Application of a Video Mediated Communication Based Remote Car Rental Kiosk Solution to Other Three Services

Abstract

A kiosk is a separate electronic computer terminal that allows the users to access information service. Traditional kiosks such as Automated Teller Machines (ATM) use software application with graphical user interfaces similar to normal computer system to allow users to accomplish their transaction tasks. However, this interaction mode has been proven to be difficult to use and not user-friendly for almost half of self-service users. A new type of interactive service kiosk which uses remote Video Mediated Communication (VMC) technology is to provide face-to-face talking with a customer servant to achieve the goal.

Interactive VMC-based service kiosk is a tool that can be utilized in information technology field, bringing its customer convenience and close care to the virtual network. Differ from previous automated kiosk technologies which were concentrated on Human-Computer Interaction (HCI), VMC-based kiosk puts emphasis on human-to-human interface technology. It's not only providing easier user situation for personal services but also bringing benefits for service providers due to the customized service VMC-based service kiosks offered. VMC-based kiosk service utilizes cost-saving goals accomplished meanwhile gives stimulations to achieve a new scale of perspectives and possibilities in the right direction for the company.

The target for the thesis is to exploit remote car rental service using VMC-based kiosk solution and analyze its attributions relate to another three service areas, banking, travelling and reception, in order to find out in what kinds of intended future services VMC technology can be beneficial. For the purpose, this case study uses qualitative approach with scenario-based prototyping and user testing. The test results were gathered in a real use environment where nine people used the prototype and were interviewed in situ. The use situations and interviews were video recorded and transcribed for qualitative content analysis.

Based on testing participants' experience and feedbacks, the three testing cases indicated that interactive kiosk services using VMC technology in general was considered positive and well accepted. This study also clearly showed that remote VMC-based kiosk service can be successfully transferred to different service areas where similar types of negotiation-based service processes are common. By VMC-based kiosks services, customers can be offered face-to-face talk as a natural communication mode which is an overwhelmed advantage over the traditional kiosk system. Participants in study testing also felt easy and convenient in VMC-based kiosk service use by these features. Meanwhile, more concerns of how to better use of VMC-based kiosk service in other perspectives are still required in the future.

Foreword

Working on my master thesis has been a great challenge for me, from which I also learned a lot. I would like to thank all the people working on the whole session and the support for me. I was pleased due to their helpfulness and interests towards my thesis work. Furthermore, I would like to express gratitude to my teachers and friends at the Department of Information Processing Science for their kindness in sharing knowledge. Finally I would give thanks to my family especially my parents for their prayers and always providing me with much needed inspiration, encouragement and gave me strength when I felt vulnerable.

Xiongfeng Dai

Oulu, June 26, 2013

Contents

1.   Introduction

The ways of access to information services has dramatically overturned for decades. Information Technology (IT) nowadays is considered to be a useful tool which is full of various activities and its use has been more than exception (Patricio, Fisk & Cunha, 2008). Meanwhile the requirements from customers have become complex and intensive, this resulted in pressure to firms to offer more advanced services. IT as an excellent solution bringing in cost-saving benefits for both parties, service provider needn't to hire too much staff as before while the customers enjoy the time-saving and easy-using services. (Forsberg & Asp, 2012.)

Video Mediated Communication (VMC) based service kiosk is a tool that can be utilized in IT field, bringing its customers convenience and close care to the virtual network (Finn, Sellen & Wilbur, 1997). Differ from previous automated kiosk technologies have focused on HCI, VMC-based kiosk service concentrates on human-to-human interface technology which offers personalized services with many perspective benefits to customers (Paradi & Ghazarian-Rock, 1997; Syrjänen, Sihvola, Kuutti & Vilmunen, 2012). VMC-based kiosk service utilizes cost-saving goals accomplished at the same time gives stimulations to achieve a new scale of perspectives and possibilities in the right direction for the company (Dornbusch, 1996; Finn, Sellen & Wilbur, 1997).

From the cost-cutting measures perspective, the service delivers in innovative way will ensure efficiency and effectiveness to be achieved in the same levels. The innovative interactive technologies of VMC-based kiosk service have been successfully implemented with AVIS car rent company on this basis. (Syrjänen, Sihvola, Kuutti & Vilmunen, 2012.) The innovative technologies not only help to meet the cost-cutting measures but bring more opportunities to business with new heights as well. By adopting VMC-based kiosk service in AVIS car rent company, it makes possibilities for car rental users who are not able to the car rental premises or agencies in person but in an urgent and quick need for car rental services when the users arrived at railway station or airport for examples.

Interactive kiosks such as VMC-based kiosk enable the adoption of services according to the customer being served. It is the aspect which may lead to enhanced development and growth of similar technologies while the social aspect is also a key determinant of the adoption of a new technology. Based on prior VMC kiosk service studies used as a model for service kiosk scenarios, (Grayson & Coventry, 1998; Vilmunen et al., 2010), considered in this work VMC-based kiosk also could provide a large seletion of personalized services, such as banking (Paradi & Ghazarian-Rock, 1997), reception (Lui & Piccoli, 2010) and public information service (Nicholas, Huntington & Williams, 2001).

In human-computer interaction (HCI) field, how to increase and promote usability is an important goal in interactive systems. Usability is a concept that correlates to the level of ease with which people can employ a particular device in order to achieve a particular goal (Lopez M., 2008). But in previous research, traditional usability principles have not covered the usage of VMC technology in service kiosks. (Paradi & Ghazarian-Rock, 1997; Maguire, 1999; Syrjänen, Sihvola, Kuutti & Vilmunen, 2012.)

After the first attempts with VMC technology since 1990s (O'Conaill, Whittaker & Wilbur, 1993), use of VMC technology in the context of kiosk service has remained as untapped. Nowadays, the prevailing media in kiosk services are related to human-computer interaction, compared to the use problems in previous kiosk services, newly-introduced VMC-based kiosk service provides an alternative for people to have face-to-face service experience to overcome the formal use problems. Facilitating new situations of VMC-based kiosk service in different areas is an orientation for this study.

1.1 Research goals, questions and methods

The purpose of this thesis is to carry out a feasibility study on whether the VMC kiosk solution could be successfully implemented to other service sectors. The results will be utilized to improve the technology and how it is to be delivered in future. This thesis exploits remote car rental service by using VMC-based kiosk solution and analyzes its attributions in relation to other three service areas in banking, travelling and reception, in order to find out in what kinds of intended future services of VMC technology can be beneficial. This work is based on the results achieved by a study project in Information Processing Science, at University of Oulu, Finland. The project was realized together with Bothnia Invent Company and AVIS car rental service that offers remote service by a kiosk network. The model of AVIS's kiosk service was chosen as a starting point for service scenarios and analyzed the VMC context for potential new service areas. Thus the result can be useful as visualizing how the technology can fit into normal commercial activities.

The goals of the research testing:

- Enhance product development and marketing of the service kiosk
- Create various user scenarios and model these according to the potential future implementation.
- Find potential application of the technology in various service sectors like banking, public services and so forth
- Generate new business ideas if possible
- Collect scientific articles for the use of the company.

The goal of this case study (Yin, 1989) was to test and get more in depth information about the three cases and produce descriptive information by following research questions:

What kind of service solution a VMC-based kiosk is?

What are the service features where VMC-based kiosk would be beneficial?

In broad terms, defining the research questions is important for case study at the beginning. Specified research questions could help to shape the research scale and collect research data accurately. (Järvinen, 1999; Eisenhardt, 1989.)

The cases for this case study is three new type of VMC-based services kiosk scenarios developed for different areas, such as banking, reception and traveling (see Carroll, 2000). As Carroll (2000) describes, scenarios are users' early activities and development in the continuingly process which researchers are to envision. Scenarios are also supportive for considering the situations of use even in the early phrase of situation creation.

The empirical study was made by using the remote service model of AVIS car rental kiosk. It offers novel remote services by VMC-based service kiosk. Kiosk use starts by pushing an activation button that opens a VMC connection. This VMC kiosk is consisted of a video display, web and document cameras, fine adjustment speakers and microphones, a remote controlled credit card reader, a laser printer and car key boxes (Syrjänen et al., 2013b).

The research practice applied in this thesis is a qualitative case study. The methods selected for the field study were interviews, observation and questionnaire. The questionnaires used in the interviews are presented in Appendix 2 and Appendix 3. The material gathered in this research was the recordings of observing the nine participants using the VMC-based kiosk service and the post-interviews done after the observation.

A questionnaire is a format which included many predetermined or open questions to be answered by respondents with the purpose of understanding the phenomenon. Questionnaire is mostly used date gathering technique in the survey way which required participants to evaluate and make judgments about the artifacts and their effect on specific activities. (Järvinen, 1999; Hufnagel & Conca, 1994.) Through a questionnaire, we could understand the intended use of the VMC-based kiosk service and its functionality features. Each questionnaire was presented in two language versions of English and Finnish, as these are two most commonly used languages in Finland.

Interview is one of the most popular methods for data gathering qualitative information. An interview is a type of material gathering method where the researcher seeks to describe the meanings of central themes in the life world of the subjects which covers both a factual level and a meaning level. (Kvale & Steinar, 1996.) Interview happens between interviewer and respondent in a conversation. It aims to elicit some purposed information and understand potential possibilities, restrictions in create and improve the future use of the artifacts. An interview is a good method to get the story behind participants' experience, because it is the best way to get information of the participants' background, prior expectations, and motivations. (Järvinen, 1999.)

In this study's interview process, structured interview was adopted and all the questions are carefully planned and formulated. Interviewers were neutral to communicate with all the testing participants in similar logic way.

Observation is a common activity we do every day to perceive the real world. It can be referred as a part of measurement procedure in qualitative research. From reliable and objective observations, valid inferences could be drawn from participants' characteristics, feelings and intentions. This is particular helpful to explore people's initial thoughts and behaviors. (Järvinen, 1999.) Video recording as a necessary tool to summarize what happened in particular remembered instances, Suchman and Trigg (1991) found it valuable to analyze participants' response and interactions towards different situation or technologies with machine records which helps to understand the interrelations of the human-machine interaction with talk and activity deeply. (Järvinen, 1999; Suchman & Trigg, 1991.) These materials are combined as a comprehensive basis for the content analysis.

1.2 Structure of the thesis

This section provides an overview of the entire contents of the thesis which starts with this chapter. The structure of the thesis is diagrammatically represented in Figure 1 below.

The subsequent chapters are structured as follows. In the second chapter, video mediated communication services and their features are presented. The third chapter is about interactive car rental services and its benefits. The fourth chapter presents the three test cases procedure in detail. The fifth chapter describes the analysis results of the three scenarios, the evaluation of the research and further research subjects and finally chapter six draws the conclusions.

