Factors Influencing the Adoption of Self Service Technologies (SSTs)

A study of attitudes towards SSTs (Internet Banking, Online Shopping and Self-Check-In Machine at the Airports) and the influence of new technologies (smart phones and tablet computers).

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Abstract

Developments in information technology and tangible computing facilitate the human’s life by inventing Self Service Technologies SSTs where it changed the way we interact with the environment as well as new technologies did. Nowadays, a lot of new technologies have embodied computer inside such as smartphone and computer tablets. Previous studies in adoption of SSTs research treat customer behavior towards technology based services. However, recent studies recognize that participants have different attitude towards different technologies even if these technologies used to support the same service. Therefore, in our thesis we are going to study the effect of smartphone i.e. iPhone and computer tablets i.e. iPad on adoption of three services of SSTs Internet Banking, Online Shopping and Self Check In Machine at Airports. Is there any hesitation while people adopting with this technology? If yes, why does it happen? Our data were collected by conducting a pilot and empirical study via using quantitative and qualitative approaches. We conducted our study at Umeå, Sweden. The study findings present the effect of adoption through age, family, friends, money, knowledge, using technology in public and private places, mobile technology and computer tablets, and Interface design on adoption SSTs. We found that participants were influenced by new technology for adopting SSTs. Participants did not use Online Shopping as much as they use Internet Banking, especially in the private places. Concerning the Self Check in Machines, participants were differential in which some tend to use it and others did not.

Keywords

Self Service Technologies SSTs, Smartphone, Tablet Computer\Tablet, Internet Banking, Online Shopping, Self Check In Machine, Adoption new Technology, Public Place Interaction, Private Place interaction.

Read more about the definitions for each term in Appendix A: Glossary.

1. Introduction

Technology changes our life day after day since the development of technology covers most of aspects in the life, and maybe all of them. Today, our life has become digital and dependent on technology since we are interacting with different kind of technologies to fulfill different kind of tasks in our daily life. Some of these technologies have become important in our life more than others like computer, Internet and mobile phones. Technology embodied in small as well as in big devices where today our interaction with them increased radically since it is easy to carry and give us a high functionality. This technology effect on the environment and the meaning of the life is influenced by information technology and the shape of technology. Nowadays, to complete a simple task we need to use technology i.e. for instance writing a thesis needs interaction with technology where it helps to reach the work anytime and everywhere.

The past decade has witnessed a rapid growth in interaction between users and machines. Users in the past got the services by interacting with each other where the rapid growth in technology especially self-service technologies SSTs changed the way we use to interact with each other to get the service. However, interaction took a different way where dealing with machines rather than with humans and that is a Human-Computer Interaction. SSTs have long existed but its importance has grown as advances in information technology IT have created many opportunities to leverage SSTs for large gains in efficiency and convenience. SSTs have
been growing rapidly in developed countries such as Europe, Canada, USA and China, etc. It helps to facilitate user’s activities where users can perform different kind of activities by using them. Today, users use SSTs like Internet Banking, Online Shopping, Interactive Kiosks (Self-Check in, Self Payment machine and Help Desk) in their routine life in addition to many other SSTs.

As we remember, the first appearance of technology was in a huge devices but the rapid growth and development of technology helped to embodied technology in to small devices like Smart phones i.e. iPhone and Computer Tablet i.e. iPad in which it becomes today the most important part in our life since its portable, easy to interact with, friendly user interface and more functional applications. These new technologies have unlimited use since they can be used for multipurpose such as browsing the Internet, Social network, calling, Internet banking, online shopping, mobile ticket reference etc. Users adopt few SSTs easier than others while the difficulty to adopt SSTs is due to some factors as well as those easily adopted.

Initially, our study was based on four popular SSTs, Internet Banking, Online Shopping, Mobile Buss Ticket and Self-Check in Machine at Airports. We expected that users can use their computer tablet and smartphones to interact with such services. The increase of using technologies in Sweden prompted us to expect that SSTs are rapidly used. Our study will discover the pattern of using SSTs and how it will affect to adopt or not the SSTs by studying the relation of influencing new technologies on SSTs and how new technologies affect to change our interaction with SSTs. Does this rapid increase in new technologies will affect positively to adopt SSTs? Does the user feel more comfortable to use SSTs by using computer tablet and smartphones? Our study while give an analysis to how, when and where users prefer to do their online shopping. Do the users feel more convenient by using new technology for the purpose of SSTs? And how do the new technology helps to facilitate our interaction by using SSTs? as well as other services. Conclusions will be drown depending on our analysis that we performed.

