchmark

Data collection 1 included, first, the interviews with the customers of the current car rental service of the case company and explored their opinions about the new LBS-based service planned by the case company. The interviews questions were designed as semi-structured qualitative interviews carried out by the researcher. Semi-structured interviews were carried out by asking thematic and open ended questions, as suggested by Quinton & Smallbone (2006: 64).

The interviews with customers sampled their wishes and preferences for the new service. The conducted interviews aimed at understanding the new LBS concept in the car rental industry from the customers' point of view. During the interview, the researcher targeted to find the acceptability degree by customers and features which are necessary for the new system. The details of the interviews carried out are described in Table 1 below.

Table 1. Description of conducted interview (Data 1).

Inter-viewee	Date	Dura-tion (min)	Mode of Transportation	Technology group (N=native, I=immigrant)	Documented as
Customer 1	6.4.2015	7 min	Private car	I	Field notes +Recording
Customer 2	6.4.2015	6 min	Public transport	I	Field notes +Recording
Customer 3	7.4.2015	8 min	Private car	I	Field notes +Recording
Customer 4	6.4.2015	14 min	Private car	I	Field notes +Recording
Customer 5	7.4.2015	19 min	Private car	I	Field notes +Recording
Customer 6	7.4.2015	7 min	Public transport	N	Field notes +Recording
Customer 7	6.4.2015	12 min	Public Transport	N	Field notes +Recording
Customer 8	7.4.2015	15 min	Public Transport	N	Field notes +Recording
Customer 9	7.4.2015	5 min	Private car	N	Field notes +Recording
Customer 10	6.4.2015	5 min	Public Transport	N	Field notes +Recording

Customer 11	6.4.2015	7 min	Public Transport	N	Field notes +Recording

As described in Table 1 above, the date, duration, technology group, current method of transportation and method of documentation are described. The target group of the interview was narrowed down to the holders of valid drivers' license and smart handheld device users. The interviewed customers were analyzed as two categories, Digital natives and Digital immigrants (marked in Table 1 above). All interviews were made face-to-face and were conducted by the researcher who encouraged the interviewee to discuss their attitudes and views of the new service. After introducing the concept and logic behind LBS car rental system, the customers were asked to discuss initial reactions towards the system. All interviews were recorded and transcribed by carefully listening to the conversations. The interview question areas are thematically described (Appendix 1) including field notes on sample interviews (Appendix 2).

In addition to the customer interviews, a benchmark of a rival car rental company which has already implemented the application of LBS was analyzed. The benchmark data was collected as both, the desk and field data search, because the researcher not only collected the available information but also went as a customer to observe and learn from the operating methods of the competitor. The results were summarized as a SWOT analysis which helps the case company to better identify the elements, first, already existing in the LBS car rental solution, but also those which are desired by customers but missing in the competitor offering. The data and criteria of the benchmark analysis are described in Table 2 below.

Table 2. Benchmark (Data 1).

Rental date	**Rental method**	**Rental Duration**	**Assessment criteria**
2.4.2015	Online (from computer)	- 3 hrs. (the minimum time allowed) - 1 hr. (additional service extension)	- System flow - Customer service - Quality of the car - Pick up/return location - Payment/ Price

As described in Table 2, to carry out the field search, the researcher rented a car from a competitor car rental company using LBS and observed the process flow from the cus-

tomer point of view. The observation process is supported by pictures of the system in practice.

Data 2. Company Input and Suppliers Interviews

The key input for Data 2 collection, the proposal building, was collected from the interviews with the CEO of the case company. During this data collection, the results of Data 1, the current state analysis, were discussed and the initial proposal was created, also enriched with the findings from the existing knowledge and best practice search. The vague wishes and suggestions from the customers and the benchmark findings (Data 1) were reflected against the available best practice (Conceptual framework), before the actual service design was outlined (Proposal). The initial service design was discussed and developed together with the CEO of the case company during a series of interviews (Data 2) described in Table 3 below.

Table 3. Discussions for proposal building (Data 2).

Discussion	Date	Duration (min)	Topics	Documented as
Meeting 1	10.2.2015	1 hr.	- Future of car rental service	Field notes
Meeting 2	18.3.2015	1 hr.	- Preliminary LBS discussion	Field notes
Meeting 3	4.4.2015	30 min.	- Creating the initial map of the new service (customers and company)	Field notes + map

Additionally, in the course of this study, the researcher was given the task of carrying out the service design beyond the initial outline and searching for potential IT service providers with expertise in the field of automotive and car rental industry. The researcher found two potential service providers to develop the planned LBS platform for the case company and the meetings were held. The meeting details are described in Table 4 below.

Table 4. Discussions with IT providers (Data 2).

Discussion	Date	Duration (min)	Topics	Documented as

Meeting 1	25.3.2015	2 hrs.	- LBS car rental design presentation by IT company - Mobile application user interface preliminary design	Field notes + presentation document

As described in Table 4, the discussion with the IT solution provider company entailed a presentation of the proposed car rental platform and tailoring the function schematics both to the customers and the case company perspective. The results of the suppliers' offerings is discussed in more detail in Section 5, Proposal building.

Data 3. Validation session

The validation session was held with the CEO of the case company (Data 3). During this data collection, the initial proposal was critically reviewed and solution provider decisions were made. The validation session with the CEO of the case company described in Table 5 below.

Table 5. Discussions for proposal building (Data 3).

Discussion	Date	Duration (min)	Topics	Documented as
Meeting 1	11.4.2015	30 min	- SWOT analysis of IT service providers - Decision to proceed with the LBS project	Field notes

In all three Data collections (Data 1-3), the Content analysis was applied for the scrutiny of the raw data which consisted of interviews, benchmark field search, and discussions and documents from the solution providers. The target of content analysis is to reach a conclusion based on the collected data systematically. Content analysis uses categorization rules in a systematic and objective manner to summarize data (Paisley, 1969, p. 133).

Summing up, in Data 1 the customer interviews were carried out and a benchmark of competitor was analyzed. The second data collection included the company input in the

form of the interviews conducted with the CEO and analysis of offers made by IT solution providers. The final data collection round included a validation interview conducted with the CEO.

2.4 Validity and Reliability Plan

In the process of research which leads to a certain specific result, the reliability and the trustworthiness of the research are essential. Therefore, validity and reliability need to be planned and evaluated to prove the rigorousness of the research.

The notion of validity and reliability has been approached from various definition points. Quinton and Smallbone (2006) stress that the important point in validity is transparency in the rigorousness of the research approach and thinking methodology (Quinton & Smallbone 2006: 126). Therefore, for this particular research, the validity is planned as the transparency of materials to demonstrate the research design, research process and data collection steps.

Furthermore, Maxwell (1996) defines validity as “the correctness or credibility of description, conclusion, explanation, interpretation, or other sort of account" (Maxwell 2013: 122). Adapting this idea to this research, validity can be interpreted as to the degree of credible and reliable information produced without the biased inputs of the researcher. This information is the knowledge acquired through the research, the explanation provided in the process, the interpretations from data sources and derived conclusions.

Another key test of validity is in the construct of a question: “Was what was found a response to the questions originally asked?” (Quinton & Smallbone 2006: 127). This key validity question is referred to as internal validity, face validity or measure validity. Therefore, the conclusion or findings of this study should reflect and answer the research question of LBS use in the car rental industry.

To ensure validity in this study, the following measures are planned. First, the study includes a detailed process of data collection and elucidation of analysis methods. Second, after each interview is conducted, ambiguous matters are discussed with the interviewee to ensure that the collected data is correct. Third, the management of the case company is involved in the development of this study to provide a certain guideline and direction to

which this project work should go, as a measure to ensure the desirable outcome for the company. Fourth, the field search conducted in this study was carried out by the researcher and suitable recording method was used for reviewing. Lastly, the documented solution proposals made by two IT companies are included to make this study multi-dimensional and rich in content.

To achieve reliability, the following methods are used. First, the study uses multiple yet specific data sources to collect data. The interviewee selection in this study was explained showing the target group and other criteria. Second, the theories selected and analyzed in this study are derived from peer reviewed academic and reputed business publications. This ensures that the theories behind this study are derived from reliable sources and thus, can be trusted to contribute to quality research. Third, to broaden the insight of this study and to deliver a solid proposal, the experience of the researcher in the car rental field is used. The insights of the researcher are neutral and unbiased.

3 Current State Analysis

This section discusses the existing customer service offerings in the case company, findings from the interviews conducted with the customers as for the planned new service, and the benchmark by a competitor analyzed for this study. Firstly, the current offerings are discussed. Secondly, the preferences of customers on future services are assessed. Thirdly, a benchmark of competitor service offering is discussed. Finally, the key findings of the current state analysis are summarized.

3.1 Current Offering and Its Service Elements

Currently, the case company offers a wide variety of car rental services depending on customer preferences. Regardless of the services, however, all customers go through *reservation, payment, vehicle pick-up* and *return phases*. These phases also involved as the key service moments. The service map of the current customer interaction with the company is described in Figure 3 below.

Figure 3. Service moments of the current offering.

As shown in Figure 3, the service moments of the customer involve the reservation, payment, pick-up and return of the rental vehicle. These steps are shown again using a service notation in Figure 4 below.

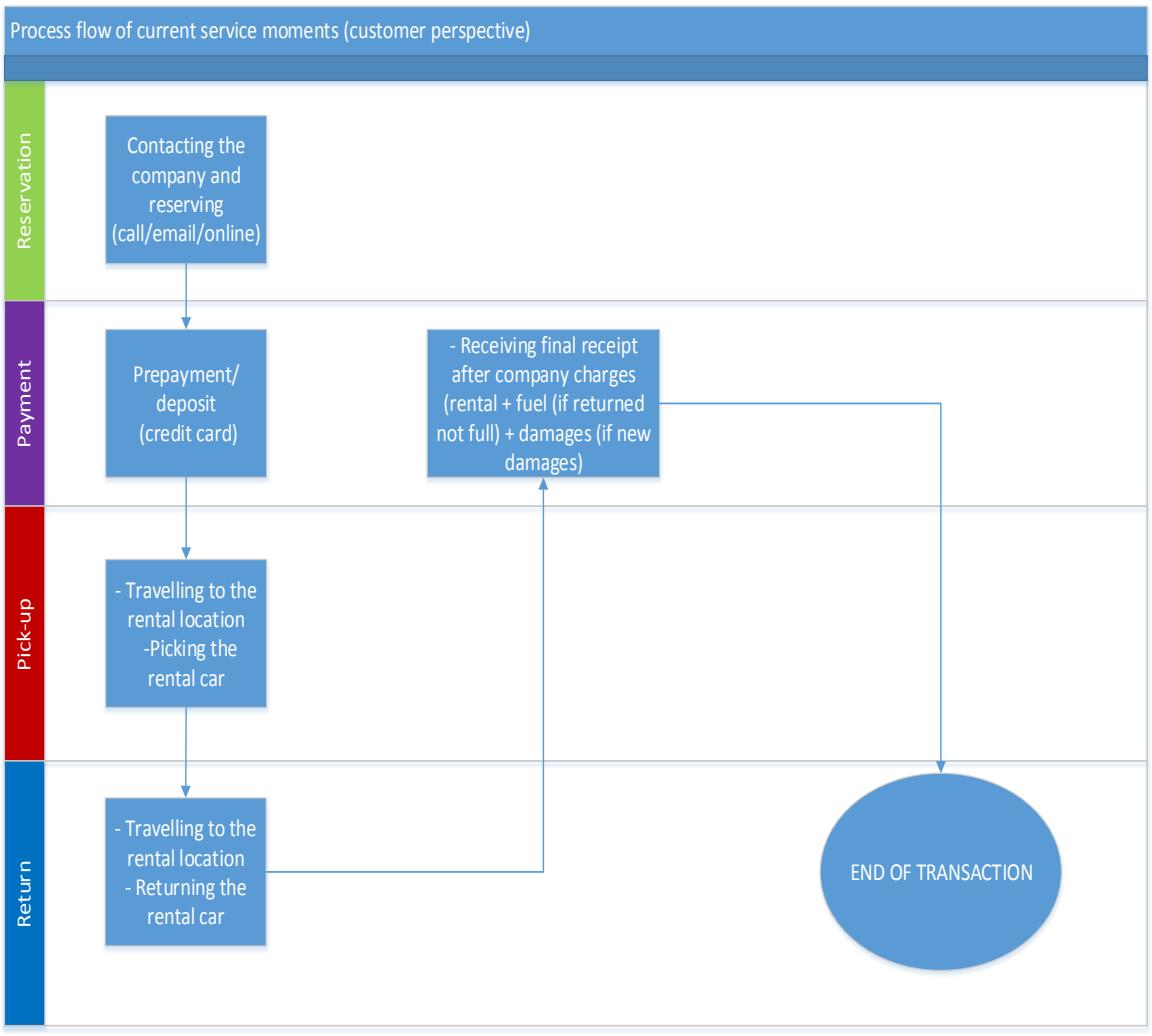

Figure 4. Categorized service flow, from the customer perspective.

The *Reservation* stage is the first contact point for the customer and the company. The customer either calls, emails or browses the website to reserve a rental car for specific time and date. This is followed by car selection and location of pick-up. The company fleet offering are described in Appendix 2. After the reservation stage is completed, the customer has to travel to the car rental location during office hours to conduct the payment and proceed with the rental process.

During the *Payment* stage, the customer shows a valid driver's license and presents a credit card. The credit card is used to take a deposit. The payment is not yet completed at this stage. The deposit taken is more than the rental price in order to cover additional costs like fuelling and damages. It is the responsibility of the customer to return the car with full tank and no damages. Once the deposit is taken, the customer is provided with the rental agreement, keys to the rental car and a map of the location of the car.

In the *Pick-up* stage, the customer travels usually 3-8 minutes to the physical location of the car, checks for damages and fuel, then begins journey. When the rental ends, the customer moves to the *Returning* stage. In this stage, the customer travels to the agreed location of return, fills up the car on the way and returns the keys to the company. The returning stage is difficult as customers mostly do not have any means of transportation away from the car rental company. The above service moments and the impact it has on the customer in terms of time and money are described in Table 6 below.

Table 6. Current car rental service moments (Customer perspective).

	Current car rental service moments	
	Service moments	**'Cost'**
1. Reservation	**1. Making reservation**	
	1. Call/email	Time/Money
	2. Receiving confirmation	Time
2. Payment	**2. Payment**	
	1. Traveling to rental location	Time/Money
	2. Presenting drivers' license and credit card	Time
3. Pick-up	**3. Pick-up process**	
	1. Travelling to the location of the car	Time

4. Return	**4. Fixed location of return**	
	1. Returning car to rental company	Time
	2. Travelling away from rental company	Time/Money

As seen in Table 6, the 'cost' for the customer is higher in terms of time and money in the reservation, payment and vehicle return points of the rental process. This is due to the regulation of the car rental process which requires the customer to be present. The case company does provide an additional service to deliver the rental car to the customers preferred location. As a result, most customers do not prefer this option because it comes as too costly for them at the moment.

3.2 Preferences for Future Service by the Customers

The rapid progress in the field of ICT, especially after the introduction of the internet, has divided users to two main categories. These categories are often labeled as Technology Natives and Technology Immigrants. Technology immigrants adapt and learn technology. In contrast, technology natives are born in the technology era and grew up surrounded by it. The earliest technology natives are the generation in 1990-2000 (Jespersen 2008: 23). Therefore, this study, though understanding this difference, aimed at collecting opinions from both technology natives and technology immigrants. By involving both categories of technology users, a trial of both customer segments was expected. This provided examples of views for the intended LBS system as customers are currently seeing them (thought few of them experienced the new service in reality). All approached customers were the current customers of the case company, who use the traditional offer of the standard car rental services. The results of these customer perceptions of the future service are discussed below.

Currently, the case company has a wide range of service offerings which has been adequately implemented and brought good results. The services are flexible and negotiable to specifically meet the customer needs. For Data collection 1, the customers were approached with the questions related to their perceptions of the future possible LBS-based service planned by the case company. The approached customers indicated that they see the extended services in the car rental industry as adding flexibility and service availability,

and therefore they would prefer using them. As discussed in Table 1 of section 2.3 above, 11 interviews were conducted to assess and find out the acceptability degree of LBS aided car rental service design. The interviewees are categorized by Customer number(C#), technology native or immigrant (N/I), public transport user (P) or own car user (O). The discussed issues of LBS are on a scale of 0-10, where “0” is of no importance and a score of “10” is highly in favor of the LBS concept in the car rental industry.