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- Ideas for future research
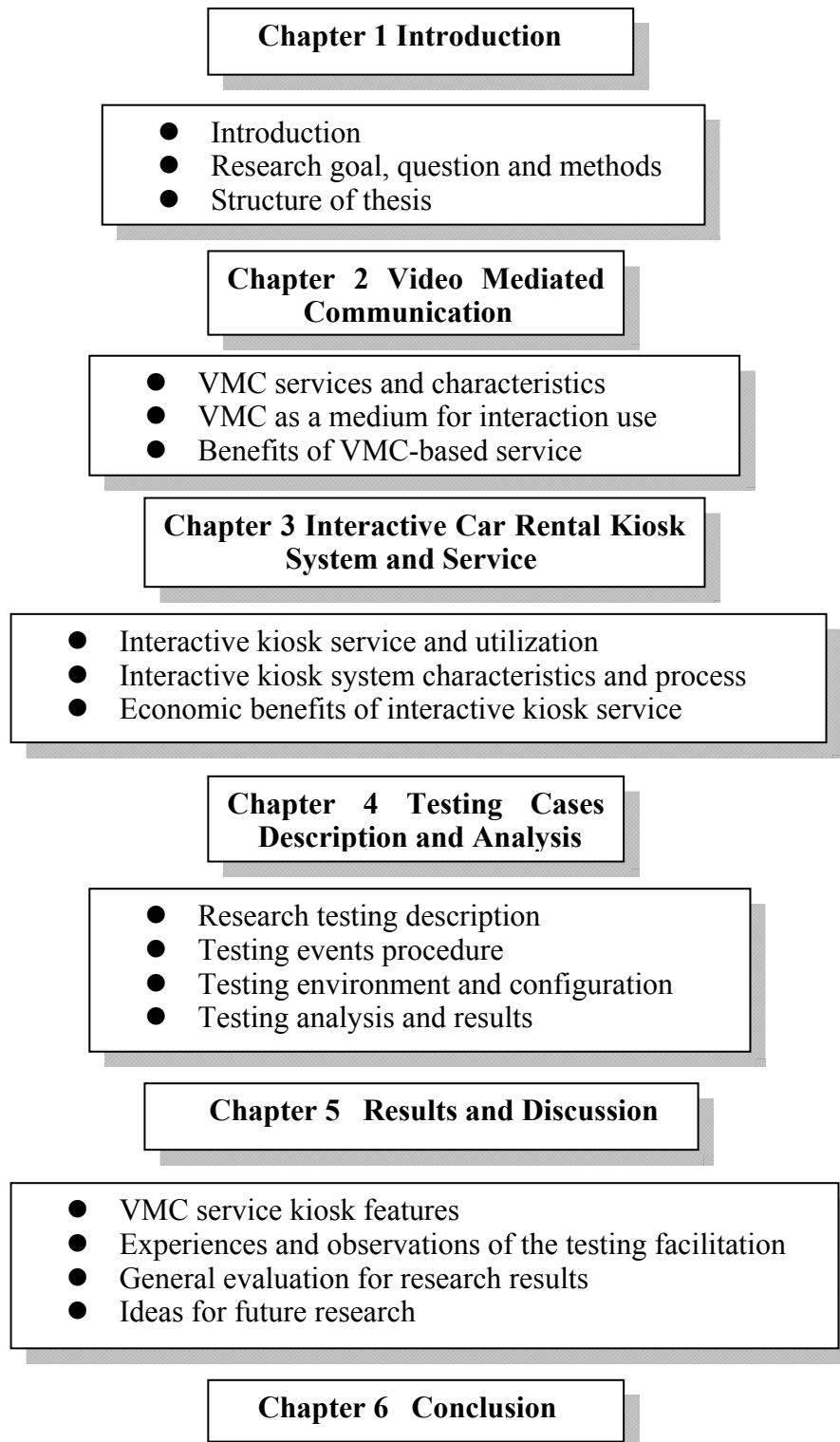
Chapter 6 Conclusion

Figure. 1. Outline of Thesis.

2.   Video-Mediated Communication

In this chapter, video mediated communication services and their features are presented.

2.1 VMC services and characteristics

Video mediated communication technology has been deemed as a valuable tool for some applications, such as remote collaboration, conferencing, and distance learning (Finn et al., 1997). Several studies have determined that availability of a visual channel benefits the process, outcome, or user experience of communication (Olson & Meader, 1995). Olson and Meader (1995) found that visual display and physical presence both make critical contributions to the quality of communication when it measured by task orientation, depersonalization, or communicative style. Still another research yields more finely grained results, in which specific variable definitions between VMC and face-to-face (F2F) interactions, between different VMC conditions, or between VMC and some other communication modality.

In the previous research conducted by Paradi and Ghazarian-Rock (1997), self-service users' problems have motivated to find better solutions for intermediate service kiosk. Typical self-services are web services and public kiosk service based on human-computer interaction without any visual or speech function, the new type of kiosk solution uses video mediated communication technologies to allow face-to-face talk through mutual way video conference with a service provider located in a call center at a service firm. Though the VMC technology in kiosk services is not totally new, but VMC-based solutions are still rare. As early VMC solutions were not able to provide adequate support for people's real-time interaction (Finn, Sellen & Wilbur, 1997), VMC has remained as an untapped potential to offer personalized and extra kiosk services.

Recent trends toward telecommuting, mobile work, and wider distribution of the work force, combined with reduced technology costs, video communications has been used more wildly as a supportive and useful tool for remote interactions. In video mediated communication technology context, face-to-face interactions play a vital role both in work communication and collaboration. (Fish et al., 1992; O'Conaill et al.,1993; Whittaker, 1991; Syrjänen et al., 2013a)

According to Syrjänen et al., (2013c) in a face-to-face situation people do not only observe, interpret and transmit communicative expressions to each other but coordinate the interpersonal communication situation and share interaction content for some certain purpose as well. The F2F interaction which was based on human-computer interaction (HCI) combined with audio or speech, visual, audiovisual, and nonverbal signals has been used as a modality for self-services (Syrjänen et al., 2012). The new interaction form which puts human-driven facilitated F2F service into use is a VMC-based interactive kiosk service.

2.2 VMC as a medium for interaction use

In 1990s, several studies in Computer-Supported Co-operative Work (CSCW) emphasized on both VMC and remote helping are in the basic use situations for

technology-mediated cooperation. A video connection between the end users is the best way to enhance service kiosks. VMC has motivated studies both with multimedia and multimodal systems, people's use of senses and expected interaction rituals. (Syrjänen et al., 2013b.) Whittaker and O'Conaill (1997) pointed out it's important to understand the affective information in non-verbal cues for personal interest, sincerity, trustworthiness, turn-taking and dis-missals, which people use together with gestures and signaling that may also imply emotions, focusing, understanding, agreement, or rejection of interaction (Syrjänen et al., 2013b).

In a typical public video-mediated remote communication service environment (Figure 2), from which two screens display video images by both the local and remote webcam, the interaction also includes speech communication in telephone context.
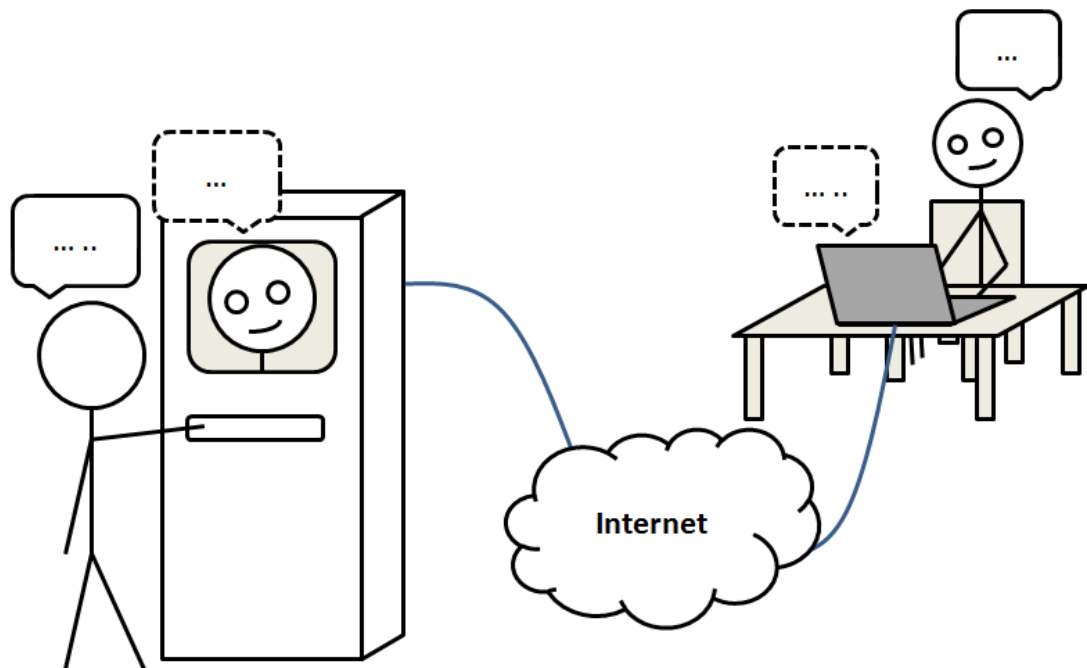

Figure. 2. A facilitated service situation at a public VMC-supported service kiosk (Syrjänen et al., 2013b)

As Syrjänen et al.(2013b) describes, in VMC-supported service kiosk situation, customers get rid of putting the inputs as needed and reading signal information from a computer screen. VMC offers a mutual way of audiovisual communication which enables the customer to interact with remote servant by using natural language face to face. Different from the typical human-computer kiosk such as ATM, this kind of use situation can be convenient and efficient for the user.

Facilitation of different kinds of VMC solutions have been implemented for general video conferencing, e-learning, telemedicine or chatting (Finn, Sellen & Wilbur, 1997; Dong & Fu, 2012; Ames, Go, Kaye & Spasojevic, 2010) however VMC has not been widely utilized in real-time remote F2F use facilitation productions nowadays.

2.3 Benefits of VMC-based service

The importance of understanding how users interact with information systems (IS) in the context of ergonomics, tasks and the organization within which they are located is well recognized. The VMC-based service improves the usability of the device because the

users understand the tasks they are doing better when the remote servant can help them in real-time for better quality of service. Services in the remote areas and small municipalities are under constant reductions but the VMC-based service can help customers maintaining the access for them via video connection. Instead of large business premises and staff the virtual desk can manage the tasks in relatively small physical area. (Diez & McIntosh, 2009.)

Martinez-Carreras et al. (2007) list the interactive parts of collaborative work environment as Sharing information and documents, Meeting systems such as video and audio conference, instant messaging and flow of information. The VMC-based service combines most of these features as one system. Video/audio connection provides a possibility to communicate and share thoughts real-time and face-to-face. The servant has been able to manage of the situation and mostly gathers all the information from the customer. The additional devices such as document printer provide the share of information in written form to both parties.