In our research we conducted a study on interaction of users with SSTs by exploring pattern of adoption and what does the effect of new technology on adoption of SSTs? Before 30 years technology was embodied in the world but now we believe that the world becomes embodied in mobility with the development of technology every day where it changes our interaction with many different services.

Our research focus on studying the effect of new technology (Smartphones i.e. iPhone and Computer Tablets i.e. iPad) and how it affects on adopt or not the SSTs. Our topic is “Effect of new technologies for pattern of adoption of Self Service Technologies” where we choose four different SSTs depending on the public and private place where the users can use the services as well as ability to interact by using new technologies. Most commonly usable SSTs by users are Automated Taller Machine, Self payment Machine, Self check in Machine at airport, Online shopping, banking by phone, Internet banking, pay at oil pump or gas stations, online brokerage service beverage, library check in\out system and snack wending machine etc. Where the SSTs we choose are Internet Banking, Mobile Bus ticket, online Shopping and Self-Check in Machine at Airports.

Most of researchers conducted their academic research to study the interpersonal interaction about customers and service provider ((Bettencourt and Gwinner 1996; Bitner, Booms, and Tetreault 1990; Clemmer and Schneider 1996; Fischer, Gainer, and Bristor 1997;
Goodwin 1996; Goodwin and Gremler 1996; Hartline and Ferrell 1996; Rafaeli 1993) while few of them conduct the interaction of customer with technological interface (Bitner, Brown, and Meuter 2000; Dabholkar 1996). Initially, as we know the adoption of SSTs depend on users’ needs where in some contexts SSTs creates users’ needs and then users become more likely to SST, while on the other side SST full filling the user’s needs. One of the most important aspects that affect on adopt SSTs are the usability aspect during using different technologies. It is observed that few of SSTs has more attraction to adopt while some other SSTs users feel unwillingness to adopt it. Why does it happen? It happens maybe because it depends on the personal behavior and user needs to adopt particular technology. The adoption of SSTs do not only depends on user needs but also depends on culture, education, society, nature of the user and the interface of SSTs. Culture and values play vital role for adoption of technology (Lee et al., 2007; Srite et al., 2006). Few people cannot take notice initially when the new technology has introduced, while few people adopt technology by following other people.

Users have different opinions regarding using SSTs. However, we have observed that users are not commonly using Self-Check in Machine at Airports while travelling, some of users prefer to wait in the long queue instead of using Self-Check in Machine to save their energy and some possible mistakes that led them to be late. We think also that there are many different reasons hidden behind using such a service, is it due to public spaces? Or maybe during travelling by plane they are afraid to take any risk by doing wrong interaction with Self-Check in Machine. Were if any mistake happened by the Airline company employee at desk help the company employee will take this responsibility. Also we wondered if users do not use SSTs due to complex interface, language problems and different interface for each Self Check in Machine in each Airline company or some other factors. We will analyze the people who are not using Self Check in Machine, either they are using the other two SSTs or if they are using some SSTs then why do they not use the others?

Today, human being life depends to a large extent on mobile technology where the number of users who use such technology has increased and it will continue to increase in the future since mobile devices are easy to carry, to use, to interact, etc. Often users use their personal laptop computer for performing Internet banking and online shopping where they cannot use them on traveling. We think that mobility and new technology devices will change this behavior of users during the long travelling where users sometimes need to do some activities so the time pass very fast such as few passengers go in deep sleeping or playing games on their mobiles etc. The new technology especially the portable devices help the users to get more benefits from their time by having Internet where it helps them to do Internet banking and check what is available on the online stores. But using a laptop today during the travelling can be heavy for users due different factors such as big size, heavy weight in addition to the long time to start work on it (Open the screen, turn on the computer, system loading, etc.) also the ability to connect the Internet service. Using smartphone and computer tablets will help the users to use them easily without feeling that they are heavy devices since they fit the user pocket and they can connect to the Internet anytime and anywhere. With the development of mobility the main purpose (Call/Receive calls) changed to contain different useful features molded in small devices. The functionality of smartphone and computer tablets make them becoming a necessary part of human life since it is easy to carry, use and interact where users
can check their emails, online stores, Internet banking, etc. The problem of Interacting with small screens in Smartphone solved by invention of Computer Tablets the new generation of mobility where it solve the problem of using heavy laptops and interacting with small screen.