After conducting the interviews, a certain type of pattern in the responses and similarities between main concerns were observed. These responses were found only on those customers who were in favor of the LBS car rental design concept.

> *“I mostly use public transport in Helsinki, in my opinion this concept sounds very good and easy to use.”(C2-I-P)*

> *“This concept sounds very convenient, it is not a life saver, but compared to the old fashioned way of car rental, it sounds easy.”(C4-I-O)*

> *“If I am in a situation where I need a car, it would definitely be a rental system I would prefer to use. This sounds way more convenient than going to a rental location.” (C3-I-O)*

As pointed by the respondents, they all feel in favor of the future LBS planned service. The customers also mentioned a list of points as desirable in the new service. The discussed preferences and the frequency of answers are shown in Figure 5 below.

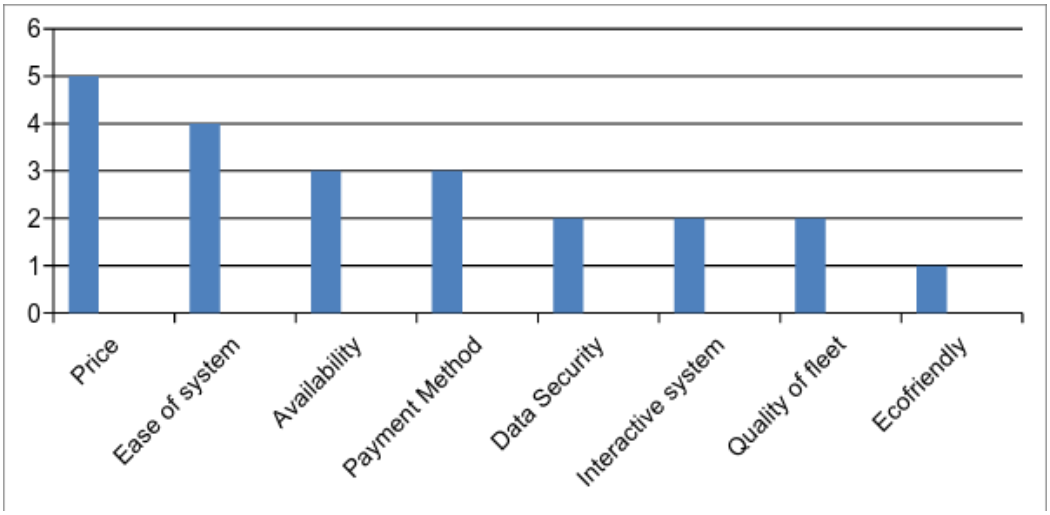

Figure 5. Important features of the new service indicated by interview participants.

As shown in Figure 5, the results of customer interviews (full records in Appendix 2); the customers mentioned a list of desirable features in the new service. These points included: *price, ease of system, availability, payment method, data security, interactive system, quality of fleet* and *Eco friendliness* of the cars. It was discovered that most interview participants are in favor of the notion of LBS in the car rental industry. During the interview, participants expressed the reasoning behind their willingness to be a user of this system or not. In order of frequency and importance, the following points were mentioned as positive as for the new service.

A. *Price*

The first main concern mentioned by interview participants is price. The amount of times price was mentioned during the interviews uncovers the importance from the customer perspective. As explained by the interviewees, the price should be attractive and reasonable enough for them to consider using the LBS car rental system.

B. *Ease of system*

The easiness and overall friendliness of the proposed LBS system was also stressed by the interviewees.

> *"The system should be as easy and convenient as possible, few clicks and a straight forward system" (C1-I-O)*

> *"If your new car rental idea works, I hope the system responds quickly and I get my car fast. If the service is slow, I rather take public transport." (C7-N-P)*

The evaluation criteria discussed with customers were assessed in terms of the speed of transaction and the accuracy of the system. This finding leads to the notion of self-service experience and customers understanding of the LBS service. In the conventional method of conducting car rental business, the customers have the opportunity to ask the employees of the service provider for assistance and to have their questions answered. On the contrary, the LBS platforms expect the customers to navigate through the service and discover the system using certain tips. In LBS concept, the customer plays a big role and becomes part of the service delivery. The speed of transaction should be maximizing the willingness of the customer to endure through the process of the service.

C. Availability of the service and the *payment method*

Availability of the service and the method of payment were raised by different customers during the interview. As described by one customer:

> *"If I can pick up the car from wherever I want it, and return it to a place convenient to me with an effective payment system, then it's awesome" (C8-N-P).*

Similarly, regarding the availability of the service, another customer explained it as:

> *"I should be able to get the service I need from the system in different circumstances. The doors should open and the car should start" (C4-I-O).*

> *"The payment should be easy. You should be able to know how much you are going to pay exactly" (C4-I-O)*

The payment method as described by the customer should be easy and, more importantly, should not involve any hidden fees. Customers mentioned the need to be aware of the exact amount to be paid for the service, preferably in advance.

D. Data security, quality of fleet and interactive system

Data security is another important element of any service design. The customers during the interview stressed their concerns in regards about the security of the information provided. From one customer's point of view:

> *"It should be like protected somehow and the data should not be spreading around. If I rent a car from you and then get many advertisements from car fixing garages then it is not fun. These are the normal problems that come up." (C1-I-O)*

The approached customers interact with service providers constantly over smart devices. Even though being advanced in technology is established as a benefit, with it comes risks of security. These security concerns were raised by customers and one pointed out a key question:

> *"Can you hack the system?" (C4-I-O)*

The quality of the fleet was also considered an important aspect of LBS car rental design by the customers. According to the findings of the interview, the driving factor which gives an additional pleasure to the customers renting cars is being able to drive latest model

cars. The cleanliness of the cars was also mentioned as an issue. During the interview, a customer mentioned that:

> *"If it is a van, it is ok if it is not of high standards in terms of cleanliness. If it is a passenger then it would bother me a bit that I am driving a low quality car" (C3-I-O)*

Similarly, customers mentioned that an interactive system which constantly "communicates" with them is important. The preferred system should be able to make the customer involved in the information circle. Interview participant C4-I-O mentioned that:

> *"The customer shouldn't be left in the dark. The system should response, and I should get the necessary information I need. If the system communication doesn't work, there should be a phone number that I can call and get information" (C4-I-O).*

Summing up, the customers tend to prefer the type of system which informs the combined summary of price and time spent using the LBS concept car rental system.

E. Eco-friendly

Car rentals are obliged to work in accordance with the current and latest environments acts. Eco-friendliness of fleet has also been used to promote the company's care for the environment. The case company plays a big role and invests to ensure the fleet is designed in an eco-friendly manner. During the course of the interviews conducted, one customer pointed out the importance of eco-friendly vehicles as it would encourage customers to use the LBS car rental concept.

Majority of the interview participants were in favor of LBS car rental concept. Some customers on the other hand had contradicting ideas and were not in favor of the system for various reasons. The reasons vary from lack of interest in downloading a mobile application *just* for renting cars to wanting to physically see the rental car/personnel in the process.

> *"In my opinion, the concept of online booking without going to a car rental office is a bad idea. When you go to a car rental company, you can physically look around and choose the type of car suitable for you. I would prefer to go to an office to select my rental car even if the rental station is far away. This idea might work in a big city like London, Have you ever been to London?" (C6-N-P)*

> *"I don't see the point in downloading a mobile phone application just for renting a car. If I need to rent a car, I might as well go to my computer and book it through the internet." – (C10-I-O)*

> *"I don't see the use of that system here in Helsinki. Personally, if I need a car, my boyfriend takes care of it."- (C11-N-P)*

Summing up the interview findings, the majority of participants were excited and intrigued by the concept of a car rental company which works using LBS technology. The interview participants who were in favor of the proposed system mainly pointed out that firstly, the price should be affordable and attractive. Secondly, the proposed system should be easy to use. Thirdly, the service should be available when needed by the customer. Fourthly, the system should be interactive and secured enough to provide reliability. Finally, implementing the LBS system in an eco-friendly manner is seen as a positive sign and favorable by customers.

3.3 Benchmark of a Competitor Service Offering

The competitor company offers a car rental service built on the LBS concept. The company offers passenger cars and vans which are rented through the internet without any customer service personnel. The system works on a four stage process which consists of reservations, opening selected car with smart phone, driving and finally closing the car with smart phone at the end of the rental. The assessment methods for the competitor service offering are adapted from the findings of the customer interviews. The assessment criteria for the competitor service offering are derived by combining the most important issues raised by customers and applying them to the competitor service offering conducted by the researcher. The process flow is described in Figure 6 below.

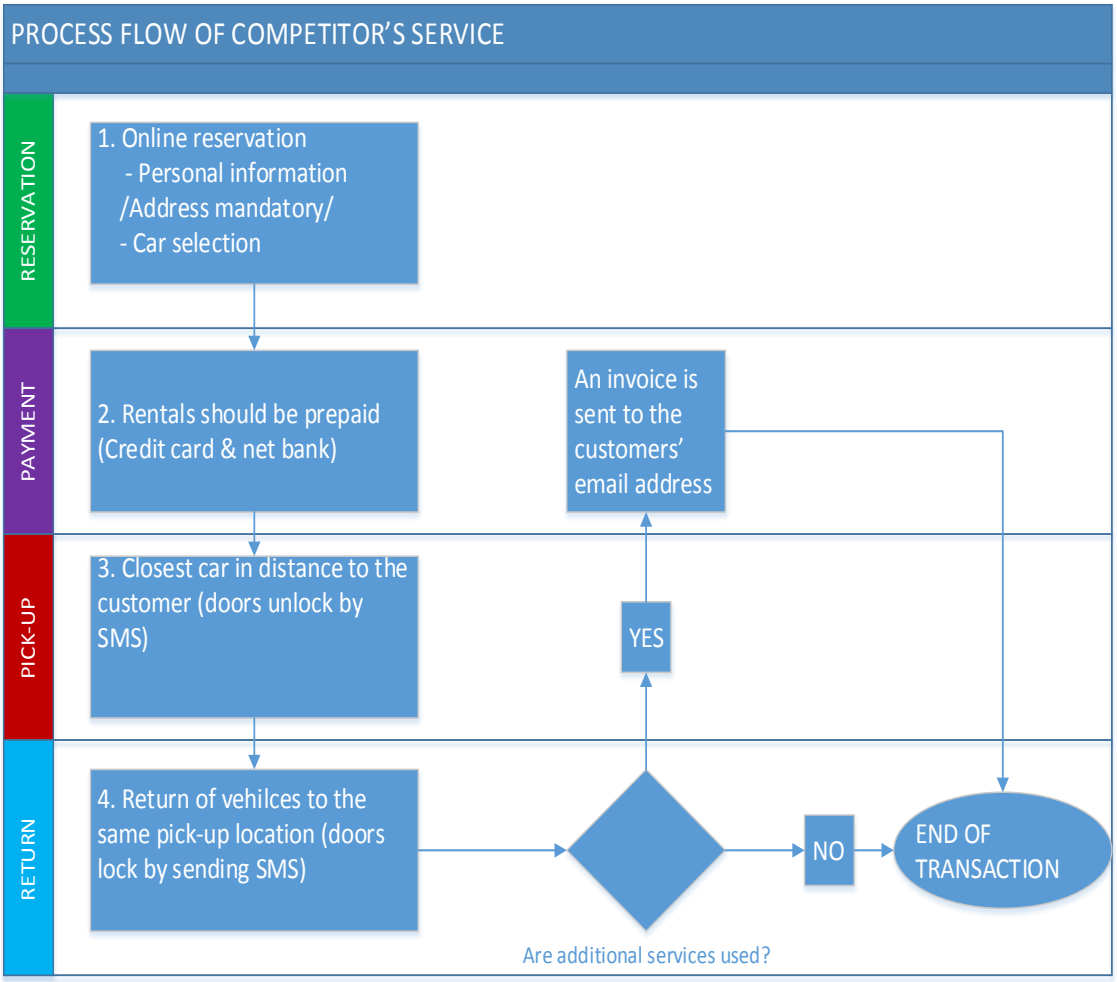

Figure 6. Rental LBS service in the competitor company.

As described in Figure 6 above, the rental process of the competitor company includes reservation, payment, pick-up and return. After the return of the rental vehicle, if additional services are used, an invoice is sent to the specified email address of the customer. If no additional services are used, the transaction ends at the return of the vehicle. The rental stages and detailed descriptions are summarized in the following sections.

3.3.1 Reservation

Reservation is the first stage of the rental process. In the competitor company, the reservation process is done via the internet. The company does not have a mobile application and thus, service offerings are limited only to computers. There is no mobile version of the reservation website. Therefore, the amount of data displayed on a handheld device makes

the website complicated. Figure 7 below describes the looks of the website from a mobile device.

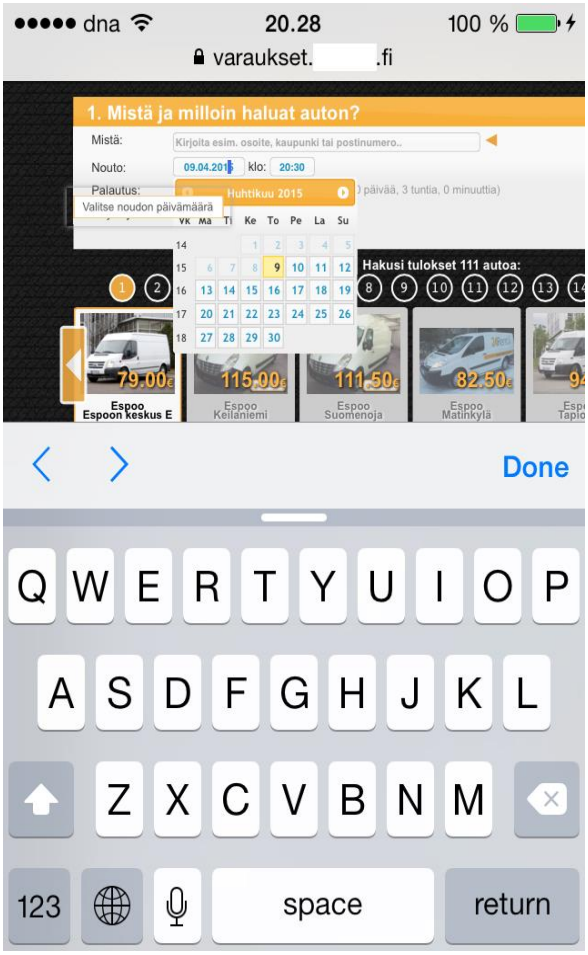

Figure 7. Information displayed from competitors website on a mobile device.

As seen in Figure 7 above, excess amount of data is displayed on a mobile phone browser. This abundant information from the website together with the low display capability of mobile devices makes the reservation process troublesome. Therefore, to conduct this study, a computer was used instead. The website displayed on the computer is clear and straight forward. Figure 8 below shows the looks of the display.

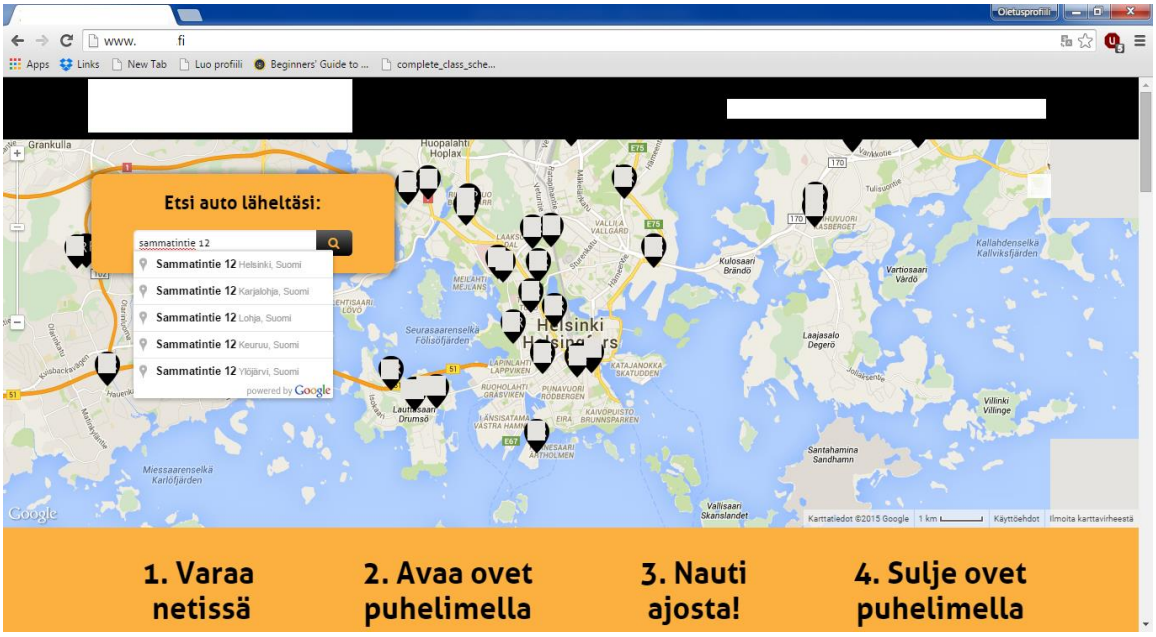

Figure 8. Reservation website viewed from a computer.