Service innovations tend to have shorter life cycles than product innovations and adoption time might affect the position of the firm in the emerging technology. Because of tight schedules it is important for firms to concentrate on their core competencies and use their resources wisely. In the case that service is not the core competency, outsourcing services to external providers can enhance the business and ensures the best services available is in use. (Narasimhalu, 2008.) In the case of the VMC-based service, it means that the service center can be off shored or out sourced to another firm that is concentrated on customer service. This means there is a chance for greater volume of skilled work force and cost reductions.

Workman and Bommel (2004) described a call center as a working environment and from the service workers point of view. Their research took place in a technical support call center which resolved complex computer problems over the telephone. The call center as a working environment requires simultaneously skills for customer service and for giving information about the subject the service is about. It also demands good problem solving skills from the employee. Because of the fact that the VMC-based service is site-specific and the service session has to fill the needs of the customer at once, instead of e.g. technical support for computer systems the desk is more suitable for relatively more quicker tasks like selling or renting. From the employees point of view this means less stress because the work does not accumulate like in the article which has a positive effect on customer service.

The research made by Connel et al. (2004) about the ticket selling machines of the London subway revealed that there were numerous situations that could cause problems for the user. There were two types of machines, one with a big touch screen and one with a small screen and separate buttons. Common situations were that customers could not pick the right route or some other information was missing. With the VMC-based service the customer is able to ask for the information they need any time during the session and they can get help for example in planning the routes. In this way, VMC-based service decreases the need for additional service staff on the station because the VMC-based service can act as a ticket machine and an information desk. Subway and train ticket selling are very simple procedures that could be handled most time with the types of ticket machines the research mentions. The VMC-based service is suitable for these kinds of more complex procedures because it can confirm the identity of the buyer.

Kibbee et al. (2002) were researching a virtual web-based library service system that provided real-time help for customers. The system had two options for the implementation: video conference or text chat. The chat was chosen because of the web platform. Web-based chat system can only handle relatively small customer problems.

The reasons are that the identification is not secure enough and the small amount of data processing. Unlike the VMC-based service which has a document printer, the chat can't deliver documents to the customers. In most cases the chat system needs registration or membership of the organization. With the identification document camera the identification is more secure and it allows the use of private information. In addition to the information service that the chat can provide, the VMC-based service can do tasks that a librarian does such as handling applications and membership renewals. This also indicated that the use of chat did take more time approximately per service than in person or by phone. In the case of VMC-based service, this has been noted by the video and audio connection which gives the advantages of face-to-face communication. The system also mentioned a problem that sometimes the user didn't know if the connection was still online which caused insecurity. The face-to-face connection provides real-time audio and video so the customer always knows that there is a person on the other end of the connection.

3.   Interactive Car Rental Kiosk Service

In this chapter, kiosk services are described defined with previous research. The interactive car rental services and its benefits are presented.

3.1 Interactive kiosk service and utilization

Increase in market dynamics causes competition, varying customer demands, move towards a service-orientation and so forth which all require organizations to be flexible and responsive. The current volatility has led to heightened organizational pressures for organizations to produce more with less. (Rockart et al., 2012.) The key factor in producing more with less is the reduction of human labor which has been made possible with advancements in technology where majority of the work is computer-mediated (Castells, 1999).

According to Dornbusch (1996), cost-cutting measures require innovative ways of service delivery that will ensure the same levels of efficiency and effectiveness are attained. This is where innovative interactive technologies like the Face2Face Kiosk which has been successfully implemented by AVIS the car rental company come into play. By filling in a gap whilst helping to meet the cost-cutting measures, technology can push businesses to new heights and lead to more opportunities. In the case of AVIS, the Face2Face Kiosk helped them to reach people who had no time to go the car rental premises and travelers who have just arrived to the airport and are in need of quick car rental services for example.

Interactive kiosks such as the face-to-face kiosk enable the adoption of services according to the customer being served. It is this aspect which may lead to enhanced development and growth of similar technologies as the social aspect is also a key determinant of the adoption of a new technology. Whereas prior technologies have focused on computer-human interaction, the virtual service desk provides a human-human interface mediated by technology that provides a more personalized service. (Vilmunen, Syrjänen & Sihvola, 2010.) Modern technology is revolutionizing the way services are being delivered and today, technology is present in almost every aspect service provision (Patrício, Fisk & Cunha, 2008). As interactive kiosks demand that users be standing near them in order to be used, many people when working with them especially if it is to be in public require functionality that is straightforward and is not exhaustive. In surroundings where there is a lot of human traffic, people easily get stressed and if the system is not easy to use then this may be counterproductive.

Furthermore, the help functions should be as discreet as possible. It is very important to make sure that the end-user acquiring a service, buying something and so forth depending on context of use with interactive kiosk service should be user-friendly and easy to use. In the case of its use or trial in a new area, it is also vital when customers only realized the kiosk service is easier for the service providers. (Forsberg & Asp, 2012.)

Preece et al. (2002) state that "from an HCI perspective, interaction design involves establishing user needs and requirements, redesigning the system, building interactive prototypes, and evaluating them in an iterative process until the final solution is reached" (as cited in Patricio et al., 2008). Designers should focus their effort in shaping the user's

interaction from users' perspective and not from the point of view of the architecture needed. Hence, the features of interaction can be expressed in form a dialogue and not in terms of data structure (Bolchini & Paolini, 2006).

Forsberg and Asp (2012) suggest the use of a pattern language – which is a solution for ordinary problem solving and the formulated solution can be used for many times without working it out in the same way; as a framework to be used in the design of public interactive kiosks. When factoring in user experience into complex interactive systems – such as the Face2Face technology that has been designed by multidisciplinary teams, understanding the experience is complex. Experience usually takes a multipronged approach that takes into consideration the user, the product and/or service under consideration and the user experience through the interaction between the user and the product. (Forlizzi & Battarbee, 2004.) It is not possible to purely rely on the physical form of interfaces and spaces in order to create smooth use of kiosk-based information and networking systems (Hope et al. 2006).

Camilli et al. (2011) noted that technological advancement in bandwidth and computing have led towards a growth of technological improvements in services and despite the popularity of Web, mobile Internet and other communication channels the presence of interactive kiosks – ATMs, ticket vending machines, self-check-in and checkout systems etc. is growing in our daily life experiences. He further classified interactive kiosks into two: Information kiosks and Transactional kiosks. Information kiosks allow users to explore a great deal of information (e.g. multimedia guides for tourism) provided by multichannel applications – audio, video, interactive, that are "aimed at increasing the level of engagement of the users' information seeking behavior". Transactional kiosks on the other hand, "are used for buying a specific product (e.g., railway ticket) or for particular information (e.g., next train departure)".

Therefore, it is important to understand the target group of users and how the users are differentiated and also engage with the systems in order to provide all kinds of users with a valuable and engaging experience (Hornecker & Matthias, 2006). Shedroff (1999) argued that that "the most engaging interactive experiences allow for productivity, creativity and/or communication, as these (a) are basic human motivations, and (b) inherently entail interaction by requiring open-ended activity of users" (as cited in Hornecker & Matthias, 2006).

In experiences with intelligent kiosks, Christian and Avery (2000) state that "The quality of the content on the kiosk strongly influences the client's evaluation of the quality of the technology". Hence, a kiosk must be adapted to its visual environment and it must also be informative or else the user will depart. Informative in the case of the Face2Face technology will depend on the service provider on the other end and whether they will have all the required information. It would also be a good idea depending on the context of use to consider utilizing the technology as a self-service information system where the needed contextual information is integrated into the system, only contacting the service provider for online assistance in more complex cases. This could be applicable in public services for example, where the kiosk is located in a central and secure location where users could privately interact with the system to find out information about the city they are. For new guests to the city then the option for contacting the service provider via voice call could be the better alternative as they are not familiar with the environment.

3.2 Interactive car rental system characteristics and process

AVIS offers car rental service based on the remote service concept. The AVIS interactive car rental kiosk in this case is a new type of service kiosk, which can be used to remotely

service customers without being need a customer servant to be actually present at the location from geographic constraint which is similarly to video banking kiosks as described by Paradi and Ghazarian-Rock (1997). In this interactive car rental kiosk, a customer servant can manage the service to several different locations simultaneously. This feature brings cost efficient to service providers especially when there are several remote and small locations where a customer servant is more rarely needed meanwhile it might not be viable to station one there permanently. This interactive car rental kiosk allows a customer to talk to a customer servant via a video display in order to let both see each other directly and communicate as much as possible as if they were actually both located in the same place. This allows for a more flexible customer service process as the customer servant can adapt to the customer's needs, which is different from the previous fully automated kiosk systems. (Vilmunen, Syrjänen & Sihvola, 2010; Paradi & Ghazarian-Rock, 1997.)

AVIS offers novel remote services by VMC-based service kiosks for customers in different locations, such as airport, station, hospital etc. The prototype was required to allow communication between the customer and the customer servant remotely, allowing the customer servant to verify the customer's identity, allow them to get a copy of the signed rental agreement and allow the customer to receive keys to the car from kiosk's lockboxes inside after the rental process had been completed. This kiosk is equipped with a video display, web and document cameras, fine adjustment speakers and microphones, a remote controlled credit card reader, a laser printer and car key boxes. Kiosk use starts by pushing an activation button that opens a VMC connection (Syrjänen et al., 2012).

From its out profile, it is similar to the version seen in figure 3. It consists of several different components altogether. The AVIS kiosk has a camera so that the customer servant is able to see the customer's profile. It also has a video display, which shows the customer video image of the customer servant who is located somewhere remotely (number 1 in figure 3). Below the screen are the microphone for capturing the users' speech and the lockboxes for giving the customer the key (number 3 in figure 3). The lockbox is opened by servant's instruction once the rental process is finished. The AVIS kiosk also equipped a credit card reader for payment on the right side under the screen (number 2 in figure 3). Below the lockbox and the credit card reader there is a small table, which can hold pens and other necessary items (number 4 in figure 3). The table is a user-friendly tool that customers could sign the rental agreement easily. There is also a printer (number 4 in figure 3). It can be used to print the rental agreement and other necessary documents by servant's instructions in the rental process.

Figure. 3. The profile of the interactive car rental kiosk (picture by Jani Sihvola).