The structure of our thesis will start by presenting our research questions, related work, classification of SST, methodology, personas and scenario. Also on the base of finding from data collection, we discuss results making comparison on bases of different age groups, make analysis on bases of gender, education, professions etc. At the end of the thesis our conclusion is drawn on the bases of findings and outputs from data gathering. Last part will be the limitation of this research and discussion about future work.

1.1 Research questions

Our study will cover different questions in order to find the factors that affect on the adoption of SSTs (Internet Banking, Online Shopping and Self check in machine) by using new technologies. Does using the new technologies (Smartphone and Tablets) will affect to adopt SSTs or not? What factors can be measured for pattern of adoption of SSTs? We explain the factors that exist behind adoption or not of particular SST. Does the adoption of SSTs depend only on users need or on other factors? How do private and public environments affect the use of SSTs? Furthermore, we explore other factors which exist for adoption of SSTs.

Do people feel hesitation or nervous at public places while using SSTs? If so, is it due to observe who interact with SSTs by other people? Like they are using SSTs frequently faster than them? Or they feel hesitation and do not adopt due to involvement of money in some SSTs (Internet Banking, Online shopping etc.). Do the users feel more comfortable by using SSTs when they don’t have to pay money? For adoption of SSTs, do age, family, education, computer knowledge, matters a lot? the interface of these machines? the way of interactions? the design? the shape? or the intensity of user needs matters a lot? Which of them have more importance for adoption of SSTs?

2. Related Works

Technology adoption is a process that is starting with the user becoming aware of the technology and ending with the user embracing the technology and making full use of it (Renauld and Van Biljon, 2008). By growing of new technologies, it is important to increase willingness of people to use new technologies (Meuter et al., 2003). There are many variables that influence the adoption of technology (Czaja, Charness, Fisk, Hertoz, Nair, Rogers, et al. 2006), but in our context we only cover age, gender, education, computer knowledge and profession. Other major areas of research of self-service technology are formation of attitude toward technology (Taylor and Todd, 1995) and role of technology improving service quality (Dabholkar, 1996). We focus on adopters and as well as non-adopters of these technologies. By increasing technology anxiety, it negatively affects the usage of self-service technology option and also affects experience of using self-service options (Meuter et al., 2003, p.904). People feel some fear when they are using computer technology (Cambre and Cook, 1985; Scott and Rockwell, 1997).Technology readiness developed in order to explain how people achieve their goals by adopting technologies (Parasuraman, 2000).
Companies consume millions of dollars to give information about new technology to users, but still there are users who feel hesitation (barriers) to adopt the technology. Company has focused on its target group. This target group may be adopters or non-adopters of technology. Some of the people adopt technology (Self payment machine) if they get some financial benefit such as discount in their total bill. While few people feel hesitation while using SSTs at public place and these people feel more comfortable at private place. This hesitation of adopting new technology presents in all age groups. (Bashir, Zakria: SPM 2010.01). Users follow the Rogers (1995) model of innovation for adoption new technology. Not all users adopt innovation at same time with same rate. Roger (1995) curve explain five kinds of adoption which are innovators, early adopters, early majority, late majority and laggards. This curve is shown by following figure.

![Rogers model of innovation of adoption new technology](image)

**Figure 1- Rogers model of innovation of adoption new technology**

All members of target group adopt technology but after passage of time. By focusing on the non-adopters group, company have to make such attractive strategy to make them adopter. On base of Rogers five stage model we will make analysis about how many people have Smartphones and Computer Tablets for using Internet Banking, Online Shopping and Self-Check in Machine. Our research will not only show adopting behaviour of SSTs but also to make analysis for adoption trend of new technology (Smartphones and Computer Tablets) and its usage.

By deploying SSTs it will increase product visibility and increase company revenue. (Joseph 2010, p.144). Few people do not want to use Internet banking, online shopping and Self check in machine at once due to some factors and few people unawares of technology invention and few have neutral state. All these people are lying in two categories that are explained in the following table from (Joseph 2010 p.145):
### Dimension

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Categories</th>
</tr>
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</table>
| Active Resistance | 1. Rejecter  
|                 | • Explicitly rejects the technology.  
|                 | • Refuses to use the technology.  
|                 | • Functional, psychological, or informational barriers.  
|                 | 2. Postpone  
|                 | • Delays adoption of technology.  
|                 | • Anticipates future changes. |
| Passive Resistance | 1. Unaware  
|                 | • Individual has no knowledge of the technology.  
|                 | 2. Disinterested  
|                 | • Presence of a neutral state.  
|                 | • Individual is aware of the technology but unaffected by it. |