As Figure 8 shows, the website display looks as well organized and user friendly. The system requires customers to put in their current address. This is in order to provide the closest available vehicle to the customer based on the mentioned address. After address is put, the website searches for available cars near the address mentioned and returns results. Figure 9 below shows how the vehicle selection process works.

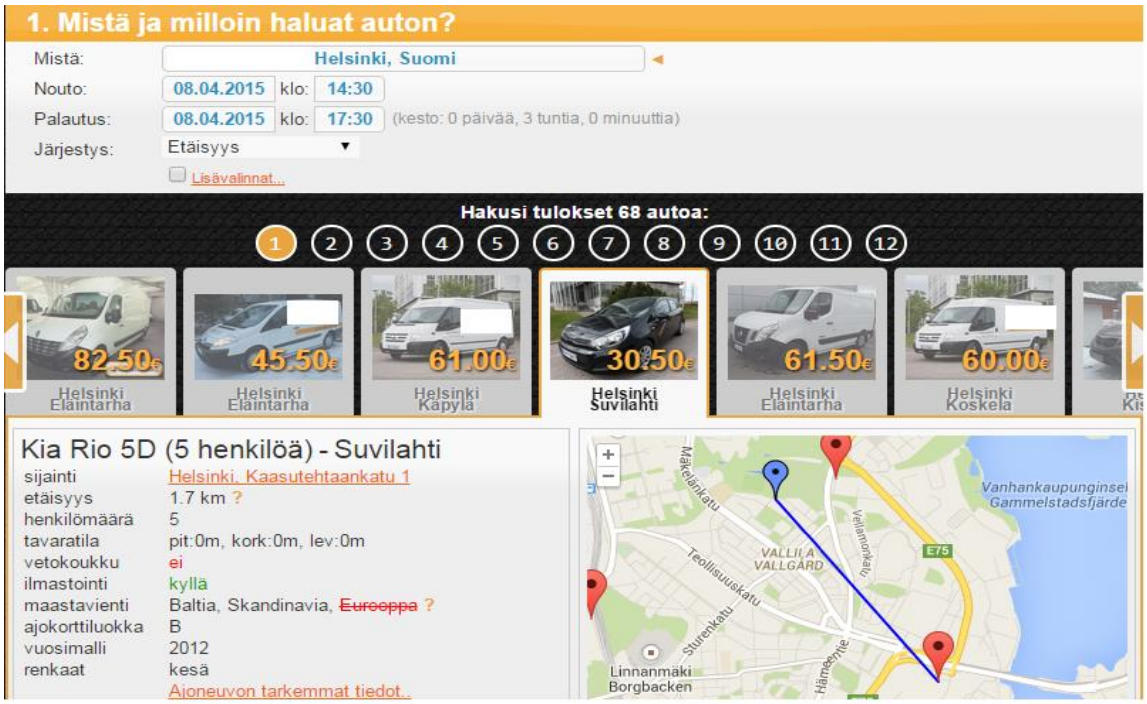

Figure 9. Search results displayed based on location.

As seen from Figure 9, the website displays available cars near the address mentioned. The vehicles presented are sorted according to the distance of the address put by the customer. The results can also be sorted by vehicle brand, size and kilometers driven.

This page is informative in a way that the customers already exactly know the type of car and detailed information on the car are displayed. Compared to the conventional method of car rental based on vehicle categories (example in Appendix 3), this informative method offers transparency in the service. Once the reservation process is completed and the type of vehicle is selected, the system redirects users to fill in their personal information. Figure 10 below describes the mandatory information required to proceed with the reservation process.

Figure 10. Customer information page.

Figure 10 above shows all the information needed to proceed with the car rental process. Name, address, phone number, email address and social security number are mandatory. Under the social security field, there is a link which says “Why do we ask for social security number?” According to the company, the reason why social security number is asked is because it is one of the methods used to ensure that the person renting the car is actually

him/her and no one else can rent a car on stolen credentials. According to the Personal Information act §13, social security numbers can be processed for the purpose of car rental. The information is confidential and it cannot be used for other purposes other than verifying the identity of the customer. Once the vehicle type is selected and mandatory customer information is submitted, the system redirects to the payment stage.

3.3.2 Payment

The payment section of the website is easy to use and explicit. The displayed information is divided into three segments. First, the summary of the vehicle is presented. The summary includes the pickup and returning place of the rental car. It also shows a highlighted pickup and return time. Second, the summary of the customer information such as name, address, phone number and email address are displayed. The third segment of the page displays the payment method, net bank or credit card. Rentals paid with credit card include an additional fee. Figure 11 below describes the payment page of the website.

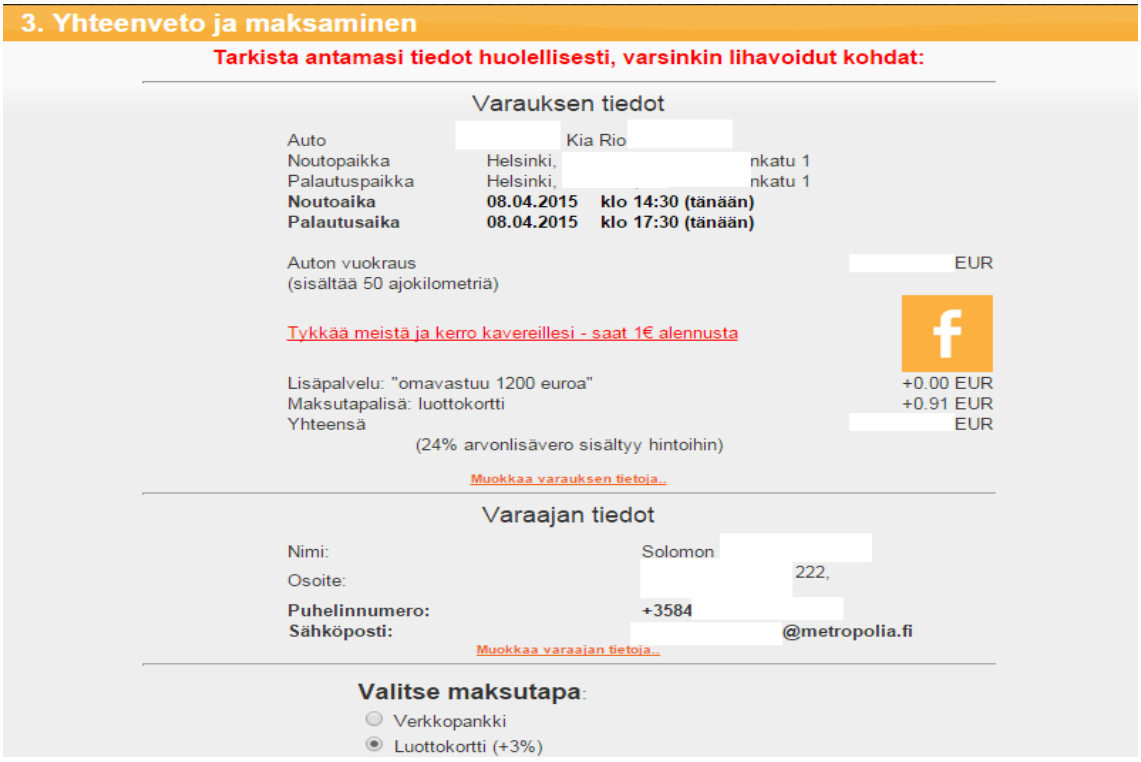

Figure 11. Payment section of the website.

After the payment is carried out, the system sends an automatic email and text message with the directions of the pickup process.

3.3.3 Pick-up

The pickup location of the rental car was 2 kilometers from the address used in this study. The car was conveniently parked 200 meters from a metro station. This was a very convenient feature because getting to the rental car using public transport was easy. The pickup process requires customers to send a unique SMS message to the company in order to unlock the doors of the car and start the rental process. The message is unique and works only to one specific reservation. The format of the SMS is “OPEN” + ”Reservation number”. Figure 12 below describes the SMS interaction part of the system.

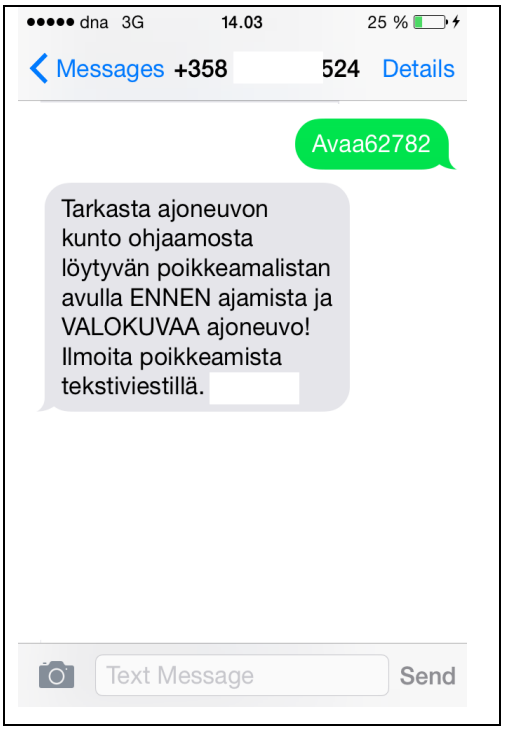

Figure 12. Unlocking doors of the rental car using SMS.

As shown above, once the door opening activation SMS code is sent, the system automatically unlocks the doors and replies an SMS to the customer with a tip to take pictures of the car before leaving the parking place. This helps to avoid any misunderstandings between the company and the customer should there be any damages on the car upon return. The car keys are kept in the glove compartment of the car. These cars are fitted with an engine immobilizer which prevents theft. An engine immobilizer is an electronic security device installed to prevent the engine from starting without the correct key or other token. In this case, the activation code sent by the customer serves as a token to start the engines. The customer can start the journey.

3.3.4 Additional services

The additional services provided by the company include damage waiver and extension of rental time. The damage waiver is handled in the beginning phase of the rental process. During the test rent, the company sent an automated message advertising an additional service one hour before the end of the rental time. The service was extension of the rental duration by one hour and paying an extra fee. Figure 13 below shows the dialogue window.

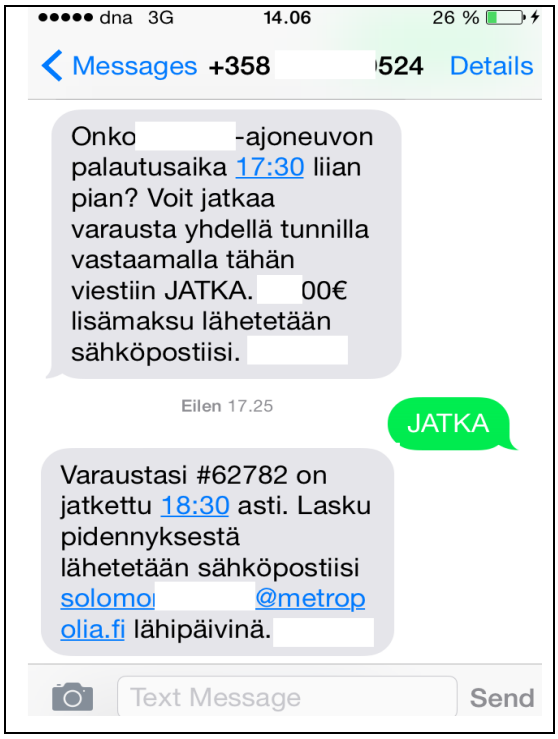

Figure 13. Additional service enquiry SMS.

As shown in Figure 13, an advertisement message to continue the use of the rental car for one more hour by paying an additional fee was sent. By replying “continue” to this message, the car rental was extended for one more hour. Since the rental fee for this car has already been paid, the extra additional service invoice was received the next working day.

The main reason why the rental period was extended by one hour for this study was not intentional. During the test rental period, the customer service of the company was tried to contact by phone several times but to no avail. In the rental directions sent to the email

provided, it was mentioned that late return of the rental car is followed by a penalty fine. Figure 14 shows the response received from the customer service.

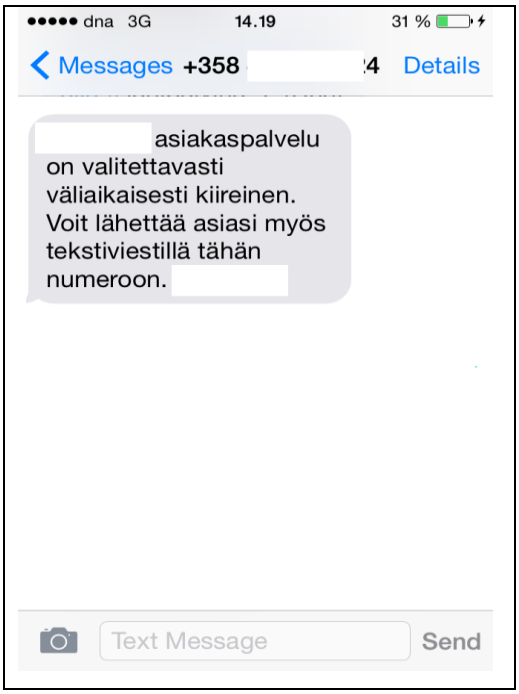

Figure 14. Response received from company when tried to contact by phone.

As described in Figure 14, a call was placed to the customer service number to inquire issues regarding the rental time and possibility to return 5 minutes later. In return, a text message explaining that all customer service personnel are busy was received. Moreover, the company prefers all inquiries from customers to be sent as a text message. The unavailability of customer service was one of the drawbacks in the case company.

3.3.5 Returning of Rental Vehicle

The returning process of the car rental works in a similar manner to the pick-up. The pickup and return places of the rental car the same. In the confirmation email sent by the company which includes pickup and return directions, it is mentioned that the car should be filled up regardless of the kilometers driven. After the tank is filled, the car was returned to the location. For the convenience of the next user, the company asks users to clean up the car after use, leave the keys in the glove compartment and close all the doors. The system requires a unique text message to be sent in order to lock the car doors and finish

the car rental agreement. Figure 15 below shows the text message code and the response from the company.

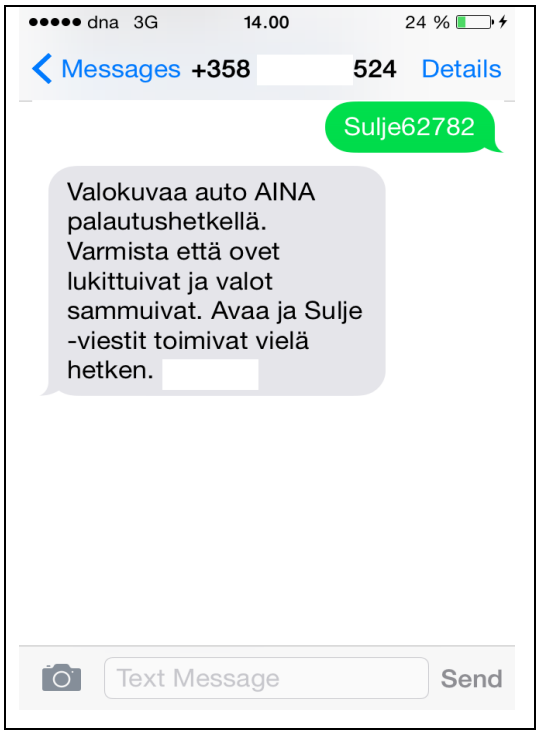

Figure 15. Locking the doors and ending the rental.