Within the usage matter, the rental process could be controlled by customers depending on the customers' needs. In the simplest use case, the user may be needless to communicate with the customer servant from the kiosk at all if the renting of the car has been prearranged in due time. As a result, the customer just need simply input their pin code and receive their keys from the lockboxes automatically. A simplified use case of a procedure of renting a car is presented Figure 4 below.
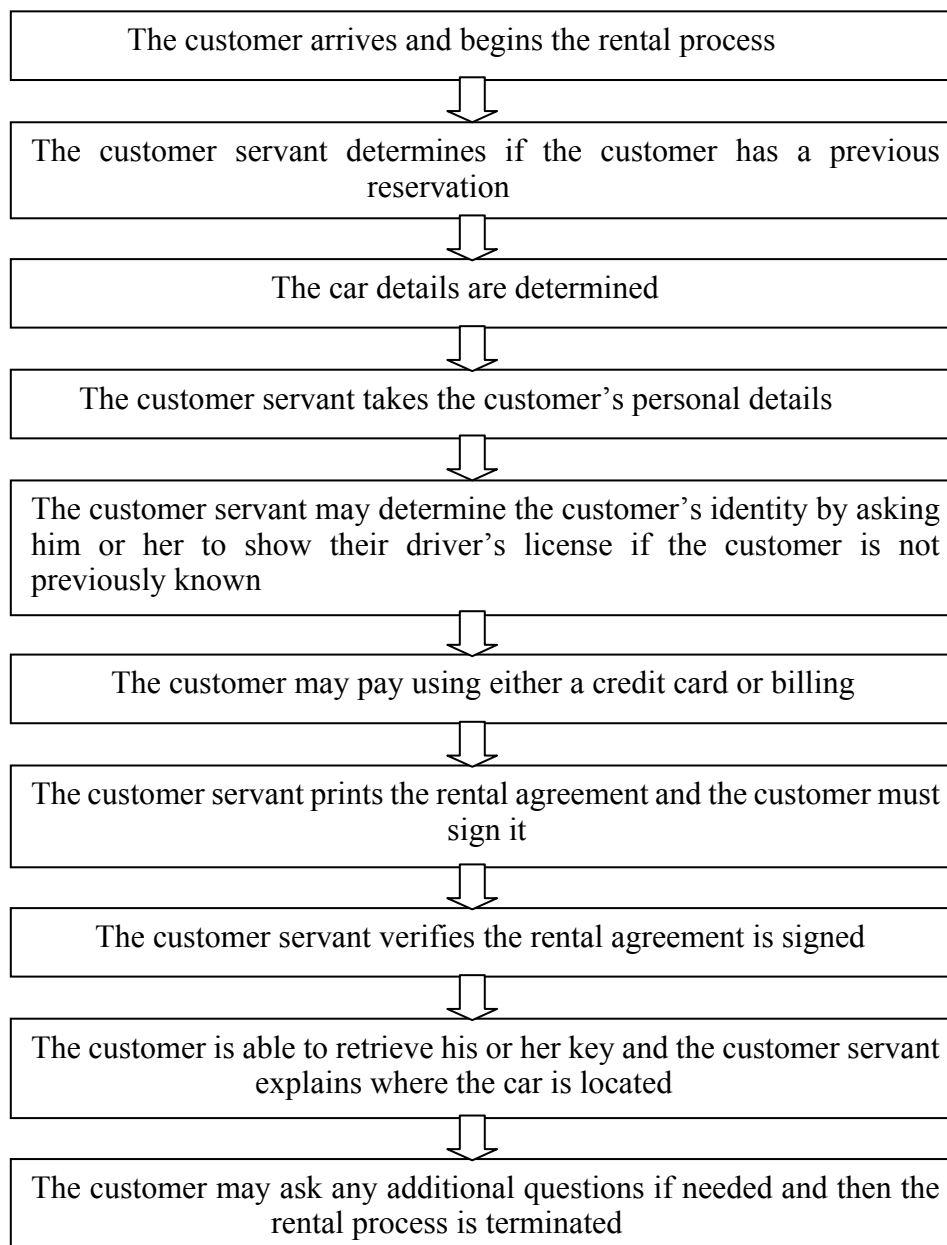
| The customer arrives and begins the rental process |

| The customer servant determines if the customer has a previous reservation |

| The car details are determined |

| The customer servant takes the customer's personal details |

| The customer servant may determine the customer's identity by asking him or her to show their driver's license if the customer is not previously known |

| The customer may pay using either a credit card or billing |

| The customer servant prints the rental agreement and the customer must sign it |

| The customer servant verifies the rental agreement is signed |

| The customer is able to retrieve his or her key and the customer servant explains where the car is located |

| The customer may ask any additional questions if needed and then the rental process is terminated |

Figure. 4. Car rental process in VMC kiosk (Syrjänen et al., 2012).

Practically, the AVIS customer service process above is not necessarily required to be done in the exact order when different needs from different customers. For instance, the customer servant may ask for showing the customer's driver license before the next step. Meanwhile, the customer servant may also at some reason ask about insurance situation etc. However, in regular way, it is need to done by certain steps in a specific order. Reasonably, the customer servant should ask the customer to sign the rental agreement before the customers receive the key from the lockboxes. After the car rental period has been done, the customers also use the same kiosk to return their keys to the lockboxes while contacting with customer servant.

3.3 Economic benefits of interactive kiosk service

"Kiosk" can be known as both free-standing pavilions for retailing business and self-service computing systems as well. Those double definitions give us the description of an automated self-contained system to be used in transaction and in other information service access. Kiosks are found in a growing number of areas, such as food service, health care service, remote education service etc. Those interactive kiosks exist in various forms for different duties even multiple duties in several areas. For instance, customers register the good catalog or gifts from an interactive mall directory kiosk; patients get their health care instruction or health record from hospital information kiosk; human resource departments deploy kiosks in employee job application. In addition, multi-channel vendors also adopt interactive kiosk to promote business from offline selling. (Cowper, 2011.)

In the last fifty years, the increasing franchises model has changed the traditional business area a lot. The franchises model has been proven to be beneficial to employees that every potential economics of scale could be able to transform on franchises bases. The utilization of shared information in franchises model is to emphasize a standard service experience and value proposition to the mobile service clients. E-commerce web sites are another successful online service system without any geographic constraints which tremendously improved the service transaction efficiency in economic profits. (Spohrer et al., 2007.) The ability of a service system to scale up depends on many factors, but most important is the nature of the resources that the service system is integrating to realize the competence being delivered as service (Vilmunen et al., 2011).

One of the most obvious benefits of kiosks is to reduce labor costs. Kiosk could offer standard service effectively for a great number people simultaneously in multiple kiosk terminals, which are all operated by a single owner, such as the self-service kiosk. Kiosk service is independent from geographic constraints, customers may share the personal information service from different locations all over the world with speed. What's more, kiosks not only decrease the labor costs but also provide more detailed information which would be easily ignored. For example, kiosk systems hold multiple functionalities in one place, such as phone numbers, addresses, timetable and so on. The information stored in systems can be managed to update in regular and easy way, users also access to it in an easy way. As kiosk service can be remotely controlled while multiple kiosks can be managed to update for services in a certain place, no matter what location is, domestic or abroad. (Avenell, 2011.)

Remotely controlled customer service kiosk systems integrate people, technology, and information resources in different proportions for different use in figure 5. Hence, different kiosk service systems have specific functional features, so that the revenue and profits were scaled in different conditions. The firms' revenue and profit scaling properties can be gained from software (information, intellectual property), product (technology), software as a service (SaaS), and the labor-based services in different skill levels are often taken into consideration. (Spohrer et al., 2007.)
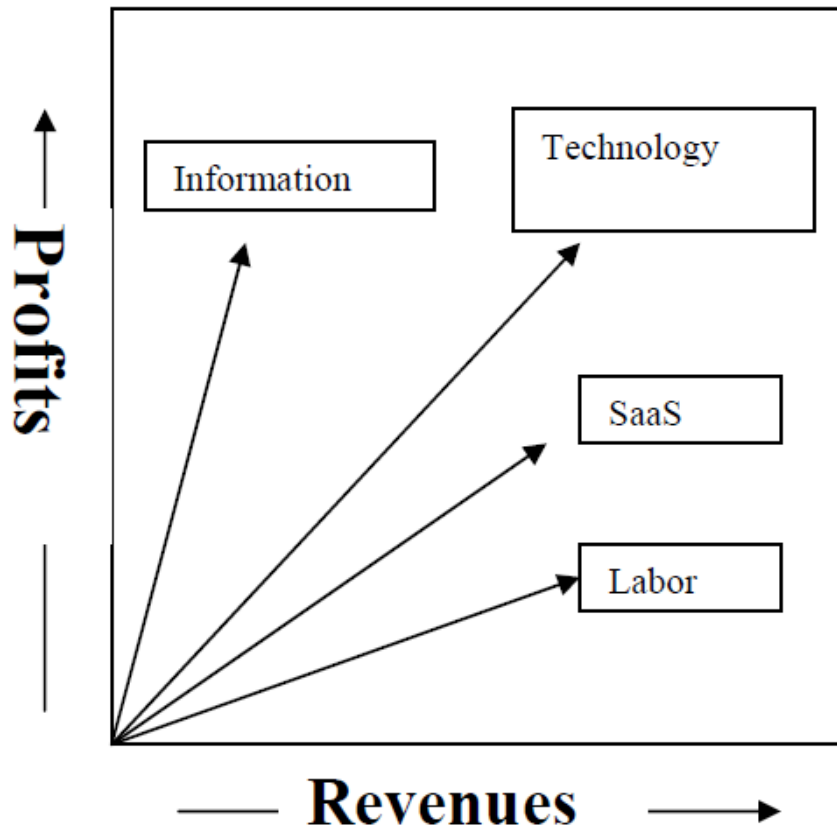
Figure. 5. Consumer-products business (Jokela T., 2004).

As Jokela (2004) described in the consumer products businesses, good usability could make cost benefits both for the manufacturers and the distributors, for example, training and support savings. Second, less requirements of customers' needs to give guidance or support service, more benefits the manufacturers and distributors may gain. Actually, these cost benefits mentioned are invisible and insignificant from customers' sites. From customers' point of view, they never consider these costs would be transferred to their consuming feasibility in reasonable way, while the influence of usability on consumer purchasing is less direct which is required to be well-conceptualized in future research.

As Dornbusch (1996) describes, the proposed interactive kiosk service operators only evaluates the revenue and the costs. If the kiosk's benefits overweight its cost indeed, it can be said that the kiosk is economical feasible. Yet, it is also necessary to examine these non-monetary benefits on social environment basis. Generally speaking, social benefits will be correlated to kiosk, such as economic development, pollution, congestion, which is not beneficial to improve the revenue feasibility of interactive kiosks as well. While the revenue and the monetary cost are greatly affected the private business owners, kiosks may provide wider economic and social benefits.

4. Testing Cases Description and Analysis

In this chapter, it presents the research subject and three cases in detail as well as describes the analysis results of the three scenarios.