*Table 1 Joseph table about dimension of individual resistance*

Regarding to the bases of data gathering we will make analysis how many people exist in active resistance and how many lie in passive resistance adoption or non-adoption of three SSTs. Using SSTs have also great impact on economy of any country. More number of users of SSTs leads to increase the economy of that country. A report published in April 2010 in which it has mentioned that *“We estimate that if self-service technology were more widely deployed, the U.S. economy would be approximately $130 billion larger annually, the equivalent of an additional $1,100 in annual income for every household.”* (Castro.D, Atkinson.R, Ezell.S (April 2010))

By deploying SSTs, it increases the more paying job opportunities for people and also increases productivity. These jobs will not be only for high management and engineers but also for workers.

#### 2.1 Pattern of adoption

People adoption for both technology and SSTs have great link with perceiving things by mind and experience of life, as Husserl gave idea about how mental life and everyday experience are interlinked one with the other. He explored things how it was existed. He did not experience to get reasoning of happening. (Dourish, 2001, p 107)

Then Heidegger (1927) rejected Husserl’s ideology and give new phenomenology, thinking and being are two different phenomena, like body and mind are different. He explained how we can know about the world, “out there”. He focused on “how does the world reveal itself to us through our encounter with it?” rather “How can we know about the world?” We are part of the world, so we understand it by shapes the way, how we are in it. Descartes gave idea how our mind perceive the world. We (mind) observe world, give meaning to it by relating with some idealized realities. We do different actions on the bases of meanings. Heidegger argued that “meaningfulness of every day experience lies not in head, but in the world”. It is the way we act in the world for interaction. (Dourish, 2001, p 107)

World is meaningful for us, we engaged to do tasks practically. We do tasks only when we interpret meaning through different ways (Dourish, 2001, p 108). We agree with the
Heidegger phenomenology, our every experience (actions) base on reasoning, thinking. But thinking and to do actions are two different things. It is human nature we think much but we do not practically perform all and sometimes we think to say something but we cannot do. Technology and all artefacts are part of the world. Make these in such way it can be understood by users. As Lars Erik Janlert says “The old idea was to put a world into the computer, the new idea is to put the computer into the world of real objects and environments” (Janlert, 2007 p, 122).

People do not use SSTs more commonly. Few people do not like to learn about technology matters it may be due to technology anxiety. Computer anxiety is fairly commonly occurrence (Meuter et al., 2003) and this anxiety is also present in adoption of other technology. There are many researchers conducted on the technology anxiety. In one research 55% Americans suffer from some degree of technophobia (Williams, 1994) while in other research it is counted that there are millions of American workers (Craig, 1994) and one third of college students (DeLoughry, 1993) suffered from computer related anxiety.

2.2 Technology Adoption

The adoption of technology depends on personal behaviour and also external environment. People perceived that by using of technology, they increase job performance without doing much physical and mental effort. After acceptance of technology then people think to adopt it.

Our framework for studying user acceptance technology is The Technology Acceptance Model (TAM). TAM is the most influential theoretical approach in studying the determinants of Information Technology (IT) utilization (Davis, Bagozzi, Warshaw, 1989). TAM is adapted from the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980). TRA called the social influences “subjective norms” and showed that these norms, along with personally held attitudes, could be used to predict behaviour. Subjective norm represents “perceived external pressures to use (or not use) the system” (Liker and Sindi, 1997). The subjective norm of consumers is the pressure they feel to use the system from environment, other consumer, or key others in the public spaces context. The construct of subjective norm represents whether consumers experience any social influence toward their use and appropriation of the consumer-related technologies.

An original proposal of TAM assumes that an individual information system acceptance is determined by two major variables (Davis, 1986):

- Perceived Usefulness (PU)
  
  It is defined as the “degree to which an individual believes that using a particular system would enhance his or her job performance” (Davis, 1993).

- Perceived Ease of Use (PEOU)
  
  It is defined as the “degree to which an individual believes that using a particular system would be free of physical and mental effort” (Davis, 1993).