As described above, when the “CLOSE” command is sent, an automated message is received. Directions to take pictures of the car for security reasons and making sure the lights are switched off are included in the message. The doors can still be opened and closed for a while using the “OPEN” and “CLOSE” commands. This ensures that the customer can still go inside the car if personal belongings are forgotten.

To summarize the findings of the benchmark, the field search conducted concluded that there is a demand for these types of simple and smart car rental systems. As described in detail in the earlier (sections 3.3.1-3.3.5), the system is easy to use and interactive. It is also available according to the preference of the customer. In addition, the main competitive driving force was the price of the rental. The competitor has attractive prices compared to other car rental companies, including the case company. By implementing a LBS rental platform, the competitor company managed to bring down the price of car rental. This is a beneficial scenario for both the customers and company. The following table summarizes the strengths and weaknesses of the competitor.

Table 7. Findings from the competitor service offering.

Assessment Criteria	**Strength**	**Weakness**
A. Price	- Competitive and affordable price	
B. Ease of system	- Easy and clear process from a computer	- Poor design of the mobile version of the website - No mobile application
C. Availability (car, customer service)	- Available functioning service - Cars were available	- Poor customer service availability - Calls were not answered
D. Payment method	- Many payment options available (Credit card & Net bank)	
E. Interactive system	- customer is informed throughout the rental duration by SMS - Detailed instruction are sent to customer by email	

In Table 7 above, the assessment criteria, strength and weakness of the competitor company are described. The key lesson from the benchmark is that, firstly, the service demand can be determined by introducing a competitive price to the market. Secondly, the ease of system with clear steps from the beginning is essential in designing a service. Thirdly, the rental service availability regardless of time and location plays a big role in customer satisfaction. Fourthly, the availability of multiple payment methods provides customers with the flexibility in using the service. Finally, the interactive system provided by the company keeps the customers informed throughout the rental process by providing detailed instructions and reminding when the rental is due. The process flow of the competitor has a number of obvious strengths, except for the weakness related to the design of the mobile version website and customer service unavailability which was a major drawback in the rental process. These findings are important to direct the service design for the case company and showing the way how to differentiate.

3.4 Key Findings from the Current State Analysis

The current state analysis described the LBS concept both from customer perspective and from the benchmark experience of using a LBS car rental system. Based on the current

offerings of the case company and the competitor, the constant variables of any car rental service were approach as the four main stages. These are r*eservation, payment, pick-up* and *return.* The following figure describes these steps.

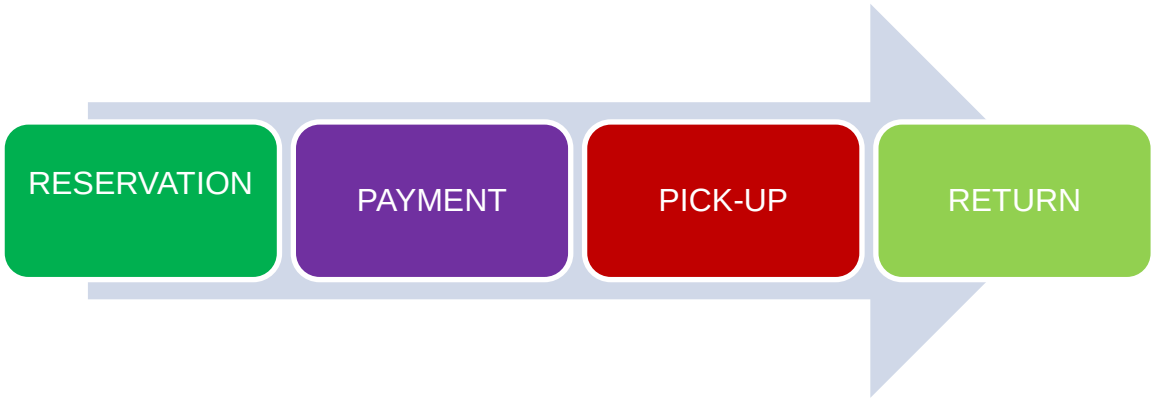

Figure 16. The constant variables in car rental.

As described in Figure 16, service design in car rental occurs within these four core steps. The same logical steps will also continue in the new proposed service. The new service proposed to the case company takes into consideration these steps from the perspective of the customer, the company itself and available suppliers of IT platform. Utilizing the discussed current state analysis results, the following issues were identified in regards to the future service.

A. Important Attributes to Include in Designing LBS

Based on the conducted interviews and the benchmark of competitor, the LBS car rental concept has a high degree of appreciation. Majority of the customers who participated in the interview were in favor of using the LBS concept in a car rental company. Similarly, the strengths mentioned in the summary of section 3.3.5 (Table 7) from the benchmark are a good example of a well-designed system. These findings from the interviews and benchmark are summarized as follows.

Firstly, *the price* of the rental should be competitive and attractive. The customer in this concept is involved in the process of creating the service, thus, the price should be cheaper compared to the conventional method of car rental. Secondly, *the ease of the system* and *the process flow* should be rigorously checked and improved. This ensures that system break downs do not occur and the designed system should deliver the expected service quality. Thirdly, all the elements involved in designing LBS car rental, i.e.

f*unctionality of the reservation website, availability of desired car* and *availability of customer service personnel* should also work in the new services, at least as well as they work currently. Fourthly, the *payment method* and options should be easy in such a service. This ensures against the ambiguity of hidden fees which most customers feared. Lastly, this type of service should be able *to interact with the customer* to a certain extent. Customers have stressed the importance of being in the information loop and having real time information regarding issues such as the time since the rental started, the information on the amount driven so far and most importantly, the outstanding fees at the moment.

B. Important Drawbacks to Avoid in Designing LBS

As stated in the interviews and field search in the benchmark in this study, designing this type of system requires inputs from different parties. Figure 7 above showed the importance of designing a platform which is suitable to use both for handheld devices and computers. Failing to design a coherent and fluent system would certainly create doubts amongst the customers. Additionally, creating a channel for the customers to reach the service provider in case of any questions is important. In the case of the benchmark, where a car was rented to test the service efficiency of the competitor, giving an information package to customers at the beginning of the rental was considered as not enough for providing adequate support. Customer calls were not answered. The fact that customer service is not available makes the customers feel neglected and helpless. Finally, the importance of fleet availability in designing LBS concept is essential. As pointed out by interview participant C6-N-P, availability of the desired car is the reason for the customer to use LBS car rental in the first place.

Therefore, based on the customer interview findings for the future LBS car rental, five evaluation criteria were identified: a) Price, b) ease of system, c) Availability, d) payment method and e) interactive system. These five evaluation criteria were used to summarize the findings of the current state analysis. The findings also point to the customers preferences in the future service. These 5 evaluation criteria should be taken into consideration when designing a new service.

Summing up, the case company currently has a wide range of service offerings which has been adequately implemented and brought good results. The services are flexible and negotiable to specifically meet the customer needs. The approached customers indicated

that the planned new service by the case company will definitely add flexibility and service availability, which would certainly be preferred by the customers. This is the main reason which initiated this study work focusing on LBS. The management of the case company also reached to a consensus that the core and future of car rental services will rely on the extended LBS offering. LBS systems has been designed and launched by competitor companies in the car rental field both in Finland and abroad. This increases the necessity of assessing and implementing the system to the case company soon in order to be amongst the first ones providing LBS oriented services to customers.

The current state analysis showed that the important aspects should be taken into consideration and also pointed to the drawbacks which should be avoided. Using this preliminary vision as a starting point, the study further investigated the service design aspects for the new LBS car rental platform. This topic is discussed in the next section.

4 Best practice in Designing LBS

This section discusses the existing knowledge and best practice for designing LBS enabled car rental platform. This section is divided into three sub-sections. Firstly, it introduces and explains the elements of customer-perceived value in the use of technology based self-service. Secondly, it discusses the service design approach in relation to a new car rental platform design. Thirdly, the concept of service design is further focused to location-based services. Finally, the conceptual framework of this study is assessed.

4.1 Customer-Perceived Value

Vargo (2008) stresses that in the current service dominant logic, the value is co-created with the customer (Vargo, et al 2008: 146). Similarly, in the context of service, value is created using a specific combination of resources by the service provider and the customer. The resources used by the customer to create value take the form of the skills to utilize and appropriate the value provided by the service.

In the context of the car rental industry, technology aided service offering is considered as a competitive advantage amongst rival car rental companies. This advantage is based on both the real benefits that the new services offer, such as speed, convenience, availability; but also, to a big extent, on the perceived value, which the customers feel these services could bring them.

Customer-perceived value has been defined and explained from various angles. Monroe (1991) defines customer-perceived value as the ratio between perceived benefits from the service required and perceived sacrifice to get the service (Monroe 1990).

$$\text{Customer-perceived value} = \frac{\text{Perceived benefits}}{\text{Perceived sacrifice}}$$

Perceived benefit is the end product of the service in a physical, service or support form. Whereas, perceived sacrifice refers to the cost a customer faces when making a purchase (Ravald & Grönroos 1996: 22). Adapting the definition of customer perceived value to the car rental industry, the perceived sacrifice can be in the form of the call/email request the

customer made and the travel time/cost spent to get to the car rental location. This is followed by the time and cost spent to get to the rental car itself. Similarly, the definition of perceived value can be interpreted as the availability, the fluency of the service, quality and comfort of the car.

According to Lovelock (2001), the major perceived sacrifice which has a big impact on increasing perceived-value is price. In addition, time, physical and psychic efforts made by the customer are considered as perceived sacrifice (Lovelock 2001). The final customer-perceived value can be increased by adding the benefits to the service or product. It can also be increased by reducing the perceived sacrifice of the customer which is associated in the transaction of the service. Therefore, if customers feel like more is sacrificed than the service received, the customer-perceived value is decreased. Similarly, if the sacrifice paid in terms of price is lower than the service, the customer-perceived value is increased (Tam 2004: 901).

Using a similar logic in the car rental field, if customers get the impression that the quality of the car and the customer service is poor, their perceived value is lower. This results to customer complaints and the customer is lost, especially when competitors are so active. As the CEO of Hertz points out below:

> *"Technology and social media have completely changed the concept of competitive advantage. For a long time, companies could test and experiment; they could pilot a new concept or product, but they could keep it confidential. Now, whatever you do and say is almost instantly transferable to your competitors".* (Frissora, 2013)

On the other hand, loyal customers can be obtained by providing a competitive service and price. Loyalty is a key value element both for the service provider and customers. By being loyal to a service provider, customers save time and energy which would be spent in searching for alternative services and learning the protocols of being a new user to a service (Yang & Peterson 2004: 802). Business practice suggests that customer satisfaction and loyalty can be achieved by reducing the cost of a service in terms of time, money and energy. Similarly, the perceived value of the customer is higher which also results in customer loyalty (Yang & Peterson 2004: 806). However, when gaining convenience and availability, the service designers should not underestimate the value of a quality customer interaction, which acts as the value facilitator (Greenrooms and Voima 2013).

4.1.1 Interaction with the Customer and Value

Value is created as a result of the actions and roles played both by the service provider and the customer. The service providers' role is to facilitate the value-in-use to the customer. This is carried out in the form of designing, developing, manufacturing and delivering the service. In contrast, the customers create the value in using the service provided (Grönroos & Voima 2012: 136). Similarly, services create value only when used by customers (Polaine, et al 2013: 23).

Grönroos & Voima (2012) point to the role of the service provider in value creation as delivered in four phases. Firstly, the service is designed to meet the requirements of the market. Secondly, the service is further developed to ensure it addresses the target issues. Thirdly, the service is manufactured so it can be delivered. Eventually, the service is presented to the customer through the customer interaction. On the other hand, the role of customers in value creation for the company is in the overall use of the service itself (Grönroos & Voima 2012: 137).

Adapting the roles of service providers and customers underlined by Grönroos & Voima (2012) to the proposed LBS, the first role of the service provider is to design a car rental platform based on LBS. The second role is to develop the LBS system platform using available knowledge and technology. Third, the developed system should be manufactured. Manufacturing the LBS system entails the hardware, software tools and platform, and a mobile application for the customer needed to run the service. Eventually, the service is delivered to the customer in the form of a mobile service of a car rental, as a technology based self-service. On the other hand, the resources from the service provider's side entail the quality of the service flow, platform and application provided to the customers to carry out the self-service transaction (Schere et al 2015: 179).

Therefore, the key interaction moment which creates value in the use of a LBS car rental platform is when customers start to search for a rental car. The car rental service provider facilitates the value creation process by supplying the mobile application and service platform to conduct an effective search for the car rental. The value created at this first moment should be further improved by utilizing the elements and the technology of self-service.

4.1.2 Technology Based Self-service (Smart Service)

Smedlund (2012) defines *creating a service platform* as producing a service, tool, or technology that can be used by customers to enhance the service performance. Service providers invest highly on IT technologies to design a stable platform (Smedlund 2012: 80). Therefore, the proposed LBS car rental platform should deliver a high standard of service to customers in order to attract customers and increase the value.

The service platform concept is relevant since, for potential technology based self-service customers, the value-in-use is considered to be created through five key attributes. These attributes are *speed of delivery*, *ease of use*, *reliability, enjoyment* and *control* (Dabholkar 1996: 33). *Speed of delivery* is the combined waiting time to get a service and time taken for active delivery of the service. Customers evaluate services highly if the expectation of the service delivery time is short (Dabholkar 1996: 34). In the proposed LBS platform, the speed of delivery is interpreted as the time needed for the customer to browse, select and reserve a car in addition to actively driving the car. *Ease of use* is explained as the effort required in using a technology-based self-service and the complexity of the service itself (Dabholkar 1996: 34). This can be the degree the customer can use the system efficiently without any aid. It is stated that the complexity of the self-service affects customers in their ability to perform the service, which results in loss of motivation towards the service (Ho & Ko 2008: 430).

Reliability is the degree to which the system can be depended on to deliver a quality service. It is also a determining factor in the quality of a service (Dabholkar 1996: 34). Reliability in this study is the dependability of the proposed LBS platform from the customers' point of view. The proposed platform comprises self-service mobile application which should work efficiently. Similarly, the rental car received at the end should work properly and customer should be able to start the journey. *Enjoyment* is the combined effect and feeling derived from using a service. Customers are more likely to use a self-service technology if it looks enjoyable (Dabholkar 1996: 34). Consequently, the proposed LBS platform not only needs to be easy and reliable, but also needs to entail enjoyable and interesting aspects in the design. *Control* is defined as the amount of power a customer expects to have during the transaction of a service. By increasing the expected control of service to a customer, the value of the service is enhanced (Dabholkar 1996: 35).

Figure 16 below shows the key attributes of the value-in-use created by being a user of a self-service platform.

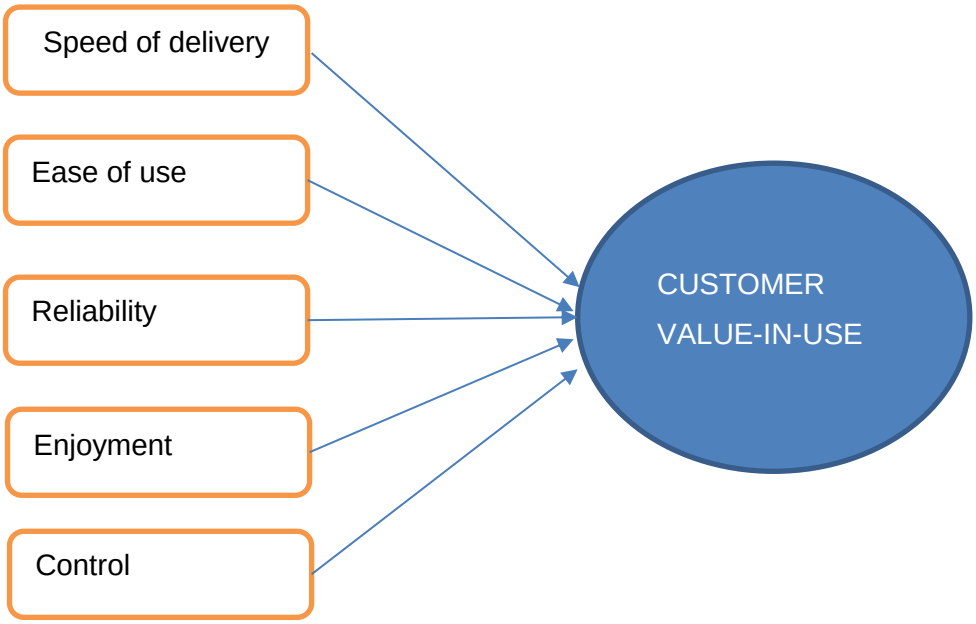

Figure 17. Key attributes of *value*-in-use (summarized from Dabholkar 1996).