4.1 Research testing description

Bothnia Invent Ltd is specialized in VMC technologies. Video mediated communication is essentially a human-to-human interface mediated by technology – adoption of service according to customer being dealt with. As customer service is a mainstay of business, the internationalization of video mediated communication is a certainty. The purpose of this thesis is to carry out a feasibility study on whether the technology could be successfully implemented to other service sectors. The results will be utilized to improve the technology and how it is to be delivered in future. This thesis is a part of an international project, coordinated by the University of Oulu in cooperation with Luleå University of Technology providing material for the use of Bothnia Invent Ltd.

The thesis was to test and provide scenarios for the intended future use of VMC technology and additional material based on the literature concerning the technology. The results of this project will be useful for companies as they do not have the knowledge to visualize how the technology can fit into normal commercial activities.

The goals of the research testing:

- Enhance product development and marketing of the VMC service kiosk
- Create various user scenarios and models according to the potential future implementation.
- Find potential application of the technology in various service sectors like banking, public services and so forth
- Generate new business ideas if possible
- Collect scientific articles for the use of the company.

In the beginning of the project we were brainstorming ideas for innovative ideas concerning the interactive kiosk. We listed all of them (Appendix 4) and finally we decided to choose three best ideas to work on. We also asked opinions from Vesa Sihvola, what are his opinions concerning the most potential scenarios (Carroll, 2000) designed to real life environment. Opinions were also received from the service provider side about the willingness to use this kind of technology. The three scenarios were banking, reception and public service which was later restricted in travel service.

As Carroll (2000) figured out, scenarios help us to understand human activities in information computer systems and applications as a media for interacting with people. Scenarios afford various views and evoke reflection from an interaction, which in return helps developers to coordinate and manage the consequences of the design action.

Scenario-based design techniques seek to control the complexity and fluidity of design, learn the structure and dynamics of problem domains, interact with concrete elements of situation in various ways (Carroll, 2000; Ackoff, 1979a,b; Checkland, 1981; Schön ,1983). In design procedure, it's important to describe how the people accomplish

tasks in order to envision and facilitate new ways to maintain a continuous focus on human activity from different perspectives and manage the effective design outcomes (Carroll, 1994,1995) .

The processing of design the scenarios is the most important part for the whole project. As shown in the Appendix 4, there were more than 10 ideas have been set up. Those ideas were come out after intense investigation and rigors evaluation. Literature review based on the results of researches and concentrate on the subjects that would most likely give us results. We got approximately 30 references for the reviews from which we think they were rather good result in numbers. The actual literature review contained several different subjects, themes and points-of-view. The results gathered in the review were hard to categorize because lots of them crossed each other in a way. After the scenarios ready, we evaluated the ideas in many ways such as interviews, literature, suggestions from professors and customers. We interviewed the people who are the expert in the specific filed. At the stage of design the scenarios, we really felt that the work is so important and efficient while we learnt together, discusses together, and analysis together. Those hard design works added more valuable experience in this study. We tried to figure out all the characteristics of each idea and compare with others. And after the project, our experience should be valuable for the other projects.

Meanwhile, we managed to interview some personnel only for the reception scenario. Bank industry became a problem as they considered their information to be too confidential and under high bureaucracy, anyhow by the help of our private relations, we managed to get a working scenario confirmed also for the banking scenario. Concerning the public services, we felt that the scenario could consist of so many kinds of things so we decided not to spend time on that but rather focused on creating a reasonable scenario by ourselves which came into being travelling scenario.

4.2 Testing events procedure

Recruiting testers was mostly done by using our own personal contacts in and outside the university. The goal was to get half Finnish and the other half English speaking testers. We thought the easiest way to recruit people was to contact our friends and other people studying or working in University of Oulu so people would more likely be able to attend. Our plan was to get at least 3 persons per each test scenario and at least one of them should be Finnish so we could provide the video for marketing purposes.

People were mainly contacted by phone and after they had agreed to join the project, they received an email with instructions and description of the scenario. In the beginning it was quite difficult to get enough people but eventually we managed to recruit enough participants. We also had couple of cancellations at the last minute so we had to try quickly to get replacements for them. Fortunately we got more people on short notice than had cancelled and we found few test participants from corridors outside the testing place. Eventually we had enough of test participants and even few more. Test participants were all students in University of Oulu and mostly all of them are studying Master of Science program in field of Information Systems. We had also few people who are studying something else. Every test participant is approximately from 25 to 40 years old. The testing proceeded on a good pace so we had time for all of the people.

The project group made two types of interview for the scenarios, pre-interview (Appendix 2) and post-interview (Appendix 3). Interviews of each scenario differed a bit because they were customized for each service. The pre-interview focused on finding out how often the tester used certain kinds of services and technology and how experienced the testers thought they were. It also contained a question asking their permission to use

the session in the research. The post interview questionnaire included questions which were solving what kinds of attitudes, images and experiences the tested received from the test session and what would be the ideal purpose of use for the service desk in their opinion.

Forms and print-outs were made for each scenario to make the test event appear more realistic. Logo banners were also inserted to the service desk for the same purpose. The banking scenario required three documents. One of the documents was the loan form which the bank employee printed for the customer at the end of a session. The form included personal information and detail about the loan. The two other documents were imaginary work contract and salary certificate which the customer scanned for the bank employee. The customer needed also some kind of identification card for the session. The travel service included also identification card and in addition a member card for the service and a credit card. There were also printouts such as receipt for showing the price and time for the flight, the flight tickets and receipt for booking a hotel room. The reception scenario was rather short and required only an identification card and a map which the service person printed for the customer to indicate the right place to go.

The service center was situated in Luleå University of Technology. For the preparation the servant received example processes, dialogs and brief instructions how she should act. Before each scenario the service person had one or two training sessions with the project group members. None of the scenarios required dressing up in uniform or some other bigger preparations in groups' opinion. The instructions were mainly about decency in service behavior and clothing. All in all the project group members were very happy about the remote servant's work which was natural even in cases she had to improvise and react to something that was not in the manuscript.

4.3 Testing environment and configuration

List of equipment used in the test sessions:

- A video mediated communication based Kiosk
- Video recording: 2 laptops, 2 digital cameras
- Voice recording: Voice recorder, cell phone
- Settings: Lighting for videotaping, movable walls to restrict the area.

Each session was started with a pre-interview which was recorded on either video or audio. After that the test person had a little time to prepare for the session. The tester could read through the examples for the last time and ask questions about the session if something was not clear. The tester received general instructions and all the requested equipment for the session. Before tester started the session the project group members set the cameras to record. The tester went through a scenario and after that he/she was interviewed which was also recorded. During the session the project group members were watching and discussing about the observations.

Our goal is to test the usability of the three scenarios in VMC-based kiosk. The main objective of the VMC-based kiosk is to serve as a virtual set between end users and customer servant. Unlike other previous kiosks on the market, the VMC-based kiosk is not an automated service kiosk, this system is fully interactive.

We aim to recruit 8 to 10 people for test sessions, including a maximum of 6 can be a non-Finnish test participants. Participants are free to choose one of three scenarios under which they go through testing. Testing is expected to last for 45 minutes, but may vary in different testers.

Two laptop computers were always used for recording each test session. In addition, two digital cameras were used in just some sessions to save the cameras' batteries. Digital cameras were utilized because, based on the previous experience, the laptops' video or sound quality didn't always meet the expectations. Nevertheless, laptops were used to guarantee the material because the digital cameras' battery life was too short for all the recordings.

Before testing a new scenario one member from our group prepped our customer servant. This material was very important because this material would be edited for advertising. At least one digital camera was used in each of these sessions so that during editing there would be different camera angles to choose from. Based on the previous experience additional lighting was also necessary in order to improve the video quality. Cameras were precisely placed so that all essential would be seen but a couple of placing mishaps came along.

We have chosen 9 people as our testing participants, there are 5 male and 4 female and aging from 25 to 40. They all considered their use skills of ICT to be good or excellent. They have been using online services and kiosk services in their daily life. Before the testing session began, all the participants were asked to be divided into three groups aiming to test different scenarios for his or her kiosk use: banking service, travelling service, reception service. The three interaction processes at the kiosk were not pre-scripted to the participants. One testing leader was working with the participants together with a group of students assisting with video recordings and interviewing. When testing participants arriving at the kiosk, a participant first asked to answer background questions (pre-questionnaire Appendix 2) for about 5 minutes. And then went for the unique interaction process by using the kiosk for about 10 minutes or more. After that all the involved participants were asked to fulfill post-questionnaires about 15-20 minutes (post-questionnaire Appendix 3).

After the test sessions we ran a quick test for sound and video quality and there was nothing worth noticing. A big difference in the materials could be seen during the editing. The video quality of the left hand side laptop was very weak but the sound was good whereas the video of the right hand side laptop was bright and clear but the background noise made the audio sound peculiar. The quality of the digital cameras was good as expected, but because of their size the aspect ratio might have been neglected and the placing went a little off. Would something be redone, with these resources we could have tried other laptops for better quality but the diverse recording was a successful approach. The video data were transcribed and analyzed by using qualitative content analysis.

4.4 Testing analysis and results

In the following sub-sections, banking, travelling, and reception scenarios with interaction processes and dialogues will be represented and analyzed.

4.4.1 Banking kiosk testing

Scenario 1: Small loan (consumer credit)

You have been thinking of selling your current apartment. A realtor has evaluated the price of the apartment and it did not fully meet your thoughts about the price. The realtor advised you to switch the old cabinets from the kitchen to get a higher price. You went to the local hardware store to ask how much it would cost to renovate the kitchen and their

offer was about 5000€. Currently you have only 2000€ in your savings so you decided to go to your bank and ask for a loan of 3000€.

Interaction process:

- Customer presses the button on the kiosk
- (Language selection)
- Servant greets and asks what the customer wants
- Identification
- Getting personal information if not a customer. Clarification of personal information if customer
- Getting working/student information and scanning required documents (employee contract, salary certificate, student register)
- Getting loan information (how much and repayment time..) and giving information to customer (interest rate and size of monthly payment)
- Printing the application and going through the application with the customer (customer signs the application)
- Scanning the signed application
- transferring the money and finishing the session.

Example dialogue:

Bank servant: Welcome to XBank, how may I help you?

Customer   : Hello! I would like to apply for a loan of 3000€ for renovating my kitchen.

Bank servant: Ok, are you our customer already? At first I would like to see your identification. Could you place your ID card picture side up on the desk beneath the camera? Can you see it?

Customer   : Yes… here you go. Yes I have an account in Xbank.

Bank servant: Thank you. You may take the card. You don't have any previous loans?

Customer   : No I don't.

Bank servant: Ok, now I have your personal information here. Is your address Kaitoväylä 2 and your phone number 040-5523341?

Customer   : Yes.

Bank servant: I would like to have some additional information about your current situation. Do you work or are you a student?

Customer   : I work at Rengas-Rauno Oy as a sales person.

Bank servant: Do you have the employee contract or the latest salary certificate with you so I see when you have started working there and what kind of salary you have.

Customer   : Yes, I brought them with me.