According to TAM, perceived ease of use of the system and its perceived usefulness determining behavioural intention and a user decisions to use a new technical device or software is determined by this behavioural intention to use the system (Arning and Ziefle, 2007). Consequently, better understanding the factors that influence perceived usefulness and perceived ease-of-use in using consumer-related technologies has potential to improve the
design and implementation. Proposes a model for senior citizen acceptance of e-Government services based on their findings that (Renauld and Biljon, 2008)

1. Intention to use is influenced by Perceived Ease of Use, Perceived Usefulness, Internet safety perception, Gender, Education, Age and Internet experience.
2. Perceived usefulness is influenced by preference for human contact, self-actualization and resource savings.
3. Perceived ease of use is influenced by computer anxiety, computer support and declining physiological condition.

2.3 Classification of SSTs

There are four major kinds of SSTs where we followed to choose our SSTs and make our study. Regarding to the Meuter, Ostrom, Roundtree, Bitner (2000) in their table we chose our first four SSTs. The following table shows us the four categories of SSTs, under each category there is many different SSTs. This table help us to understand the definition of SSTs and how we can chose them regarding to interface, purpose, private and public interaction.

<table>
<thead>
<tr>
<th>Customer Service</th>
<th>Online/ Internet</th>
<th>Interactive Kiosks</th>
<th>Video / CD*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone Banking, Flight Information, Order Status.</td>
<td>Package tracking, Account information.</td>
<td>ATMs, Hotel checkout.</td>
<td></td>
</tr>
<tr>
<td>Transactions</td>
<td>Retail purchasing, Financial transactions.</td>
<td>Pay at the pump, Hotel checkout, Car rental.</td>
<td></td>
</tr>
</tbody>
</table>

Private place interaction
Public place interaction

![Figure 2: Types of SSTs on base of interface](image)

Regarding figure 2 we have chosen our SSTs depending on public and private place interaction in addition to interface and purpose of use. We focus to choose the self-help purpose where users can do the services by themselves.
3. Methodologies

Our research is based on three categories of age 20 to 30, 31 to 40 and 41 to 50 years since we expect that different age of groups do not have the same behaviour for using and adopting SSTs. In order to know if the age matter or not we divided the age to three groups. We did a pilot study by using quantitative and qualitative approaches for data gathering. Our questions were developed to elicit from the participants about the patterns of adoption SSTs. The sample participants for this study were all from Umeå University, Ålidhem and Downtown Umeå, Sweden. They help us to make some amendments to conduct the empirical study. We use the following methods to gather our data:

1. Pilot Study
   - Quantitative Approach
   - Qualitative Approach
2. Empirical Study
   - Quantitative Approach
   - Qualitative Approach

3.1 Pilot Study

We used quantitative and qualitative approaches in our pilot study in order to have holistic understanding of effect of new technology for adoption of SSTs. According to pilot study we choose three SSTs and developed our questionnaires. We got inspiration for pilot study from Saunders et al. (2007), pilot study was conducted to refine the questionnaire and also provide feedback about the wording of the questions. It also increases the validity and reliability of the questionnaire (Cohen et al., 2000, p.260).

We did our pilot study not only to reform the questionnaire but also to find which SSTs influenced by new technology (Smartphone and Computer Tablets). Which three SSTs we will use in our empirical study, it based on the results we got from the pilot study. The following SSTs were the main services to conduct our pilot study:

   a. Internet banking
   b. Online shopping
   c. Mobile Bus Ticket
   d. Self-Check in Machine

To get concrete data for the effect of new technology on adoption behaviour of SSTs we conducted our pilot study by distribute questionnaires to 15 different subjects in Umeå University, Ålidhem and Downtown Umeå-Sweden. We got back 13 questionnaires from all subjects.

3.2 Empirical Study

As mentioned above, we use quantitative and qualitative methods for data gathering where three SSTs used to conduct the empirical study, these services are the following:

1. Internet banking
2. Online shopping
3. Self-Check in Machine
3.2.1 Quantitative Approach
We conducted a survey by distributing questionnaires at Umeå University, Ålidhem and downtown Umeå-Sweden. We have access different subjects in Umeå while in order to get more feedback from users who live out of Sweden Asia etc. we design an online questionnaire by using Google document form.

Our users selected randomly and given a form of questionnaire where we distribute 150 copies on different subjects at Umeå. In addition to send the online questionnaire to 100 other subjects belong to Pakistan, India, Iran, USA, Morocco, Palestine, Greece, UAE, Estonia, Germany, Denmark, UK, Norway etc.

3.2.2 Qualitative Approach
We conducted interviews with 25 users from Umeå-Sweden. These respondents belong to 3 age groups. We got response from 23 respondents and the other two respondents did not give complete information.