Ho and Ko (2008) argue that the key attributes which have a direct impact in the customer value-in-use also affect the intention of continued use (Ho & Ko 2008: 431). Therefore, if all the attributes of a self-service technology compliment the service, the customer-perceived value is high. On the contrary, if one or all of the elements are of poor quality, perceived value is low which results in loss of customers. Thus, to ensure a high standard of customer-perceived value, the elements of the service should be designed well.

4.2 Designing a Service

Designing a service as a term used in literature and best practice has various contextual meanings. Stickdorn & Schneider (2011) describe service design as a practice that results in the design of systems and processes that provide a holistic service to the user (Stickdorn & Jakob 2011: 29). Similarly, Moritz (2005) described service design as a key element to help innovate or improve services to make them more useful, desirable and efficient for clients and organizations (Moritz 2005: 51). From the provided definition of service design, it is understood that service design ensures the process flow of services for

customers, as well as service providers. Service design is described as a user-centered, co-creative, sequential, evidential and holistic approach (Stickdorn & Jakob 2011: 33).

User-centeredness of service design

User-centered service design focuses on the interaction between a service provider and customer. To put the customer at the center of the service design, a good understanding of the customer needs to be analyzed. To understand the customers' needs, service designer needs to experience the service through the customers' eyes (Stickdorn & Jakob 2011: 35). Additionally, a real value is delivered when services are designed based on a genuine insight of the customers (Polaine et al 2013: 18). The definition of user-centered adapted to the LBS car rental platform should consist of the insights from customers. The customers are the end of users of this service, and thus, the preferences and inputs of the customers' needs to be included in the design phase of the service.

Co-creation in service design

Service design focuses at putting the customer in the center of the design process. Because service design itself is not created by the customers, the input of various stakeholders needs to be considered. The stakeholders in the process of a service design entail front-line staff, back-office employees/managers and non-human platforms such as websites and vending machines (Stickdorn & Jakob 2011: 37). The co-creativeness of service design ensures a reliable interaction which is crucial both for the customer and employee satisfaction (Stickdorn & Jakob 2011: 38). The co-creativeness of service design defined in terms of LBS car rental platform involves customer service representatives who deal directly with the customers, managers who control the process flow and the non-human interface – a mobile application which the customer uses to conduct the car rental process.

Sequential feature of Service design

Sequencing in service design is the dynamic timeline process that takes place which influences the attitude of customers towards a service. This timeline needs to be considered in designing a service because customers lose interest if the service is too fast, or on the contrary, too slow. Service design uses a direct and indirect process to create single touch

points to deliver a service moment (Stickdorn & Jakob 2011: 39).These service moments in the LBS car rental process include the direct and indirect interactions of the customer. The direct interactions of the customer can be with a car rental interface (mobile application), employees (phone/email) and the final product itself (rental car). Indirect service moments can be the reviews of the service from other customers who have used it before.

Sequence of service design follows a three step process which includes pre-service period, the actual service period and post-service period (Stickdorn & Jakob 2011: 39). The pre-service touch point of service design in this study can be considered to be the moment when customers have the need for a rental car. The actual service moment is the combined action taken by the customer renting the car and the process of facilitating the rental process by the company. The post-service period is left from the process of renting a car in terms of the good or bad experience.

Evidencing in Service

Evidencing in service design refers to the invisible service process that takes place in the background. Service evidencing prolongs the experience achieved by the customer in the post-service period. This evidence of a service reminds the customer of the positive touch points in the process (Stickdorn & Jakob 2011: 42). Service evidencing simplified is presenting the tasks carried out by the service provider to the customer. An example of service evidencing can be seen in flight comparison website search engines, where the website displays a list of many airlines and travel agencies before the actual result is delivered to the user. Using this logic, evidencing in the car rental industry can be explained as the information provided about the search for rental car, price comparisons and location options for picking up the rental car.

Holistic Service design

Holistic service design refers the architecture of the physical environment where the service occurs. Customers sense more than the service itself. The sound, smell, touches and taste of the service environment is part of the service (Stickdorn & Jakob 2011: 44). Berry, Carbone & Haeckel (2002) refer to this holistic design as clues sent to customers to manage the total customer experience. These clues range from the product or service to the setting of the transaction location and the gestures of the employees (Berry et al 2002:

86). Holistic design in the car rental industry can be described in terms of the brand, look, feel and cleanliness of the car, the attractiveness of the reservation page and the email or telephone response received from an employee.

In service design of self-service technology, the interface design of the system plays a key role in affecting customer perceptions and service encounters (Zeithaml et al 2002: 364). Zhu et al. (2007) conducted an experiment on various self-service technologies including a car rental platform and arrived at three main conclusions on the methods of designing a self-service system (Zhu et al 2007: 504) Firstly, service providers should implement an appropriate technological design by taking customers competences and preferences into consideration. A sophisticated and latest platform implemented to compete for market attention but not according to customers preference results in poor customer satisfaction. Moreover, customers who are disappointed by sophisticated system are the most valuable customer group. This leads to the conclusion that self-service technologies need to be customer centered.

Secondly, the customers' sense of control over the self-service system should be built either by providing informed service choices and price comparisons or by investing in cutting-edge technology which can interact with customers. Zhu et al. (2007) suggests that service providers with limited sources to invest in ICT can provide comparative information to customers that can be used as a competitive strategy. Thirdly, segmenting the market and creating a target group based on customers' behaviors has a direct effect on the use of self-service technology. Self-service technologies that are interactive to user's competences are adopted quickly. The current technological era has provided majority of customers with the knowledge of operating self-service technologies. However, this does not mean that all customers have equal understanding and capability. Therefore, service providers should continuously improve self-service technologies towards a more user-friendly platform (Zhu et al 2007: 504).

4.3 Location-Based Services and LBS Application Design

Location-based services (LBS) are defined as services that depend on and are enabled by the location of the users' mobile device. These services provide valuable information to the user based on the users' geographical location. The use of LBS has been increasing

in the areas of information services, tracking and advertising (Dhar & Varshney 2011: 122).

According to Frissora (2013), technology is affecting the conventional modes of business transaction. The use of LBS car rental platform has been adapted and implemented by a car rental company called Zipcar. Zipcar uses an enhanced technology to conduct the rental process online, find closest car near the customer, reserve, unlock remotely and start the journey. The development of this location-based mobile software application is transformational and changes the business model. Therefore, Hertz has started integrating this technology into their existing business platform to create a new business model based on the notion of LBS (Frissora 2013).

According to Collier & Kimes (2012), three influential attributes of self-service are exploration, accuracy and speed of transaction. *Exploration* refers to the ability of the customer to browse through and understand all elements of the service. *Accuracy*, on the hand, describes the capability of processing and delivering the expected service in a reliable manner (Collier & Kimes 2012: 42). Accuracy in terms of LBS car rental design can be explained as the ability of the car rental platform to deliver necessary results and ensure high quality flow of the system. *Speed of transaction* refers to the customer expectation of the time needed to carry out a service transaction using a self-service technology (Dabholkar 1996: 34).

4.3.1 LBS Value Elements

Rao and Minakakis (2003) identify the demand for LBS and divided them into four major categories. These identified demands are: a) location queries, b) point of need information, c) niche consumer applications, and d) industrial applications. These demands are described as follows. The first large segment of demand comes from the need for *Location queries*. A large segment of LBS demand arises from questions about location and navigation. Maps and driving directions are good examples of location and navigation services. For drivers, getting real-time trip related information such as information on the traffic conditions, locations of gas stations and car fixing places important (Rao & Minakakis 2003: 64).

The second type of customer demand is related to the *Point of need information*. Point of need relates to the delivery of important and personalized information. The information

can be advertisements and promotions targeting the customer based on a prior knowledge profile or similar information. The third segment, *Niche or specific consumer applications*, point to the market segments which include specific demands by consumers for particular applications. These applications target a specific potential group of consumers; and the consumers benefit from being users of these applications. The application in return provides networking and specific yet rich information to the customer (Rao & Minakakis 2003: 64). The fourth type of demand for LBS comes in a from *Industrial/Corporate applications*. This demand is initiated by industries and companies who would like to keep track of moving goods (Rao & Minakakis 2003: 65). Post offices, package delivery companies and logistics companies are examples of LBS users in an industrial application.

Thus, when designing a new LBS service, these segments of customer needs guide the service to the right direction. In the case of the proposed LBS car rental platform, demands can arise from Location queries to find out the location of the customer in order to provide the closest car, from Point of need information to send customer tailored advertisements and from Industrial applications to track the physical location of the rental car itself.

4.3.2 LBS Design Elements

Despite the wide application and demand, there are major challenges in the use of location-based services. These are: a) price of the service, b) personalization of advertisements, c) privacy of the customers, d) suitable applications, and e) technical issues (Dhar & Varshney 2011: 127). Dhar & Varshney (2011) argue that *the price* is the biggest challenge both by service providers and consumers. This is due to the fact that network operators charge voice services on a per-minute rate but do not yet have a suitable pricing model for the transfer of data (Dhar & Varshney 2011: 127). Although network providers offer various data packages based on the amount of data transferred, the overall profitability and therefore affordability of a new service is the common concern of service developers.

Next, *personalizing* advertisements is defined as accurately matching customers profile and location to send advertisements. Based on the predefined behavior and preferences of the customer, service providers can encourage customers to buy by sending personal

advertisements (Dhar & Varshney 2011: 128). Customers discard advertisements which are not suitable for them.

In addition, *privacy* makes a special area for concern. Increased use of location-based services provides network operators with a large amount of customer data. Therefore, the use of LBS depends on the protection of customers' information. The margin between personalizing content and intruding privacy is an important factor in privacy concerns (Dhar & Varshney 2011: 128).

Development of *Suitable mobile applications* also plays a key role in the design of LBS by increasing fluency and comfort to the end user. Location-based service providers do not necessarily have the expertise of mobile application software development, and therefore, a strategic partnership with developers is essential (Dhar & Varshney 2011: 128). The partnership with software developers gives a location-based service provider a competitive advantage over application related issues of compatibility and mobile device platform selection.

Finally, various *technological issues* needs to be considered when designing a mobile based LBS. Firstly, connectivity of the application to the internet is important. Service providers cannot transfer data without the use of internet. Secondly, if a suitable application is not used, the screen size of mobile devices is not sufficient enough to display all the content. Thirdly, these mobile devices use a large amount of battery power when large applications are in use (Dhar & Varshney 2011: 128).

Thus, LBS can be transformed as a revenue opportunity by taking the above mentioned design elements into consideration. LBS designs should be able to deliver targeted and relevant information at the desired time and place of customers. Rao & Minakakis (2003) concluded that a competitive advantage is obtained by providing a high standard, secure and distinctive customer experience (Rao & Minakakis 2003: 65).

4.4 Conceptual Framework for This Study

To discuss the issues related to a new service design related to LBS services, this study selected several key directions for best practice search related to LBS. Figure 17 below shows the building blocks used in the search for best practice.

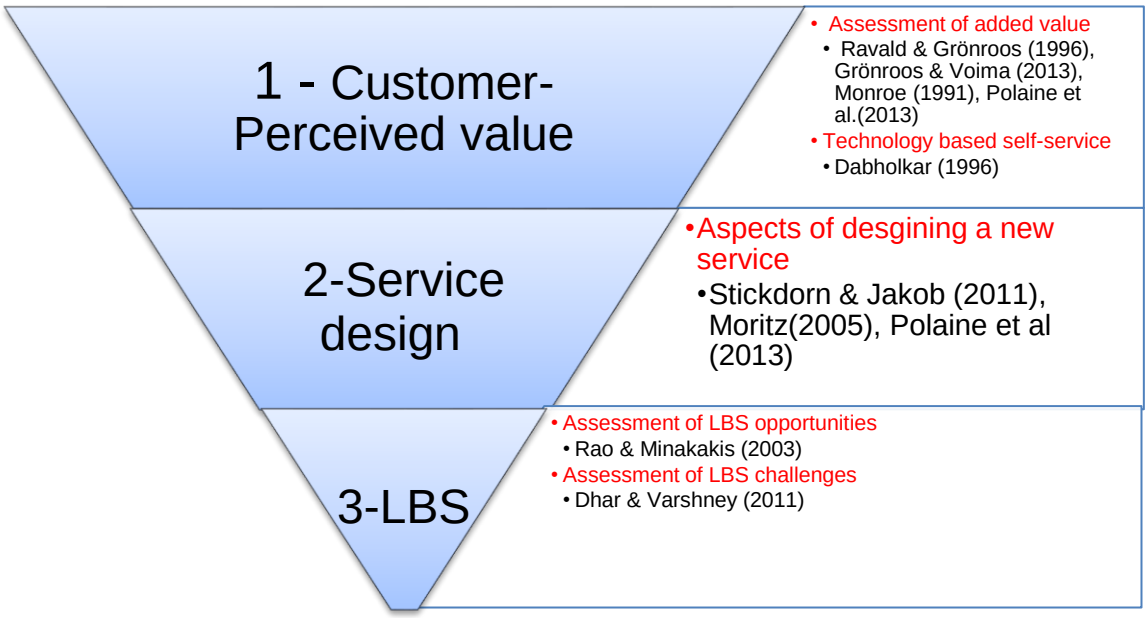

Figure 18. Directions for the search for best practice in service design and LBS.

As seen in Figure 17, the best practice for designing LBS were indicated as related to creating value for customers, new service design and specifically LBS services. The first building block is customer perceived value in relation to the design of the proposed new car rental platform. Second, the service design aspects are assessed. Finally, the service design is further targeted to the design of a new location-based service.

Adapting the service design logic discussed in Section 4.2 (*Designing Service)* and applying it to the LBS platform, customers should be able to choose the vehicle, method of payment and proceed or stop the transaction. Therefore, the general logic of service design leading to a new service delivery and use is illustrated in Figure 19 below.

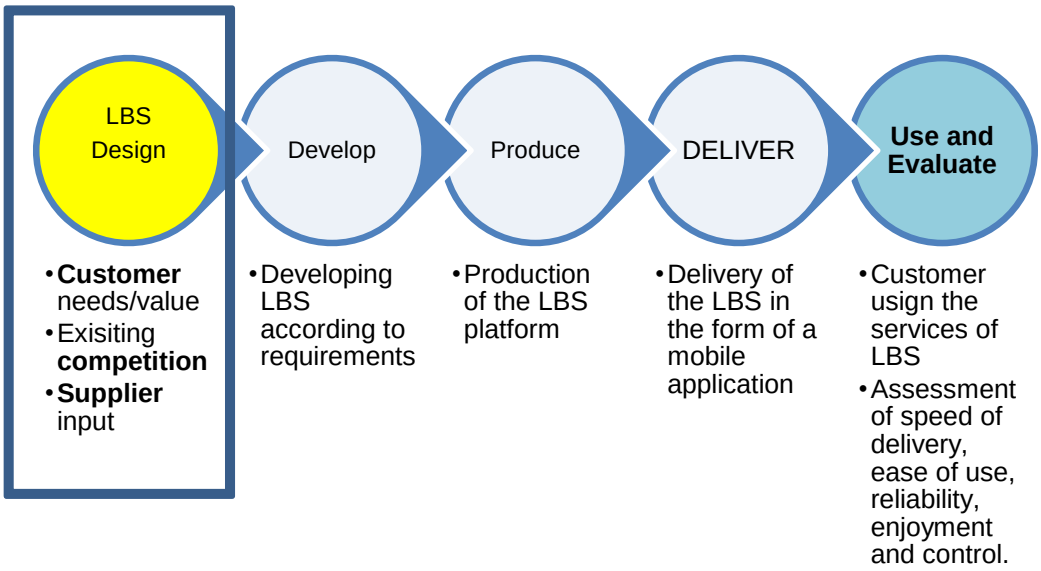

Figure 19. Conceptual framework of this study (Step 1. LBS design).