Bank servant: Ok, I can take a copy of each of them so I can attach them to your loan application. There's a lid on the desk open it and place a document there text side down.

Customer   : It's there.

Bank servant: Thank you. This may take a while…

Bank servant: Now it's ready. You can place the other document.

Bank servant: Ok, the scanning is complete. You can remove the document. I have the both documents and I can see you have been working there for 3 years and you have a monthly salary of 2300 which seems to be directed to your XBank account.

Customer   : Yes, that is correct.

Bank servant: Ok, I will add this information to your application. The amount of the loan would be 3000€.

Bank servant: This type of loan has a monthly payment and the time for the repayment is 5 years maximum. The interest rate is based on the 3 month Euribor which is 0,766% today and our margin is 6,50%. With 5 year repayment it's 64 euros per month.

Customer   : Five years is fine.

Bank servant: I will print the application for you so we can go through it. After that you may sign the application.

Customer   : It's signed now.

Bank servant: Once more open the lid from the desk and place the application text side down. I'll scan it and you can keep the copy.

Bank servant: Ok, the application is done. I will now make the transfer of 3000€ for your account.

Bank servant: Is there anything you'd like to ask or anything I could help you with?

Customer   : No thanks, I'm fine.

Bank servant: Then I'll wish you a good day!

Customer   : Thank you, bye!

Bank servant: Bye Bye!

In the banking test session we had two Finnish speaking testers and one English speaking tester. Two of our three testers evaluated their technology skills excellent and one satisfactory. The pre-interview also showed that all of the testers had experience on self service technology such as ATMs and internet. They also used services which the project group considered related or applicable for the service desk. Banking was the most used service within these three testers.

Insecurity towards the technology and technology anxiety in general was one of the issues that could be seen from some of the answers in the post-interview. One of the testers was suspicious towards the technology and wondered if there was a possibility to copy credit cards etc. In most cases banking services involve handling money in some form so it is considered highly private in the minds of people. This is why it's understandable the have concerned feedback. One of the testers didn't realize that the service person on the other end was real person at first. The other one realized that was a real servant at the end of the test session. He suggested that if the information of the servant can be somehow showed on some place of the screen. Such as Servant's Name, Company Name, Language specking etc. Even though all of the three testers compared the way of service to the traditional way or at least to direct contact with a person, it was mentioned that it's not the same. It was considered better than complete self-service because you can ask if something is unclear but they said it's easier to talk to real person ahead of you and when using the traditional way of service you have more time to think about the decisions.

One of the testers had a problem to find the lid of the scanner on the service desk when the service person asked to place the documents there. After the session the tester explained that he had tried the handle but it wouldn't open the lid and he just placed the document for the camera which took an image of his identification card. The service person was able to recover the process by scanning the documents again. In real life this type of incident wouldn't probably occur or it would have been noticed earlier because the information on the sheet was not considered important in our case and the tester could use any paper sheet they could find. Excluding this there were no other incidents that could have categorized as negative situations in the banking sessions. Another tester also suggested that the documents which were scanned should be displayed on the screen. This is the easy way to confirm the customer had filled the right data into the form and also convenient to the customers themselves to check if they wrote the right information.

In conclusion the banking service desk was considered very handy and easy to use even though of the incident with the scanner lid because there were no additional buttons and the service person was in good control of the session. The testers said they would use the kiosk if it would be in use in the banking services but two of the testers mentioned in addition that when thinking banking services in big picture they prefer going to the office. All of them preferred the kiosk in creating new account but in applying a loan 2 of 3 preferred offices. One said that for small loans the kiosk would suit fine but in case of a big loan the office option would be preferred. In paying bills they preferred Internet bank but one of them mentioned that in some cases the kiosk would be fine. The answers for handling investments varied between office and Internet. Some additional comments after the session were that the size of the screen could be even smaller and there could be information also on the screen. One of the testers was thinking that in the longest sessions it would be nice to have a chair to sit on.

4.4.2 Travelling kiosk testing

Scenario 2: Tickets and hotel rooms booking (travel information kiosk)

A businessman in Oulu wants to go to Helsinki to have a conference. He is willing to arrive in Helsinki on Monday evening and spend the night in Helsinki. The conference will be on Tuesday morning and he would like to go back to Oulu after the conference. The customer needs the best way to get to Helsinki and the hotel room should be near the conference center. Meanwhile, the customer would like to get back to Oulu before dark. Currently, the travel information kiosk could offer air tickets, bus tickets, train tickets and hotel rooms booking as well as travel information offering. The travel information kiosk will give the best solution to the customer.

Interaction process:

- Customer presses the button on the kiosk
- (Language selection)
- Servant greets and asks what service the customer wants (transportation tickets, hotel rooms, travel information)
- Making the book as customer wants
- Getting customer's personal information
- Customer paying for the tickets fee or reservation fee by using bankcards
- Printing the tickets or reservation numbers to the customer.

Example dialogue:

R: Good afternoon, how may I help you?
C: I am going to travel from Oulu to Helsinki on Monday 21st June for a conference and I would like to buy a travelling ticket.
R: Ok, and how would you like to travel there?
C: Could you suggest me the most convenient option according travelling time?
R: Absolutely. What time of the day would you like to travel there?
C: After 6 p.m.
R: That is fine and how about returning back to Oulu, would you like to book a return ticket as well?
C: Yes please, I will come back on Tuesday after my conference. The conference will be finished at 3p.m. and if possible, I would like to be back in Oulu before dark.

R: Ok, let me search for the tickets, this may take a few seconds. The fastest way to travel to Helsinki on Monday 21st is by plane, would you like to book a flight ticket?

C: Yes please.

R: And do you have any member cards for certain airlines which you would like to utilize?

C: Yes, I have a golden member card for Finnair.

R: So I will book a flight from Finnair. The departure from Oulu airport will be at 7.05 p.m. and return back to Oulu at 6p.m. Is this ok?

C: Yes, that sounds good.

R: Now, I would like to have your personal information for the tickets. Could you show me your ID card, please? Place on the scanner under the lid in front of you.

C: Ok, I think it should be ok now.

R: Thank you very much, now you may remove the card. Now I will print the exact travelling times and the price, the printout will appear on the table in front of you just in a moment. Please, read it through and check that all the information is correct.

C: The information seems to be correct.

R: Good. Now, how would you like to pay the tickets?

C: By credit card.

R: You may now insert the card into the card reader and follow the instructions written on the screen.

C: Ok.

R: Thank you very much. And do you need accommodation for the trip?

C: Yes, I would like to have a hotel room nearby the location of the conference. The address there is Korkeavuorenkatu 13.

R: That is fine. The closest hotel is Hotel XYW and one night in 1 person's room is costing 80 euros, is this option suitable for you?

C: Yes, that seems to be fine.

R: Very well, now I already have your personal information so I will be filling everything here and printing again the exact information for you.

C: All the information seems to be correct again.

R: Okay and if you wish to pay by credit card also the hotel room, you may now repeat the same procedure as earlier.

C: Ok, I think it is done now.

R: Thank you very much. Now I will print you the tickets and a receipt for the booking of the hotel room. I will also include route instructions on how to get from the hotel to the conference.

C: Ok, thank you very much.

R: Thank you very much, sir for using our services. Have a pleasant journey.

C: Thank you, bye bye.

R: Bye bye.

(R: Receptionist, C: Customer)

In the travelling test session there were four test participants, three English speakers and one Finnish speaker. Three of them evaluated their computing skills as excellent and one of them as good. Each test participants is using service self-service machines and remote services via Internet mostly weekly or monthly, some few services only few times in a year or less. Travelling services in each case are used only few times per year.

According the post-interview, each of the test participants considered service kiosk to be a convenient way to buy travelling tickets and one of them thought that combining travelling tickets and booking a hotel room is a good idea. Few of the test participants also mentioned that one is able to specify requirements very precisely but still able to discuss with the customer servant. About the service kiosk, each of the test participants thought that this type of service reminds their most of either a face-to-face service or a service where the customer servant is behind a glass. For this type of services, test participants would choose either a service kiosk or e-service. Sometimes it is enough simple to take care of these things by oneself, then e-service would be the best option. If one has a more complicated situation, the service kiosk would be a good option.

Service kiosk was considered to be most applicable in situations where the person is not familiar with the environment and they need for instance travelling tickets or an accommodation. The test participants mentioned also other types of services, such as banking services.

When asked whether the test participants would feel the difference between face-to-face and service kiosk as a customer, majority said no or not much and only one said that he would prefer human contact. When asked about some ideas for improving the service, we got a variety of them. To be able to choose the language would be a good idea, one participants mentioned that when you have booked your tickets/hotel room, it would be good to receive a confirmation message to a mobile phone, one test participant wished for visible instructions on how to show the documents for the customer servant and one test participant wished the prices to be visible on the screen, he thinks that there could be something else fitted on the screen as well besides the face of the customer servant.

There was a variety of answers on the question: which method would you preferably use for purchasing travelling services. Customer service point for face-to-face services was rarely preferred. Internet got probably the biggest share of all the answers but also service kiosk got answers in cases where participants considered need some assistance in their bookings.

Overall, the service kiosk was considered to be a convenient way of booking tickets and accommodation and the reason for this was that you do not need to necessarily go to a customer service point for face-to-face service but you are still able to get personal assistance from the customer servant. Service kiosk was considered to be a convenient service method especially in situations when you are not familiar with the environment. On the other hand, the person knows exactly what he/she wants and it is easy to just book tickets and accommodation via Internet while being at home. According few test participants, this type of service kiosk should offer enough additional features to Internet services to be compatible in real life.

4.4.3 Reception kiosk testing

Scenario 3: Reception service kiosk

You have a job interview in company Software House. The Software House is located in a building where there are also other companies and a number of entrances to these companies. To enter the House you will need a pass and receptionist can help you with that. You explain that you have a job interview and you are bit too earlier and you don't remember interviewer's name. Receptionist asks your name and identification. Receptionist calls the company and asks whether they expecting you for a job interview. The company said that the interviewer is still at lunch but they give permission to receptionist to let you in. The receptionist explains to you the way and asks whether you

want a printed map of the building. Receptionist unlocks the door and wishes you a good day.

Interaction process:

- Human arrive to building and press the button on the kiosk
- Receptionist greets and asks: "How I can help you?"
- Ask your name and wants to see something by which to verify identify (business card, driving license)
- Call to company and ask permission to let in
- Advice where company is and ask if needed a map
- Unlock the door.