4. Findings of Pilot Study
After conducting our pilot study by using both approaches we found that all people are using almost all services. The following sections present our findings.

4.1 Internet banking
From the pilot study we found that all of the participants using internet banking to make different transactions such as payments of utility bills. Participants are using this service by using different devices such as Personal Computer (PC), Laptop and Mobile phone i.e. iPhone etc. Among 13 participants there were 3 users who are using their smartphone (iPhone) to use this service, while remaining are using laptop and PC. So in order to discover variation in pattern of adoption of this service we decide to choose this service in our empirical study.

4.2 Internet shopping
Our sample study shows that all participants are using this service through a personal device such as Laptop and PC. At the same time we couldn't find users who using these services by using new technology like computer tablets or smart phones.

During the interview one of the Swedish participants 49 years said “I never ever use this service. I don’t have hesitation to adopt new technology since i don’t like to give my personal information like visa card number, address etc. at Internet”. She thinks that her private information can be used for wrong purpose or maybe her money can be stealing from the Internet by using the service.

Another participant 23 years said in her interview that, “I am a regular user of online shopping through using my laptop. I have iPhone but I didn’t do Internet shopping by using it”. She explained that “Due to smaller size of mobile screen (iPhone) I cannot see pictures of clothes or shoes by zooming as i did on my laptop”. She is using this service because there are a few stores in Umeå offer her needs.

Our result shows that participants use internet shopping service when they have chance to get things in less price comparing to the shop price, but this concession cannot create any attraction for Swedish women to whom we conducted our interviews.
Depending on our findings we decide to include internet shopping service in our empirical study to discover what other patterns of adoption to use this service? In addition to explore if the money matter in adopting the service or not.

4.3 Mobile bus ticket

In our samples, only two participants are not using their mobile phone to get this service. Only one participant gets the bus ticket by using her iPhone. Another participant does not use this service because she is using her car for travelling and other participants did not travel constantly. So we concluded on base of our samples, all participants are using this service, because they don't have other option if they have to travel. One of the participants told us “I had cash, but i don’t have balance in my mobile. So i talked with some of the passengers (who is waiting the bus at the bus station) to get bus ticket by using passenger mobile, I pay cash equivalent cost of the ticket to her or him”. There are two participants from our sample study have uncomfortable and boring feelings while getting ticket at their mobile even others said that it’s comfortable activity.

As we were thinking to know pattern of adoption of using this service and the availability of the service for local travelling inside Umeå-Sweden. Participants can buy online bus ticket for travelling to other cities. So it’s hard to just focus on participants who are just traveling locally and using this service. So we conclude that we cannot add this service in our empirical study.

4.4 Self-Check In

Among 13 participants 9 were using this service. There were four participants who are not using this service due to different reasons. Even non participants also like to use this service any place. It will possible if this service is available at mobile phone. For example at Umeå Airport there is only SAS Airline offering this service for mobile phones. Passengers can get boarding card 24 hours before on their mobiles.

There are 2 participants who are using this service at their mobile (iPhone). That means new technology has impact for the adoption on SST. So in order to know how much people are adopting this service due to change of technology and discover reasons for not using SST we decide to include this service in our empirical study.

On the base of pilot study we have corrected few questions and also add more questions in order to get more concrete data.

5. Personas and Scenario

We write personas and scenario in order to know who the users are and what they understand about the service in addition to understand what kind of SSTs used by conducting a real users. Moreover, the purpose of writing a personas and scenarios in the research, is that persona tells us who the users are, their pattern of behavior? While scenario explains the description of every day situation and what kind of activities users want to perform and How, Why? How SSTs fit in the context of their general life? It also explains the users prospective for guiding a design or service of SSTs and prompt new design possibilities and features. The scenario assists us in thinking about using SSTs in different context. Due to the scenario we can expose
problems and opportunities in current design. It flesh out and evaluate a design idea from multiple perspectives.

In the following section we present our personas followed with one scenario. The content of the sections collected by doing questioner contained open-end questions that cover using the SSTs. Were the data gathered from different places at Umeå University.