As described in Figure 18 above, the conceptual framework of this study demonstrates the LBS design steps which compose the *customer needs/value, existing competition and supplier input.* First, the *customer need/value* was assessed by conducting interviews with customers. The interview aimed in assessing the acceptability degree of the proposed LBS car rental platform and preferences of the customers to the new system (Appendix 2). Second, the *existing competition* in the field of LBS car rental platform was investigated to analyze the system in reality. The competitor company and the findings were discussed in Section 3.3. Finally, the *supplier input* in terms of solution proposals for LBS design is included. Supplier proposals are essential in building a final proposal and a recommendation to the case company. Therefore, supplier proposals are taken separately and discussed in the next section as one of the milestones in designing a service.

5 Designing the New Location Based Car Rental Service

This section discusses the proposal building of the LBS based service for the case company. First, it discusses the overview of customer expectations and existing competition. Second, it explains the designing and mapping of the new service from the customer perspective. Third, it evaluates the new service from the company perspective. The fourth section analyzes the design and mapping of the new service from the IT solution provider perspective and finally, the last section summarizes the initial proposal.

5.1 Overview of the Customer Expectations and Existing Competition

As discussed in Section 3.2 (*Customer Preferences)*, the customer interviews were conducted to assess the customer expectation of the new LBS car rental system. The interview participants mentioned key points which can turn them into paying customers.

A major customer expectation of the new service was *the price* of the service. Customers stressed out that the price of this service should be competitive and cheaper than the conventional method of car rental system. The main reasoning is the fact that customers are also involved in the service process and an effort is expected from them in order to attain the car rental service. Similarly, customers pointed out that the new system should be *easy to use*. Customers stressed that complicated *user interface* or *service process* for the LBS car rental platform creates frustration and eventually followed by loss of interest. In addition, the service should be *available* for the customers *at any time and place* desired. Since the proposed system works on the notion of self-service, availability of the service is not limited to the working office hours of the case company. Moreover, the customers expect the user interface of the system to be *interactive.* Customers also mentioned the importance of being kept in the information loop and receive *relevant information* regarding the rental process during the transaction period. This relevant information includes *the usage history, kilometers* driven so far and *the outstanding rental fees*. Furthermore, *the security of the data* supplied by the customers should be kept confidential. During the interviews, the customers also indicated that the information provided to the company should not be used for advertisements or passed to any third party.

The existing competition was analyzed by renting a car from LBS enabled car rental company located in Finland. The main reason for conducting a benchmark of the competitor company was to analyze the efficiency of the system and based on the acquired customer experience by the researcher, to propose a better platform for the case company. The analysis of the competitor concluded that the rental process is easy to use and highly interactive. As discussed in Section 3.3.4 (*Additional Services)*, the competitor company also uses the car rental user interface as a means of advertising additional services. In addition, compared to other conventional car rental companies, the price is attractive and cheap which provides them with a major competitive advantage. On the contrary, during the course of the existing competition analysis, it was discovered that the quality of the customer service provided by the competitor is not of high standards. Test calls made to the customer service department of the company were not answered. The company recommends that all enquiries are done via SMS message which is not convenient to all users. Similarly, the car rental platform provided does not have a mobile application or a mobile-friendly website which made the beginning of the rental process complicated.

5.2 Designing and Mapping the New Service: The Customer Perspective

Based on the findings of the interviews, the competitor service offering and literature and best practice findings, it became apparent that the new LBS car rental platform eases the process and is more convenient for customers. The convenience of this system can be interpreted as the time and money saved, as the most obvious among other possible criteria. In addition, the new system brings service flexibility and 24 hours availability which were not possible in the conventional car rental system.

The draft service map used the findings of the customer expectations from the interviews and the benchmark of the competitor company. The initial draft of the service map was created together with the CEO of the case company who shares the vision of future car rental services.

> *“The future of car rental service has shifted to smart handheld devices. Our company should undergo a certain type of transformation to deliver car rental service on the go.” (CEO, case company, 2015).*

The service map created for the new LBS car rental system uses the four constant variables of any car rental procedure. These are reservation, payment, picking-up the rental vehicle and returning the rental. Figure 20 below explains the service moments of the customer in using the new car rental system.

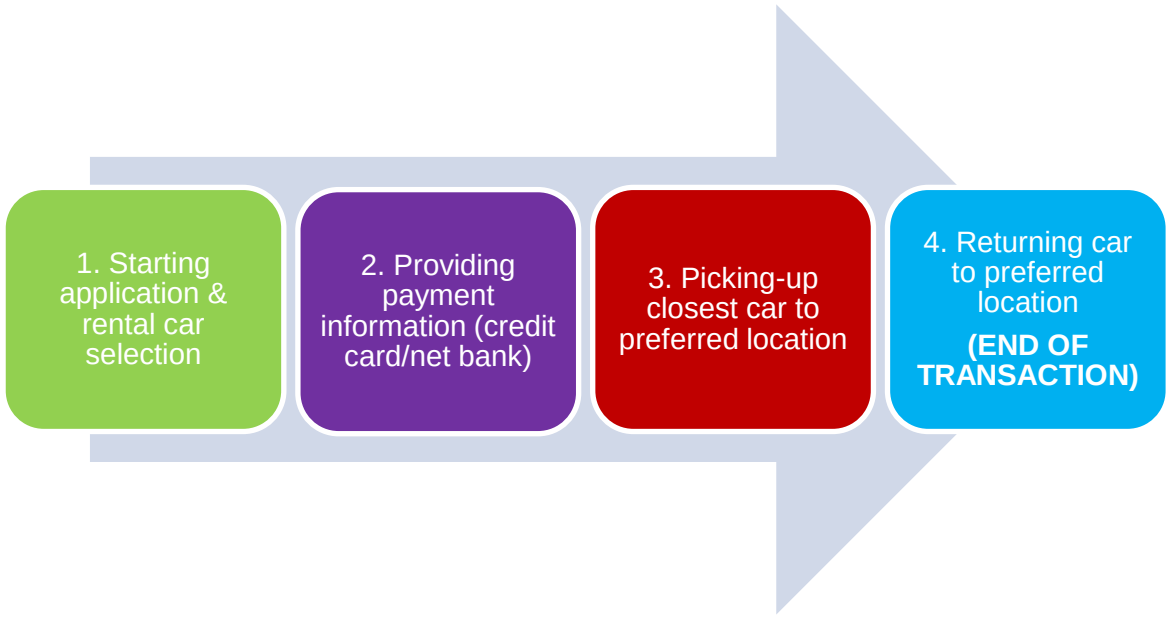

Figure 20. Service map of the new LBS car rental service (customer perspective).

As described in Figure 20 above, the LBS car rental from the customer perspective is rather simple and involves only four steps. When there is a need for a rental car, the customer first starts the mobile application which displays the available vehicles for rent. The customer then selects the desired car and proceeds to the payment stage where payment details are provided. This is followed by the beginning of the rental period by picking-up the closest car from preferred location. After use, the customer then returns the rental car to preferred location which ends the rental period and transaction.

Compared to the conventional car rental system used in the case company at the moment, the new system entails significantly less steps and overall easiness of procedure. In addition, the *cost* for the customer which can be interpreted as the *pain* is lower. Table 8 below summarizes the comparison of the current car rental system with the new LBS car rental services.

Table 8. Comparison of current and LBS car rental (customer perspective).

	Current car rental			New LBS car rental		
	Service moments	**"Cost"**	**"Pain"**	**Service moments**	**"Cost"**	**"Pain"**
1. Reservation	**1. Making reservation**			**1. Starting application/rental car selection online**	Time* saved	**LOW**
	1. Call/email	Time/Money	High			
	2. Receiving confirmation	Time	Medium			
2. Payment	**2. Payment**			**2. Giving credit card information**	Time* saved	**LOW**
	1. Traveling to rental location	Time/Money	High			
	2. Presenting drivers' license and credit card	Time	Medium			
3. Pick-up	**3. Pick-up process**			**3. Picking closest car to customer**	Time* saved	**LOW**
	1. Travelling to the location of the car	Time	Medium			
4. Return	**4. Fixed location of return**			**4. Returning car to preferred destination**	Time* saved	**LOW**
	1. Returning car to rental company	Time	High			
	2. Travelling away From rental comp.	Time/Money	High			

Time* - Includes 24 hrs. availability and convenience of the system.

As described in Table 8, the LBS car rental service provides the customer with shorter rental procedures compared to the conventional car rental system. The proposed LBS system also gives flexibility and the process costs to the customer are minimal. The “cost” comparison for the customer is carried out by assessing the service moments of the customer with the company in the rental process. These service moments are assessed in terms of time and money spent to conduct the rental process from beginning to the end.

5.3 Designing and Mapping the New Service: The Company Perspective

The mapping of the new service from the perspective of the company was also designed together with the CEO of the case company. The service moment of the company in the new LBS service is described in Figure 21 below.

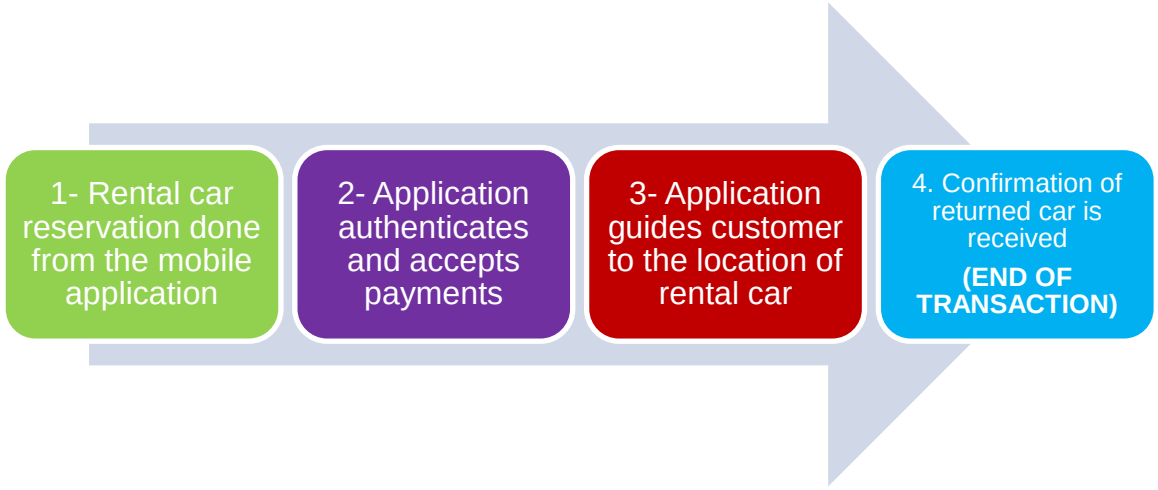

Figure 21. Service map of the new LBS car rental service (company perspective).

As described in Figure 21, the steps involved in conducting a LBS car rental are simple and easy from the perspective of the company. This is because the rental steps which were handled manually in the conventional car rental system are automatically processed by the smart LBS car rental service. All the four variables of car rental – reservation, payment, pick-up and return are conducted in an automated manner which makes conducting car rental business more efficient and easy for the case company. To analyze the comparison of the current car rental with the planned LBS car rental, a comparative ‘cost’ analysis is made. Since the company is fully operational with the conventional method of car rental system, the ‘costs’ are assumed to be ‘medium’ except for the service steps that include more than one department. Table 9 below summarizes this comparison.

Table 9. Comparison of current and LBS car rental (company perspective).

	Current car rental			New LBS car rental		
	Service moments	Department	Cost	Service moments	Department	Cost
1. Reservation	**1. Accepting reservation**			**1. Reserving/ selecting rental car**	Mobile app.	**Low**
	1. Processing customer request	Customer service dep. Booking dep.	HIGH			
	2. Checking availability of fleet	Logistics dep.	Medium			
	3. Confirmation	Booking dep.	Medium			
2. Payment	**2. Processing payment**			**2. Processing payment and authorizing rental (**Net bank, credit card**)**	Mobile app	**Low**
	1. Charging customer	Billing dep.	Medium			
	2. Sending receipt	Billing dep.	Medium			
3. Pick-up	**3. Pick-up process**			**3. Customer preferred pick up**	Mobile app.	**Low**
	1. Preparing rental car	Logistics dep.	Medium			
	2. Delivering keys & signing the rental agreement	Customer service dep. Logistics dep.	HIGH			
4. Return	**4. Fixed location of return**			**4. Customer preferred location of return**	Mobile app.	**Low**
	1. Picking up car from parking place	Logistics dep.	Medium			
	2. Checking damages & refuel	Logistics dep.	Medium			

As seen in Table 9, the current car rental system has several service moments involved compared to the proposed LBS car rental platform. The steps that require the collaboration of two departments are marked in red because the running cost is relatively higher. This is because a significant amount of man hour is required. In addition, the error margins in these departments are high due to misunderstandings and miscommunications. On the other hand, the LBS car rental platform has all the steps in an automated manner, which as a result, makes the rental steps significantly shorter. Furthermore, the running cost and error margins of the system are lower.

5.4 Designing and Mapping the New Service: The Service Design Perspective

In mapping of the new service using the perspective of the service designers, the cost in terms of the investment for the new project was one of the biggest challenges. Customers have stated that the new LBS car rental system should be affordable in terms of price. In addition the system needs to be easy to use with a few steps involved and the service should be available when needed regardless time and location. Moreover, customers wished that the new system would be interactive and the data provided should be kept secure. However, based on the preferences of customers, findings from the competitor and preliminary solutions delivered by IT companies a complete proposal can be derived. This is because a conclusive and definite price was not able to be quoted by the service designers before the project is started, therefore the relative estimations were relied on, especially regarding the most fundamental investments such the investments into the system development.

In addition, based on the findings of the competitor offering, the fear of existing and pressurizing completion was eliminated, which is also important when discussing the service design and investments. It was found out that there is room for a new LBS car rental platform in Finland. Compared to the big brands currently operating, the benchmark company is fairly small both in fleet and turnover per year. This leads to the conclusion that adapting this new technology and incorporating it to the current car rental platform provides a competitive advantage.

The service designer expertise is needed because the case company does not have the necessary IT skills to proceed with the development of the new service. The IT systems include the development of a mobile application, embedded a GPS device to the cars and

cloud service management. Therefore, in this study, two IT service providers were contacted to investigate the possibility of designing LBS car rental system.

5.4.1 Supplier Proposal 1 (Technology Architecture)

The first proposal for a possible Technology architecture for the new service is built around the offer by a Finnish IT company which specializes in additional location based features for cars. This additional service requires an external sim-card enabled hardware device to be installed on the car. The proposed system connects the sim-card of the hardware device installed on the vehicle to a cloud service. This enables the hardware to be controlled remotely by a mobile device connected to the internet, which then controls features on the car itself. Figure 22 below describes the cloud architecture design of the system.

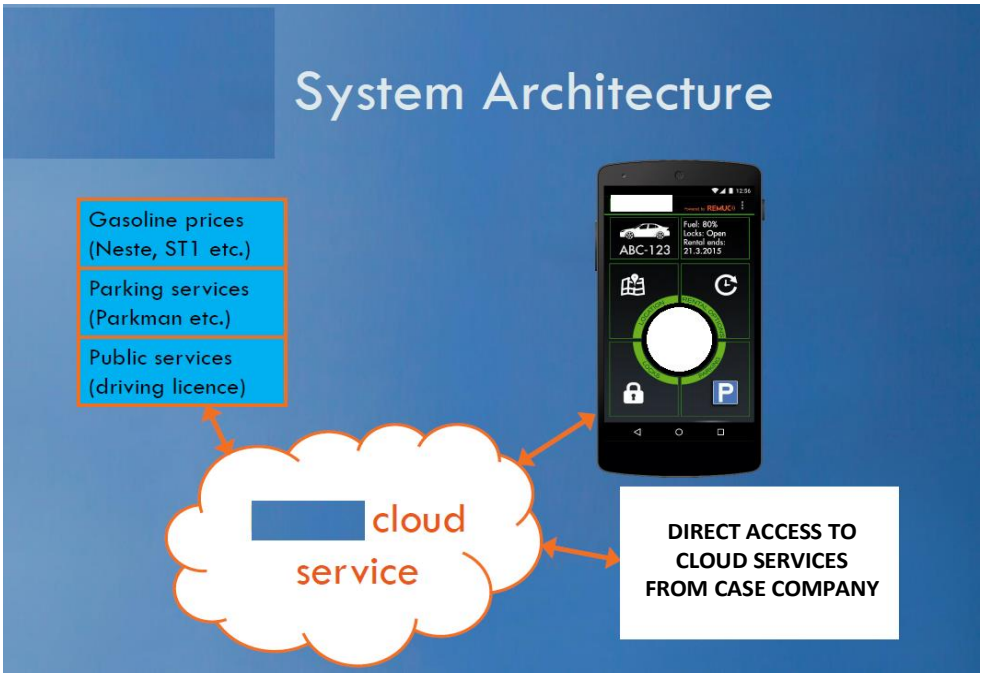

Figure 22. System architecture of supplier proposal 1.