Example dialogue:

C: Excuse me, Hello.
R: Hello, How can I help you?
C: My name is … and I have come for an interview at company Valta.
R: At what time is your interview?
C: I am actually a bit earlier than expected, was wondering whether it was possible to just go wait at the company.
R: Do you have your identification with you?
C: Yes, here it is.
R: Please slide it under the glass or ….
R: Ok Mr. / Mrs. …, I have to call the company to ask them whether they are expecting you. Pardon me for a moment.
C: No problem
R: Excuse me ... They have said that the interviewer is on their lunch break at the moment, but you can go and wait. Do you know where the office is?
C: No, I do not. It was a problem even finding this place!
R: Well, it is on the 5 floor. First you need to go through the door that is at the far end of the corridor (which will be opened by the receptionist), and then turn to your left and about 50 meters to your right you fill see a glass door which you should go through. Just besides the door on the left there is an elevator which you need to take to the 5th floor and once there will be someone waiting to take you to the office. Do you want that I print for you a map?
C: Okay. It will be much easier…
R: Front of your desk you can see the map. You can take it.
C: Thank you.
R: All the best on your interview.
C: Thank you once again and have a nice day.
R: Likewise, see you!

(R: Receptionist, C: Customer)

In the reception test sessions we had three participants. The three participants were English speakers. The experience the participants had while using the kiosk service was varied. Two participants considered their information technology skills were excellent while one participant deems his information technology skill was good. Most of participants have used service by self-service machines and remote services via internet

such as Web-bank mostly daily or weekly. By calculating the frequency of the reception services using, the participants basically use it weekly or monthly.

In the post-interview part, participants mentioned that the reception process reminded them about grocery store shopping and it felt quite easy and clear. Generally, the reception kiosk appearing familiar to the users seemed to affect their sense of convenience.

The time for reception service process took from around two minutes up to five minutes. Still, all of the three participants were able to complete their tasks eventually. The reception service process was similar to what it would have been if the participants had been served face to face. Therefore, the kiosk system had utility as it allows the service process to be completed as normal just without the receptionist to be physically presented.

This type of reception service through a video connection differs from the traditional reception service. It somewhat combines the properties of customer service through phone and personally at a location. The participants found the presence of the customer servant to be of help to complete their goal. The customer servant's ability to explain things to the customers was considered very useful but, it also places some demands on the customer servant's skills. In some way, it was apparent that the line between face-to -face and remote communication was starting to blur the customers. Video phone calls are still somewhat rare so this type of communication is not something that most people have a lot of experience of.

Overall, the test results is similar to what gained from AVIS car rental service previously, the experience of how the reception service processes were felt very positive (Syrjänen et al., 2012; Syrjänen et al., 2013a). Most of the testing participants considered that being able to have F2F interaction through kiosk is a simple and effective way of communication. They were inspired to perform and built confident with customer servant when they were able to ask any questions during the live face time. Some participants were also motivated along the message delivering from the customer servant that they entirely involved in the event which is similar to their physical attendance with the customer servant.

5.   Results and Discussion

In this chapter, the conclusions, the evaluation of the research and further research subjects are presented.

5.1 VMC kiosk service features

VMC remote kiosk service is a new type of interactive service kiosk which uses remote VMC-based technology is to allow face-to-face talk with a customer servant remotely to achieve the goal. Interactive VMC service kiosk is a tool that can be utilized in IT field, bringing its customer convenience and close care to the virtual network. Differ from previous automated kiosk technologies which were focused on HCI, VMC-based kiosk concentrates on a human-to-human interface technology, providing easier user situation for personal services, while bringing possible benefits for service providers due to extra customized services could be offered. By VMC-based kiosks these can be offered face-to-face talk as a natural communication mode is an overwhelmed advantage over the traditional kiosk system.

We describe VMC-based kiosk as an interactive public information kiosk with a face-to-face interface which provides users with the flexibility. This kiosk is equipped with a video display, web and document cameras, fine adjustment speakers and microphones, a remote controlled credit card reader, a laser printer. Kiosk use starts by pushing an activation button that opens a VMC connection to the servant. (Syrjänen et al., 2013b.)

A key feature of a VMC-based interactive kiosk system is that it allows users to have face-to-face talk with a remote customer servant to achieve goals without any geographic constraints. VMC-based kiosk adopts face-to-face talk as a natural communication mode among the service, which is an overwhelmed advantage over the traditional kiosk system. Moreover, needless of involvement in the IT proficiency skills, the VMC-based interactive kiosk can be used in availability publically and enable user experience more effectively. This is possible because users could control the process directly, thus he or she may be able to tailor the service better to meet their requirements. Considering this to be possible, the system must be easy to use. Additionally, the visual and printout capabilities of the VMC-based interactive kiosk systems provide users with more information and security feelings than that they would receive over the tradition kiosk systems. A potential travelling guest might, for example, be able to select means of transportation, view his or her satisfied accommodation and determine other travelling sources to be needed. VMC-based interactive kiosk could offer potential guests better information service base on their own choice.

VMC interactive kiosk systems not only offer the same services which the computer-based systems offered but many other additional benefits by its functional features as well. As a result, it seems that most of the participants should be willing to use VMC-based interactive kiosk in test scenarios. Therefore, VMC-based interactive kiosk could be placed at suitable locations which are easily to approach and convenient to users. Thus, VMC-based interactive kiosks may be ideal alternative solutions for banking, reception and traveling services in the coming future.

5.2 Experiences and observations of the testing facilitation

According to previous empirical kiosks developed for different sets of input and output modalities, they have been varying for decades, such as video banking kiosks (Paradi & Ghazarian-Rock, 1997), self-service reception kiosk (Lui & Piccoli, 2010) and health information service (Nicholas, Huntington & Williams, 2001). The video banking kiosk (Paradi & Ghazarian-Rock, 1997) is a "stand-alone unit where retail customers at remote locations, can interact with personal bankers (servers) at call centres via video conferencing". The hospitality reception kiosk (Lui & Piccoli, 2010) designed as self-service system which indicates the certain routine tasks were handled, operated by an international hotel company. The health information service kiosk (Nicholas, Huntington & Williams, 2001) combines InTouch technology with a touch screen in health care kiosk from which medical conditions, support group contact information and health living/cost topics were covered.

In general, previous kiosks have not been very successful in attracting many users. According to Dornbusch (1996), the primary reasons for these shortcomings were:

- Poor system reliability and maintenance
- Systems were not user friendly and the public was unfamiliar with the technology
- Information not comprehensive enough to be useful for the public.

Compared with previous kiosk service, VMC-based kiosk service supports composite functionality feature with its own advantage.

Good recognition and understanding is a particularly important feature for VMC-based kiosk services since there are so many new comers. Almost the same feeling from Johnston and Bangalore (2004) is that social interaction for a public kiosk that different unknown users will approach those capabilities is important. Communication was generally referred to face-to-face interaction qualities, it made kiosk use easier and the personalized service interaction for individual customers (Syrjänen et al., 2013a). Considering the VMC-based kiosk service, it added basic support for social interaction to the language understanding and effective sample dialog response by a well-trained customer servant. During VMC-based kiosk service processes the dialogue was driven by small questions which are similar to the face-to-face service. In the procedure, the customer servant recognized and understood the customers' needs in a short time, managed to give all the necessary information to customers with service willingness.

VMC-based kiosks make use of both scanned input and printed output as a modality. According to Syrjänen et al. (2013b), VMC-based kiosk facilitation contained several input and output helps for customers only. For example, the service provider of the VMC-based kiosk needs to identify the customer, typically the servant will invite the customer to show his confidential, use a credit card and print booking documents out etc. In the procedure, VMC-based kiosk use involved the customer servants' indexical phrases related to the customers' real-time conduct situation (Kules et al., 2003).

VMC-based kiosk services support information-sensitive service in information exchange facilitation. This is in line with Syrjänen et al.'s study, i.e., from customers' point of views, a face-to-face interview by the servant from the kiosk service is a great evidence of security of trust when considering controlling the charge of credit card. Also, remote servant may ask some customers to service dialogue by signing certain documents in front of the video display. In this way, human-driven VMC service kiosk enables the customers feel secure of use and be active in flexible interaction (Clark et al., 1991; Glushko et al., 2003).

User experience refers to any experience that the user undergoes while interacting with a product under certain condition. User experience is a concept that goes beyond usability, which is related to how well the user can use the product (Nielesen, 1993). User experience is formed in the interaction between the user and the product in a particular context, which may be affected by many things. In our scenario testing, all the users brought the interaction into their personal properties such as values, emotions, expectations, and prior experiences. There are social factors such as time pressure, explicit and implicit requirements, and culture factors such as habits, norms, symbols and language. In addition, the context of the use such as time, place, and other persons present may change the experience. Finally, the interactive kiosk itself is a large influence with its properties such as size, weight, usefulness and usability. (Arhippainen & Tähti, 2003.)

Many factors may influence the user experience of the participants. To address the variety, factors influence user experience could be classified into four main aspects: utility and usability, the security and the aesthetics of the product. Usefulness is something that affects the user experience perhaps in more ways that could directly be identified. (Arhippainen, 2009.)

Based on the test participants' use experiences it can definitely be said that our three types of interactive kiosk -- banking service kiosk, travelling information service kiosk, reception service kiosk – have good utility. As banking service kiosk, it allows users to make a small loan from the VMC-based interactive kiosk. Most of test users said that they felt safe from the loan process. There were some privacy concerns about the location, but those were not common. As travelling information service kiosk, users easily approach VMC-based interactive kiosk services to book transportation tickets and hotel rooms as well as travelling information offering. Meanwhile, test users deemed that the kiosk system reminded them of Skype considerably, which they had a lot of user experience. They thought that it was secure to use VMC-based kiosk service because many things work through the Internet nowadays are secure enough. As reception service kiosk, it makes people to get a permission to make an appointment by virtual reception kiosk. Test users felt that the process appears familiar to them which seemed to affect their sense of security and convenience.

The usability of the physical aspects of VMC-based kiosk service was mostly good as the participants felt that all the required actions were easily to complete. The user experience should be taken into consideration when designing new products, because it may greatly determine the success of product. Aesthetically, the kiosk was mostly pleasing although there were some rough edges, because of the way our prototype was build. The interface design (Laurel & Mountford, 1990) of the kiosk is a strong factor in affecting what the users thought about the kiosk and it generally matched users' expectations.

Cooperation with the client during the project was working well. The project group was pleased due to the helpfulness and the interest towards the groups work. The communication and the feedback were covered via emails and occasional meetings as planned in the first meeting. The information received always helped our project tasks to proceed forward. There were some confusion during the way but eventually everything was clear.

5.3 General evaluation for the research results

This thesis exploits remote car rental service by using VMC kiosk solution and analyzes its attributions related to other three service areas in banking, travelling and reception in order to find out in what kinds of intended future services of VMC technology can be beneficial.

Test participants were all students in University of Oulu and mostly all of them are studying Master of Science program in Information Systems. There are two types of interview for the scenarios, pre-interview (Appendix 2) and post-interview (Appendix 3). Interviews of each scenario differed a bit because they were customized for each service. The pre-interview focused on finding out how often the tester used certain kinds of services and technology and how experienced the testers thought they were. The post interview questionnaire included questions which were solving what kinds of attitudes, images and experiences the tested received from the scenarios test session and what would be the ideal purpose of use for the service desk in their opinion. Forms and print-outs were made for each scenario to make the test event appear more realistic.