5.1 Persona One

Emma is 21 years old blond Swedish girl and she lives in Umeå city, Sweden. Currently she is doing her bachelor degree in Umeå School of Business and Economics (USBE) at Umeå University. She is interested in sports, writing and browsing Internet. She does not have a car so she goes to school and different places by buss. She has an advanced knowledge of how to use a computer. She also likes to use new technologies that embodied in many different devices since it save her time. Having a laptop computer helps her for doing different works especially for checking her email and social networking by talking with family and friends on the Internet. She enjoys computer classes as well as doing her Online Shopping and Internet Banking service.

She uses her laptop for Online Shopping to buy books from online stores and different kind of tickets such as bus, cinema and airplane. She uses her mobile for keeping reference of product code information such as bus ticket since she does not carry paper bus ticket. While browsing the internet for online shopping, she fined the things she exactly need since the opportunity to search for her required products at different online stores much easier than visiting the physical stores where she can check the prices for the same products at different online stores. She chooses the same product with lesser price. She likes online shopping because there are not time constraints for shopping. She does not like to buy clothes from online shops, as she loves to check dress fits according to her physical body. She becomes frustrated while online shopping when she is not sure about the term and condition. In order to know about term and condition she calls at help line and sometime she does not understand how to do the process so she prefer to cancel it (buying online) at that time. She has good and bad feedback (attitude) regarding online shopping. She thinks that online shopping still need to be made more savers.

According to Internet Banking service, she uses her laptop computer to pay the utility bills i.e. rent, internet, etc. and make some transactions and refilling credit in her mobile. She takes the whole responsibility if some problems happened. The question that she have it in her mind all the time is if she make a mistake then to whom she will ask? She while in the end she has positive attitudes for using this service.

According to Self-Check in machine service, she likes to use this service since it is quick and efficient to get your boarding card and the labels for the luggage without waiting in long queue. Since she uses machine to get the service she take the whole responsibility if some problems happened. The question that she have it in her mind all the time is if she make a mistake then to whom she will go and ask? In the end she has a positive attitude regarding this service.
5.2 Persona Two

Antonio is 24 years old; he is doing his education in Sweden at Umeå University. He takes interests to learn more about information technology and how it’s change our life by using computers. That’s why he is currently doing his higher education in Information Technology (IT). In his free time he likes to play music by using his guitar, playing computer games and play different sports.

His typical day is like other common students, He checks his email after his breakfast. He goes to university by using his bicycle or sometimes he walks to University since he live close to it. During his travelling inside and outside the city he uses the bus. But for travelling outside the country he uses the plane for visiting the far cities in Sweden or for travelling to other countries out of Sweden.

After finishing his tough day at the university he goes back to his home and start playing music. After that he starts playing computer games until he get tired, then he goes to bed. Due to his tight schedule at the university and other activities, he does not have enough time to go and buy electronic accessories, hardware, software and other different products from the stores at the city centre so that he prefers to buy online. After searching on the internet and exploring the online stores he found his required electronic product while most of the time he use new shopping sites to buy his stuff. It is hard to trust the new shopping websites since he interact with virtual world.

He feels comfortable while using the internet since he can visit many shopping websites at the same time. He believes that using SSTs save his plenty of time because he can buy any product from anywhere around the world without moving from his place. Mostly he uses his desktop computer for online shopping. Sometime when he is out of his home he uses his mobile (iPhone) to check what is available on the online stores but he do not use his iPhone for buying products online.

Antonio use internet banking service to check his account; paying utility bills buy and sell stocks. He has a good knowledge in information technology which helps him to deal with technology problems especially while using internet banking service for doing different kind of activities. Using internet banking service saves his time instead to go to the bank. His interests to learn more about new technological services made him trying different services to understand it and learn how to use it. While trying to learn new services he do not give up by facing different mistakes since he trying to learn and understand how the new services can help him where he says “I take the whole responsibility and afford consequences for doing mistake myself”. He believes that systems and services can be improved with passage of time to reach better performance in future.

He do not using Self Check-in Service since his travelling are made by aviation where he is always reaching the airport before his trip time in two hour, so he check-in by waiting in the long queue by professionals of air Line Companies.

5.3 Persona Three

Jurma is 30 years old. She uses her bank account to get her salary each month. She likes to do all of her bank activities by visiting the bank and pay by cash for any shopping process. She always keep cash money with her and pay cash during her routine shopping where she all the time do her best to find the good opportunity to pay only by cash. She do not like to use
internet banking service since it’s a tool where somebody can trace her as it happened with her in the past. While doing her shopping and it is not possible to find her opportunity to pay cash then she go and visit the bank to transfer the money or whatever the transaction with help from the bank officer. For the big transactions Jurma likes to pay by going to the bank intermediately rather than using internet banking service since she believe that the bank documents will be good evidence to use in future by going to the court if any mistakes happened.