As described in Figure 22, the system includes information on third party service providers, such as, gas stations and parking places accessed through the cloud service. The cloud service displays real-time data on the location of the car, distance travelled, average speed, average consumption and etc. The following figure describes the information retrieved from the vehicle and displayed to the car rental service provider.

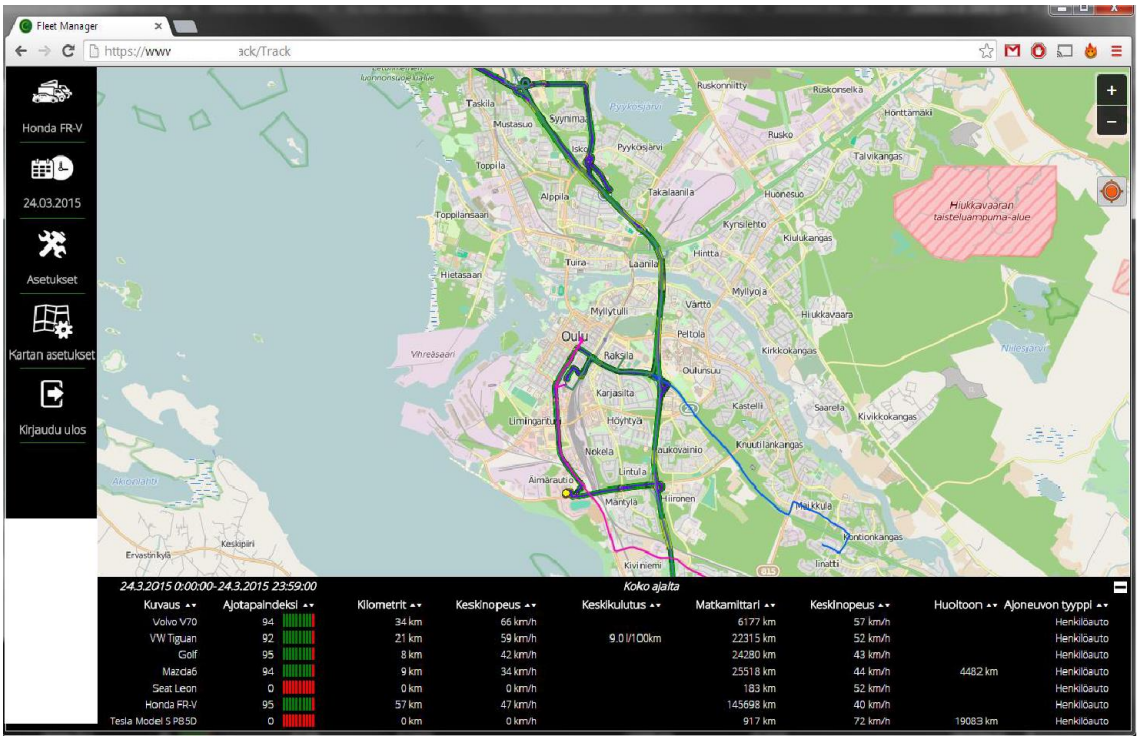

Figure 23. Information displayed in fleet management.

As shown in Figure 23, the fleet management displays various type of information related to the vehicle. This information is important in maintaining the service intervals and tracking of the vehicle if needed.

Based on the results of the technology architecture analysis conducted in Data collection 2, this proposed system can be customized to the case company's preferences and also provides a control channel to remote services. In addition, training of the case company's staff, server administration, maintenance and support are also provided.

The mobile application interface, reached from the customer perspective, works in a four step process consisting of: a) vehicle search, b) closest vehicle display, c) displaying details of chosen vehicle and d) personal information and payment. The following figure describes the looks of the proposed mobile application from customers' mobile device.

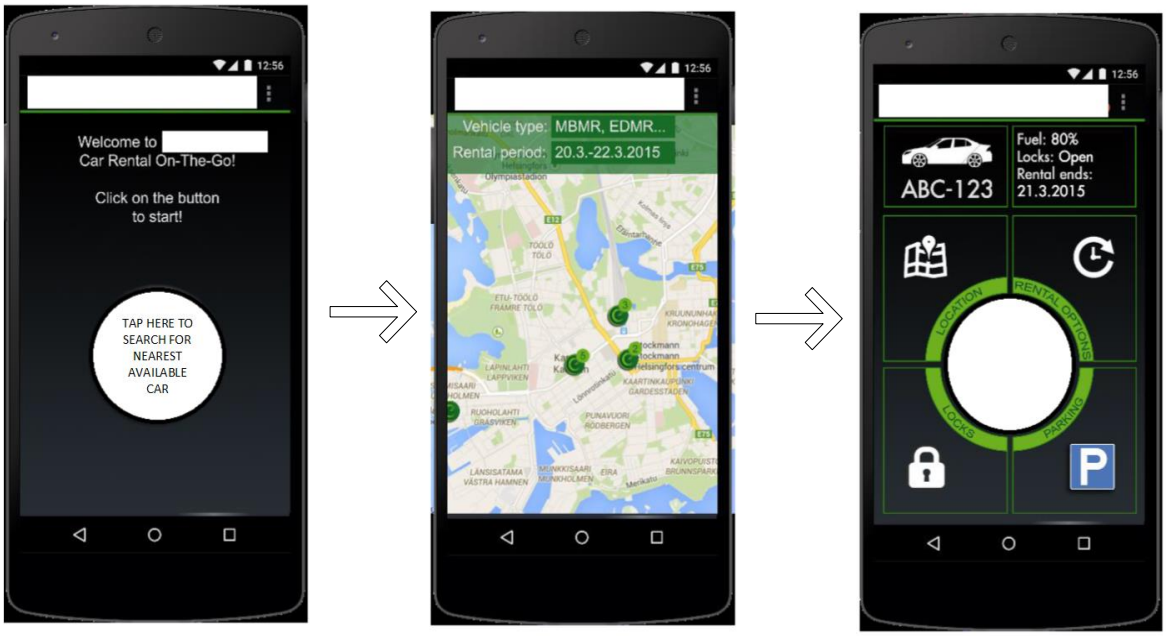

Figure 24. User interface of the mobile application.

As shown in Figure 24, the process flow of car rental from the customers' mobile device starts with a single button to search for the nearest available car. The nearest available cars are then displayed on a map. The map also shows the customer's current location. This is followed by selection of car, which displays the license plate number and other details of the car.

5.4.2 Supplier Proposal 2 (Technology Architecture, from Supplier 2)

The second car rental platform analyzed as part of service design for the new LBS based service was done by a German company. The company specializes in delivering car sharing platforms which can be customized according to the preferences of the case company. The following figure describes the system architecture.

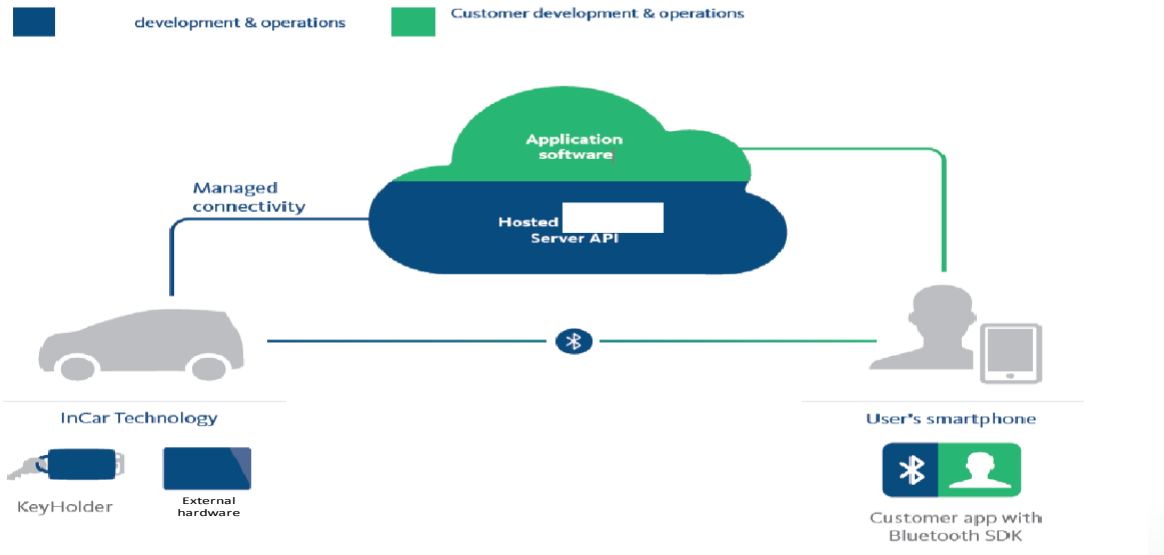

Figure 25. System architecture of supplier proposal 2.

As seen in Figure 25, the system architecture of suppler proposal 2 uses a cloud service which is connected to the customers' mobile device and the existing architecture of the service provider to develop application software customized for the case company. An external hardware is also fitted in the car to connect the vehicle to cloud services. The following figure shows the type of hardware needed to connect the vehicle to cloud services.

Figure 26. External hardware installed on vehicles.

The external hardware added to the car has a sim-card slot which makes remote access and location services possible. According to the IT Company, the hardware is capable of

Bluetooth connection which makes connection to the vehicle possible in places where there is no GSM coverage.

The proposed system entails a refueling card to be used at a gas station after rental. This ensures that the next customer receives a car which has a full tank. The platform also includes real-time information about the vehicle status to the customers' mobile device via GSM and Bluetooth. The following figure describes the elements displayed to the customer.

Figure 27. Real-time information displayed to customer via GSM/Bluetooth.

As seen in Figure 26, the real time communication with the customer provides information on the general vehicle and rental status is displayed to the customer.

5.4.3 Comparison of Initial Proposals 1 & 2

Both technology architectures presented in the supplier proposal contained interesting features that are either needed or could potentially be utilized in the new LBS based service by the case company. As discussed earlier, comparison of supplier proposal 1 & 2 based on the price of the project is not included in this study. This is because of the fact that a conclusive and final price could not be quoted during the timeframe the study was

done. A definite price will be presented only when the LBS project is initiated by the case company. Therefore, the comparison of the offers is based on the strength and weakness assessment of the offers. The following table describes the strength and weaknesses of both systems.

Table 10. Strength and weakness comparison of supplier proposals 1 & 2.

	PROPOSAL - 1	PROPOSAL - 2
STRENGTH	- Company is located in Finland, which makes communication and support easy. - Track record available for LBS installed for other purposes (remote heating system and fleet location). - The company is relatively small and can dedicate and prioritize this type of project. - Training on the use of the system is provided for the case company.	- Readily available platform available which can be customized to the case company. - The company has installed and operates this service in over 45,000 vehicles in 20 different countries. - Communication between the vehicle and mobile device is done by GSM and Bluetooth. The addition of Bluetooth increases service availability in places with no network coverage.
WEAKNESS	- No prior experience or platform available for car rentals. As a result, the project development and piloting phase might take a long time. - The company is relatively small both in staff and yearly turnover. This brings the reliability of the company to question.	- The company is located in Germany which may affect the quality of support and maintenance after installation.

As discussed in Table 10 above, both proposals have strong and weak points in the solutions provided to the case company. From the service design perspective, these companies offer a solution which the case company cannot design itself. Moreover, both companies have taken into consideration the new system should be user-centered. This means that the IT solution provider selection criteria are based on other characteristics than the design process itself.

5.5 Summary of the Initial Proposal

In this study, the initial proposal for the new LBS based car rental service was designed in three parts. First, the new service was mapped from the customers' point of view. It contains the four basic steps (reservation, payment, pick-up and return) which are common in any car rental service, but were specified for the new LBS rental platform. Second, the study discussed the service map from the case company perspective, using the same four steps from the point of view of the case company. Finally, the study analyzed two proposals from the suppliers for the technology architecture of the future LBS service. Together, these three perspectives show the outline of the future LBS based service for the case company.

From the *customers' perspective,* firstly, the price should be attractive and affordable. Secondly, the system should be easy to use and understand. Thirdly, the service should be available continuously to serve customers. Fourthly, the personal information provided by customers should be protected. Finally, the system should be able to interact and provide real-time information to customers.

From the *company's perspective*, the new LBS service introduces an automated system which reduces the car rental process, save time and man power. It also offers service fluency and lower error margins which are normally caused by miscommunication of departments within the company. In addition, the company can fully serve customers at all times by providing an interactive system which adds to the customer satisfaction. Currently, the case company uses third party companies which are open 24 hours at the airport to service late coming customers. The third party companies are not qualified to answer questions by customers related to car rental. As a result, a few customer complaints have been received.

From the *supplier's perspective*, it was found out that IT solution providers are available and ready develop the necessary IT system required together with the company. The initial offers made were analyzed. The strength and weaknesses mentioned various positive and negative elements of the IT service providers in their proposals. Compared to proposal 1, the IT solution provided by proposal 2 seems as a better choice. Even though the second proposal was done by a German company which might affect support and maintenance, the availability of a ready concept to be implemented and customized

to the case company makes their offer preferable. In addition, the company installed and maintained similar systems (but not incorporated in a car rental service) in 20 different countries and in almost 45,000 vehicles. This suggests that a good track record is available and can be depended to deliver a high quality system compared to proposal 1, which has never carried out this type of large scale service design.

6 Validation of the Proposed LBS Car Rental Service Outline

This section discusses the validation of the outline of the new LBS based car rental service and its technology architecture proposed to the case company. First, this section discusses the validation of the initial proposal made by the CEO, and second, it describes the recommendations made based on the findings from the customers, competition and suppliers.

6.1 Validation of Initial Proposal

In the course of the study, several elements of the new LBS based car rental service were identified and discussed based on the data collected and analyzed. Taken together, they outline the new LBS based service as considered from the point of view of the three key parties involved; the customers, the case company, and its potential suppliers.

First, it was confirmed that there is an increasing need for a flexible and easy car rental service. Second, the customer perspective was once again clarified and the critical features for the customers confirmed as justly included in the outline of the new service. During the interviews conducted, potential customers expressed their willingness to be a user of the proposed LBS enabled car rental system. Customers outlined that the new LBS car rental platform adds value by the increased service availability. In addition, the new car rental system saves time for customers by reducing the procedures of the rental process compared to the conventional car rental system. Moreover, customers save money by cutting down the travel time to get the rental car itself.

Third, the new LBS based service was evaluated from the company perspective. In addition, the CEO supports the logic of the five evaluation criteria (*price, ease of system, availability of service, payment method and interactive system*) for the new service. For the company, a LBS car rental platform reduces the steps of processing customer's request. By utilizing a fully automated system, the error margins and departments needed are lower.

Fourth, the supplier perspective was discussed and the proposal for the technology architecture from the supplier proposal validated. The CEO has accepted the initial proposal for the supplier selection. The supplier selected to develop the LBS car rental sys-

tem has a ready platform to be adopted and customized by the case company. In addition, the supplier has implemented a similar system in over 20 countries and has sufficient experience to provide to the case company. The proposed system also entails a direct interactive system between the car and the customer's mobile device using a GSM network or via Bluetooth connection to be used in places with no network coverage.

The CEO's conclusion was that the study provider sufficient information for the supplier selection to be approved and preliminary discussion meeting will be held with service designers of the company who made proposal 2. Similarly, the service design aspects explained from the customer and the company perspective were once again confirmed for being included as initial requirements for the service design, for the supplier's part as well.

Based on this outline of the new LBS based service, the CEO concluded that the company evaluated the new LBS based service as feasible for the next, more detailed service design stage, with the prospect for implementation. Therefore, the goal of this study was considered as reached by the evaluator.