For the testing preparation the customer servant received example processes, dialogs and brief instructions how she or he should act. Before each scenario the remote servant had one or two training sessions. The instructions were mainly about decency in service behavior and dressing. All in all the test participants were satisfied about the remote servant's work which was natural even in cases she had to improvise and react to something that was not in the manuscript.

During our testing session, the estimated time for training an inexperienced customer servant to an experienced one does take less than a day because the focus used on the kiosk begins to decrease very quickly and customer servant performance will also start to increase at first after the kiosk focus decreases. We could not test how routine work would effect on the performance on the long run but it mentioned that after a while it could have negative effects such as boredom and stress which would balance the changes in performance. Customer profile and session time standards could give more helpful information for the management. These measures can indicate what kind of resources the products and customers need. For example loans take much more time than simple services such as general inquiries in reception service kiosk. By examining the time that a certain product takes and frequencies of customers the management can avoid line-ups and other factors that could influence service quality. When building customer loyalty, the management should focus on the lifetime value of the customer instead of single transaction such as ATM. The banking kiosk service gives good possibilities for creating a customer profile which could contain information such as customer type and background, products discussed, amount of money invested and the time and frequency of sessions/appointments (Paradi & Ghazarian-Rock, 1997). Creating a customer profile would help tailoring the service for each customer and building long term relationships with them.

After the testing cases of three scenarios, we considered some feedback information from customer side is still needed to improve the usability of VMC-based kiosk service. For example customer satisfaction studies for the service would give more beneficial information of the consumer behavior towards kiosks. According to Shackel (1991), usability is a relative property of the system which referred to user relations and its dependent context evaluation, resulting in a subjective perception of the product or system. Improvements in technology and consumer's computer skills have made better ground for kiosk based services that using different kinds of ways to communicate and interact with the customers.

Based on the scenario study, we can conclude that usability testing with the VMC-based service concept were mostly positive. In a kiosk service situation, the VMC-based service takes many overwhelmed advantages over the traditional full-automated kiosk systems with improvement of usability and security by human servant interaction.

5.4 Ideas for future research

This thesis tested three scenarios for the intended future use of video mediated communication technology and provided additional material based on the literature concerning the technology. The goals of the research are: Create various user scenarios and models according to the potential future implementation; Find potential application of the technology in various service sectors like banking, public services and so forth; Enhance product development and marketing of the VMC service kiosk; Generate new business ideas if possible.

The usability testing results were collected of nine test participants using the remote VMC-based kiosk service. Based on the testing results, there are still various areas which deserve a further research to gain more specific results. The results of this project will be useful for companies as they do not have the knowledge to visualize how the technology can fit into normal commercial activities.

Future research could be conducted into finding the more empirical solutions for VMC-based remote service kiosks. For example, in Oulu area the Northern Ostrobothnia Federation and municipalities involved in the cooperation funded by the ERDF project, with the development of remote services approach together with the municipal and state government bodies. Nowadays, electronic services are starting to replace the traditional face-to-face interaction with governmental officers more and more. It is, however, when face-to-face transaction is desirable or necessary, it still has distance or physical limitations due to the traditional way. As a result, remote VMC-based service kiosk is a possible solution to make face-to-face transactions at home or in nearby locations. Typically, the transaction does not require physical contact in certain places. This remote service can be called a VMC-based technology transaction, which is comparable to that obtained from the kiosk service. The service provides face-to-face interaction with officers to deal with confidential matters, as well as with documents and files. In this process, the video access is never stored without any mention and the procedure will not be visible to others. This remote service is designed to bring services closer to the citizens and the municipal service center employee is responsible for ensuring customers' transaction a success.

This testing research only has worked three scenarios out, but several different types of service kiosks could be tested and compared with which would possibly lead to even better results. This kind of comparison could give an even better understanding about the advantages and disadvantages of remote kiosk customer service. It also would be useful to get more information about what kind of the VMC-based service kiosk would be the most beneficial to gain more information about how well it is suited for a wider range of situations. Remote service approach as an essential part of the technique is to create a video using effective customer service approach.

Additionally, only usability matter has been conducted, however some other aspects like how to maintain or increase public service efficiency and quality also could be discussed in the future research. Development is expected to increase the overall effectiveness of the services, customer focus and result in cost savings for both customers and service provider. Remote VMC kiosk services are reducing the need to travel to the certain area, but bringing in positive environmental impacts.

6.   Conclusion

The purpose of this thesis is to carry out a feasibility study on whether the VMC-based kiosk solution could be successfully implemented to other service sectors. The results will be utilized to improve the technology and how it is to be delivered in future. This thesis tested and provided three scenarios in Banking, traveling and Reception for the intended future use of VMC technology. These testing scenarios are benefited from VMC remote car rental kiosk solution. The results of this project will be useful for companies as they do not have the knowledge to visualize how the technology can fit into normal commercial activities. The research questions were what kind of service solution a VMC-based kiosk is and what are the service features where video mediated communication would be beneficial.

The research was conducted as a qualitative case study. Test results were gathered in a real use environment where nine people used the prototype and were interviewed in situ. The use situations and interviews were video recorded and transcribed for qualitative content analysis.

The three testing scenarios with participants and study show that interactive kiosk services contact by the video mediated communication technology in general was considered very positive and well accepted. This research also clearly showed that remote VMC-based kiosk service can be successfully transferred to different areas other than AVIS car rental service. Based on the testing results there are still various areas which deserve a further research to gain more specific results. Future research could be conducted into finding the more empirical solutions for VMC remote service kiosks.

In conclusion, the results of testing these three scenarios were mostly positive. These three types of kiosk services offer great potential possibility to combine with different services. Thus, a personal contact by a VMC-based kiosk service offers many advantages over the traditional human-computer interactive kiosk systems. More research is still required to get even further information about how to better VMC-based kiosk services for its future perspectives.

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Appendix 1. Participants' Information

User	Age	Gender	Experience with similar service	Information Technology skills
1	28	Male	Yes	excellent
2	25	Female	Yes	satisfactory
3	22	Male	Yes	excellent
4	25	Female	Yes	excellent
5	22	Female	Yes	excellent
6	25	Male	Yes	excellent
7	24	Female	Yes	good
8	23	Male	Yes	excellent
9	33	Male	Yes	good

Appendix 2. Interview Form: Pre-questionnaire

The collected data and recorded material will be used in scientific research and teaching (see appendix) and will be saved in electronic form. The information will be handled confidentially during all stages and in every form of use ensuring participant's anonymity according to good practice of science.

Name:_____ Test user ID:_____

Age: _____ Date:_____

Selected scenario: _____

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Use of services	Almost daily	Weekly	Monthly	Few times a year	Seldom	I don't use at all
The self-service machines use(Bank, ticket etc.) Use of Internet-remote services (the web bank, - stores, - travels)						
Public (government) remote services (tax return, job search etc.)						
Visiting service point in general (students-, job- etc. office services)						
Rental or loan services (DVDs, books, equipment etc.)						
Car rental services in general						
Other remote services Example_____						

Characterize your use of information technology skills:

a. Excellent
b. Good
c. Satisfactory
d. Weak

An optional argument: _____
I can be contacted in case of need for further research _____
                                      (E-mail address or phone number)
I understand the purpose of the research and its confidentiality.

_____
Signature and printed name

Appendix 3. Interview Form: Post-questionnaire

INTERVIEW QUESTIONS AFTER RECEPTION DESK EXPERIENCE

1. What are your opinions on having VMC as the first point of contact when you visit organizations or any public service institutions?

2. What kind of service form was conveyed to you about this reception desk service?
a.   Traditional service (face to face)
b.   Auto service (e.g. bank)
c.   Customer servant behind the glass (e.g. VR's ticket sales)
d.   Any other, what _____

3. Which method would you prefer for delivery of such services?
a.   Face to face service
b.   The self-service kiosk
c.   Telephone service
d.   Free-form type of e-service
Reason(s):

4. In what kind of situation would the use of self-service kiosk be best applicable to you?
_____
_____

5. Would you use this kind of kiosk if it would be in usage?
6. Would it be different to be a customer in a customer service point if you would be communicating with a customer servant via interactive kiosk instead of face-to-face service?
6. Do you have any ideas for improvement? What would you change?

7. Which method would you preferably use for purchasing travelling services:

	Customer service point	Internet	Interactive kiosk
Flight ticket			
Train ticket			
Bus ticket			
Booking a hotel room			

Appendix 2 and Appendix 3 are originated from the the WiSeD research project (Department of Information Processing Science, University of Oulu, Finland).

Appendix 4. Scenarios Ideas

eniro.fi (fonecta.com)
Customer servant will help customer find bus station, friend, nearest hotel and the customer servant will print map or send taxi for customer. Customer servant also can reserve hotel room for customer or movie ticket. Kiosk needs one another display where customer can see what kind of hotel customer servant propose or when s/he reserve movie ticket customer can see what place to choose. This service will ask for paying the fees, so customer pay ticket and service at the end.

Nurse/doctor desk
When municipality reformations (kunta uudistukset) will do some changes, some people may have long distance to hospital and they maybe need just some receptions for sickness, prescription renewals or sick note (patient can't go work).

Library service desk
Loaning happens as usual with the current automated desk but if the customer wants to know more or needs instructions it happens through the video connection. The reservations, orders, applications for the cards and renewals can also be done through the video-connection and additional devices. The service staff can be more concentrated for example to the central libraries and the smaller libraries work with less staff.

Appointment desk / Reception
Desk is used for greeting and directing the customer. The desk can also give information. The member of the staff is not tied to the desk and can do other tasks when there is nothing happening on the desk. That way it's also more cost efficient. The desk is useful for hospitals and health care centers and also other types of businesses

Video rental
The desk hands the disc to the customer and the video connection is being used to check the identification.

Banking services
-For small municipalities and remote places/offices (cost savings when all services can be automated)
-For people that don't speak the native language.
- Still elderly people go to the bank pay bills and they need customer servant.

Kela and social services
Look banking services

Fast food

Service and ordering at the interactive desk and the food can be retrieved from a desk next to the kitchen when you get some kind of sign.

Automated gym
The keycard can be purchased and loaded from the desk. If the customer needs service (e.g. training programs etc.) they can ask it via video connection.

Kiosk
For serving alcohol or something where you need to show identification

Public authority services
Police, Municipalities…
Permits and licenses

Voting system
For example in sparsely populated areas in Lapland etc.

Grants applying kiosk
- For Finnish citizens applying for their grants, especially for the students who used to apply it through the Internet.
- offer face to face interaction to the applier when he/she meets unsure things or errors