Finally, based on the results of the study, the CEO of the case company was convinced that the LBS car rental platform would provide a competitive advantage and reach customers in a flexible manner, and he also initiated the assessment of the opportunities for a new business model to support this new proposed service.

6.2 Recommendations

As a result of the validation session, the study also developed a list of Recommendations for the next design phase of the project. In this study, recommendations come in two parts. First, the CEO of the case company requested a list of recommendations based on the insights concluded from *the Customers, Competition* and *Suppliers*. This logic also specifies the first step mentioned in the conceptual framework of this study (see Figure 28 below). The following table highlights the recommendations for the development of LBS car rental service from these three sources.

Table 11. Recommendations Part I: inputs from the *Customers, Competition* and *Supplier.*

Recommendation source		Recommendation
CUSTOMER	**R-1**	The price of the LBS should be extremely competitive to attract new customers.
	R-2	The designed system should be easy to use and not complicated.
	R-3	The service should be made available anytime and system break downs should not happen. In case service breakdown happens, the customer should have a channel to reach customer service.
	R-4	The system should entail flexible payment methods. Other options than credit card and net bank should be considered.
	R-5	Customer data confidentiality should be a priority in the implementation of LBS system.
	R-6	The user interface of the service should be interactive to keep customers in the information loop.
	R-7	Quality of fleet should be of high standards and the environmental friendliness of the vehicle should be considered.
COMPETITION	**R-8**	Suitable user interface should be designed which works well with mobile devices.
	R-9	Customer service should be made available incase customers have immediate questions to ask.
SUPPLIER	**R-10**	Supplier with experience in developing LBS and a good track record should be selected for the development of the project.
	R-11	The mobile application to be designed should be able to communicate with the vehicle in places with no GSM coverage. Bluetooth is an option supplied by the proposed company.

As shown in Table 11 above, 11 recommendations are suggested to the case company, based on the best practice and insights relevant to the *Customer, Competition* and *Supplier*. These recommendations can be used in the design phase of the project to make sure that the service is developed accordingly.

Second, the study also proposed recommendations as for further developing the initial service design proposed in this study. After covering the first step (*LBS Design*) above, the next recommendations relate to the subsequent stages in the service design process of *developing, producing, delivering* and *evaluating* as shown in Figure 28 below.

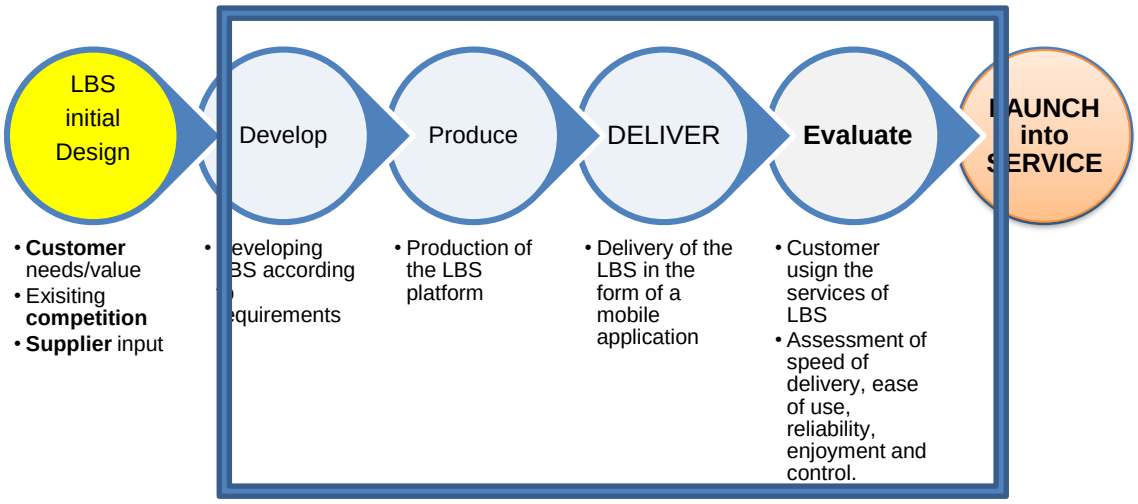

Figure 28. Recommendations Part II: related to next steps in service design.

The recommendations relate to the following stages in the service design process:

Step 1. LBS Design

(See section 6.2 above)

Step 2. Develop:

1. The requirements of the preliminary LBS design need to be further defined and crystalized by the IT service provider before moving to the production stage.
2. Conducting a large scale interview, perhaps on a questionnaire manner will help achieve a remarkable degree of user-centered service. This in return creates a sense of belongingness in the customers which may turn them to be loyal customers of the system.

Step 3. Produce:

1. The software of the LBS platform should be designed by taking the mobile platform differences into consideration. These major platforms currently are Android, IOS and Windows. Producing a platform suitable for all three mobile devices is expensive for the case company and therefore, either a major platform in dominance should be selected or a platform independent system should be produced. A platform independent system can be in the form of a mobile friendly website.
2. The mobile application of the LBS car rental platform should be as user friendly as possible. In addition, the system should be easy to use with few clear steps.

Step 4. Stage Delivery:

1. The delivery stage requires marketing and advertisement to announce to customers that a LBS car rental application or mobile-friendly website is available. Since the LBS car rental is a relatively new service, newer methods of advertisement (e.g. social media buzz) should be considered to accompany it.
2. The initial delivery stage for the new service is crucial in assessing the first impact of the service. Therefore, the case company should stress on all aspects of the service (product, service quality, customer service).

Step 5. Evaluate:

1. This is the initial piloting phase of the service and therefore the feedback received should be taken into consideration and acted upon before the launch of the service.
2. The case company should try to deliberately push the limits of the service to evaluate the speed of delivery, ease of use, reliability, enjoyment and control achieved from being a user of the new LBS car rental system.

7 Discussion and Conclusions

This section presents the summary and evaluation of the study. It also discusses how the reliability and validity plan was realized in the research process.

7.1 Summary

The main goal of this study was to identify the feasibility of use of the new location-based service (LBS) in the case company. The proposed LBS car rental service outline targeted to clarify the required features of such a service, from the potential customers and the company points of view, as well as to screen potential suppliers and finally discuss the new service from the service design perspective.

The findings from the study show that the new LBS service would increase service flexibility and availability to customers. It also saves time, energy and money spent to get to the rental location and away from the rental location. Similarly, the system would provide a competitive advantage for the case company as being the pioneers of this new service in a country where the competition is minimal. In addition, the company decreases running cost and error margins by implementing a fully automated car rental system.

The current state analysis which was based on the customer interviews and benchmark of the competitor service offering confirmed that there is demand and available market gap to supply LBS car rental service. Therefore, in this study, the main focus was to compare the conventional car rental system with the LBS car rental in order to propose a solid grounding and design features for the case company. The LBS car rental significantly decreases the work load and save cost for the company by conducting automated transactions. Similarly, the *pain* of the customer which arises in the process of renting a car is substantially lower compared to the conventional car rental system. This results in a higher customer satisfaction which in return creates loyal customers. Using the proposed recommendations from the customer, competition and suppliers, a grounded starting point can be achieved to begin the design phase of the LBS car rental platform.

Additionally, the study discussed the prospects of developing a service platform based on the available offers from potential suppliers. Based on the feedback received from the case company, the proposal done by the German company (Proposal – 2) is better than Proposal – 1. The selected supplier has a readily available platform to be customized to

the preferences of the case company. The supplier has also installed the car rental system in over 45,000 cars. This proves that the supplier is experienced and can deliver the car rental platform to the case company. In addition, direct communication between customer's mobile device and the car is available using GSM network and Bluetooth in places with no network coverage. The first proposal done by the Finnish company brought up certain doubts. This is due to a lack of experience and the unavailability of a ready platform to the case company. This results in a longer project delivery time and quality.

Finally, the study also took into account the service design perspective. Based on the findings in study it was also concluded that the proposed LBS car rental platform requires a new approach and design thinking compared to the conventional car rental system. This is because location-based services are built on the idea of self-service technologies which do not involve any human interaction. Therefore, the service design should be adequately designed to address all possible customer enquiries to make sure the system runs smoothly. However, this does not mean that all forms of human communications should be disconnected. In the case of the competitor company assessed in this study, the company did not have any immediate contact means for customers. It is important to prepare a channel for customers to reach customer service in case of immediate enquiries.

The proposed LBS aided car rental platform is expected to bring the following benefits to the case company. Firstly, it will increase service availability by automating the car rental process. Secondly, the new system lowers the running cost for the company by reducing the departments involved in the car rental process. Thirdly, the error margins of the new system are lower because the system is run in an automated manner.

7.2 Evaluation of the Thesis

The evaluation of this study is carried out in two sections. First, the outcome and objective are compared to see the found answers to the research question. Second, the reliability and validity aspects are discussed.

7.2.1 Outcome vs. Objective

The main objective of this thesis was to propose a new location-based car rental service in addition to the existing conventional car rental system. The proposed service design had to address the service design implications and the added value both for the customer and company. This was done by comparing the service maps of the proposed system with the conventional car rental system.

The outcome of this thesis is an outline of the new LBS based service and a list of recommendation for the LBS car rental platform described in Section 5.5 (*summary of the initial proposal)*. The application of LBS in the car rental industry was analyzed based on the acceptability degree and the preferences of customers. In addition, the use of a LBS car rental system was assessed by using the services of a competitor company providing such type of rental platforms. Moreover, the input from both the customers and the top management were used in the development of this study. To make this study three dimensional, the preliminary solutions provided by IT companies is also incorporated in the development of the implementation plan.

In this study, two key questions have been addressed from the case company. The first question assessed the need for the development of a location-based car rental service in the case company. The second question targeted in finding out the design aspect of the LBS system. The answer to the first question is yes, there is a need for development of a LBS car rental in the case company. Customers and current competition suggest that there is a stable market and demand for this type of flexible extended services. Similarly, the competition in this field is not high which gives the case company a competitive advantage in being one of the pioneers in engineering LBS car rental platforms. To address the second question related to the methods of implementing a LBS car rental platform, price, ease of system, availability of service, interactive user interface and data security issues need to be taken into consideration.

To summarize, this study explored the feasibility of designing a new LBS base service in the car rental company and described the key elements in designing such a self-service location-based car rental system. It also illustrated the comparison in terms of ‘pains’ and ‘gains’ of the proposed LBS with the conventional car rental method from the company

and the customer perspective. Therefore, it can be considered that this study addressed the business challenge initially formulated as its goal.

7.2.2 Validity and Reliability

This study has been conducted following the action research approach, by the qualitative research methods. The validity and reliability plan was created in Section 2.4 (*Validity and Reliability)* to increase transparency and rigorousness of the study.

In qualitative research, validity is measured by assessing if the outcome of the study provides adequate answer to the research problem. In this study, the outcome discussed the use and application of location-based services in the car rental field and the important elements to consider in the process of designing such system. This study can thus be regarded to answer the question asked in the business problem.

As described in section 2.4 (*Validity and Reliability)*, to establish a high standard of validity the following measures were taken. First, the study included detailed process of data collection and analysis methods. Second, after each interview was conducted, the findings were discussed with the interviewee to ensure that the collected data was correct. Third, the management of the case company was involved in the development of this study. This ensured the outcome of this study to be desirable for the case company. Fourth, the field search conducted in this study was carried out by the researcher and appropriate recording tools were used to capture the service in action. Lastly, the documented solution proposals made by the two IT companies were included in the study to increase the depth of the study.

Reliability in qualitative study is defined to be the similarity of the research result, if the research was repeated by a different researcher using the same techniques or if the research was conducted in a different time. Based on this study, it can be concluded that if the same research technique and data sources are used, the findings will remain the same. However, the exponentially increasing mobile technology of the past years suggest that if this study is to be conducted in a different point in time, the technology of that era might provide a different and better answers.

To achieve a high degree of reliability, the following methods are used. First, the study used multiple yet specific and relevant sources to collect data. The interviewee selection

in this study was explained showing the target group and other criteria. Second, the theories selected and analyzed in this study are peer reviewed academic and reputed business publications. These publications are cited accordingly with page numbers. This ensured that the theories behind this study are derived from reliable sources and thus, can be trusted to produce quality research. Third, to broaden the insight of this study, the experience of the researcher in the car rental field was used. The insights of the researcher were all neutral and unbiased.

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Appendix 1. Interview topics and questions

Table 1. Interview topics and interview questions.

Interview Topics	Interview Questions
Assessing target group	Do you have a driver's license?
Use of smart mobile devices	Do you use a smart phone?
LBS car rental idea proposal	What is your opinion about a mobile phone application based car rental platform?
Usage history	Have you used similar system previously?
Required features	What are the most important elements to include in LBS car rentals?

Appendix 2.The results of the customer interviews

Table 2. Findings of the customer interview

Customer	LBS concept for car rental acceptance (0-10)	Potential future customer (0-10)	Important aspects of LBS in car rental
C1-I-O	9	10	- Data Security - Ease of system - Price
C2-I-P	10	8	- Quality of fleet - Reliability/Safety
C3-I-O	10	9	- Location of the rental cars - Cleanliness
C4-I-O	10	10	- Payment method - Data Security - Availability -Reliability/Safety of vehicles - Real-time Interactive system
C5-I-O	10	10	- Price - Availability - Payment Method - Fleet damage
C6-N-P	4	3	- Choice
C7-N-P	10	10	- Ease of system - Price - Quality of fleet
C8-N-P	10	10	- Payment method - Ecofriendly - Availability - Real-time Interactive system
C9-I-P	8	6	- Price
C10-I-O	7	7	- Ease of system
C11-N-P	10	6	- Ease of system - Price

Appendix 3.The current company fleet offering

Table 3. Description of current fleet offering

Vehicle Category	Description	Rental Frequency
A, B	Smallest cars cheap low CO2 emission 2-4 passengers	High
C	Compact Slightly expensive than A/B class vehicles 5 passengers	Moderate
I	Intermediate slightly bigger in size than C class vehicles 5 passengers automatic/manual transmission options Gasoline/diesel options	Moderate
S	Standard Spacious vehicle 5 passengers Automatic/manual transmission options Gasoline/diesel options	Moderate
F	Full-size Spacious vehicle 5 passengers Automatic/manual transmission options Gasoline/diesel options	Low
P	Premium vehicles All of the above mentioned options Four wheel drive vehicles	Low
L	Luxury vehicles All of the above mentioned options mostly expensive and luxurious brands	Low

Appendix 4.Relationship between interview finding and literature review.

Table 4. Relationship between CSA findings and literature review

Comparison of interview findings and literature review		
CSA Finding	Quote from interview	Supporting Literature Review
A. Price	*"It really depends on how much the new service costs. If the price is attractive, of course I will use it." (C5-I-O).*	The biggest challenge in any service industry is setting the right price. If the price is too low, the industry cannot generate profits and cover running costs. On the contrary, if the price is too high potential customers will not convert into paying customers (Lipovetsky, et al., 2011, p. 167).
B. Ease of system	*"The system should be as easy and convenient as possible, few clicks and a straight forward system." (C1-I-O).*	Dabholkar (1996) argues that ease of use of a system is described as the effort required to use a technology and the complexity of the service itself (Dabholkar, 1996, p. 34).
C. Availability	*"I should be able to get the service I need from the system in different circumstances. The doors should open and the car should start." (C4-I-O).*	This point directly relates to the idea described by Stickdorn & Jakob (2011) in sequential service design. It is argue that if a service is too fast or too slow, customers will lose interest in the service. (Stickdorn & Jakob, 2011, p. 39).
D. Data security	*"It should be like protected somehow and the data should not be spreading around. If I rent a car from you and then get many advertisements from car fixing garages then it is not fun. These are the normal problems that come up." (C1-I-O).*	Dhar & Varshney (2011) pointed out that the increased use of LBS provides network operators with a large amount of customer data. It is also stressed that the margin between sending a personalized advertisement to a customer and crossing the line of privacy intrusion is dangerously close (Dhar & Varshney, 2011, p. 128).

E. Interactive system	*"The customer shouldn't be left in the dark. The system should response, and I should get the necessary information I need. If the system communication doesn't work, there should be a phone number that I can call and get information." (C4-I-O).*	The notion of an interactive system which is user oriented is discussed in the service design section by Polaine et. Al (2013). It is argued that a service design should be user-centered which is able to interact between the service provider and the customer (Polaine, et al., 2013, p. 18).