Jurma prefer to do her shopping by going to the market and buy her things from their since it helps her to pay by cash. She likes to visit the market and check the products then buy what she want direct from the market. She also checks the prices at different stores. By visiting the different stores she can make analysis about her required shopping. She only used online shopping if her desired products, things are not available in local market and some time she wants to buy from other countries i.e. books. She don’t like to use new technologies smartphone and computer tablets since she love her PC and she do all of her services by using it. She does not think that new technologies can replace her PC just in order to get few services.

Jurma don’t use the Self-Check-in Machine since she does not travel a lot also she do not know about Self Check in service since she do not have it at the airport in her city so she have never use this kind of technology.

5.4 Scenario
Ahmed is 32 years old, he get acceptance to be one of the master students in Business at Umea University. He received his Bachelor degree in Information Technology. Before he come to Umea-Sweden, he have booked a student apartment from Bostaden company, Internet connection account from Bredband company and TV connection from ComHem company where the companies will send him bills each month to pay. When Ahmed arrive Umea he go to the bank and open account at Nordea bank so he can pay the bills. He found that the bills for the first month have arrived to his address. Ahmed don’t know how he can pay his bills so he start asking his friends how he can pay the bills and they told him that he can pay them online or he can pay them if he go direct to the bank, so he try to pay the bills first time online but he couldn’t do it since he don’t know Swedish language where the interface of the bank website build in Swedish language only, that make the online service for him complicated. So that he decide to visit the bank in order to know how he can pay the bills online. He gets the help from there but the bank takes 80 sek for the help he get. In order to save his 80 sek, Ahmed learns how he can do the online service and pay his bills online by using internet bank service, so he can load a credit to his mobile where with his experience in information technology he learn how he can control his account perfectly and start to buy and sell stocks online.

Ahmed’s like to play sports, guitar and computer games while he sometimes browse the internet to check his email and social network. In order to increase his knowledge in information technology he all the time read about it so he can follow the new technologies since technology all the time developed where new services and systems are found. He does that to reach better performance in the future. Ahmed have buy his laptop and smartphone
Ahmed decides to buy new computer accessories from the internet for his laptop. So he starts checks what is available on the online stores by using his iPhone. He really feel comfortable regarding visiting any website during his search since he uses his iPhone to check what is available on the online stores but he buy the product by using his laptop in order to go through the details of the products. Ahmed can stay on the online store websites for long time where at the stores he need to run from one to another since he need to go to other stores to find a cheap price. After he fined his product (wireless keyboard and mouse) he order them from electronic online store called OnOff and pays the money online by using his Visa card. This semester Ahmed has taken two courses where he needs to buy the course literature for each course. He goes to Amazon website and buy his books from there.

Ahmed expects to finish his study in this June so he decides to go with his friends to the cinema to watch a movie where they later can say goodbye to each other. He goes to sj.se and book the cinema ticket where the website send him the reference code on his mobile (iPhone). Also Ahmed get invitation to visit his cousin in the south of Sweden after three months and he knew that if he book the flying ticket before three months he will get it cheaper so that he search on the internet to find a suitable ticket for him where he have visit many different websites and see different prices of the tickets, after searching for a good Airline company and price he found what he look for exactly and book the ticket by paying for the cheapest ticket by using his visa card. He also gets the reference code for his ticket on his email and iPhone.

Time pass very fast and Ahmed prepare himself for visiting his cousin in south of Sweden. Ahmed take his luggage and went to the airport where he find a lot of people waiting on the queue to get their tickets and the label for their luggage's so he go to use the Self-Check in Machine where he need just to enter the reference code of his flying ticket from his iPhone.

6. Findings of Empirical Study

After conducting our empirical study through using both approaches of data gathering, we found that all participants using almost all services. The following sections summarized our findings for each approach.

6.1 Qualitative Approach Findings

The qualitative approach was conducted by interviews with different participants who were chosen randomly from Umeå, Sweden. They also belong to different age groups.

“I like to use Internet banking by using my Mac laptop. But I don't like if someone (system) push me to adopt particular service. For example, regarding internet banking, bank system push me to use this service by staying at my laptop. The bank provides me several services to do different activities i.e. to pay house hold bills, transferring money to other countries etc. I don't want to pay any charge for getting a service either to the bank or to anyone else. I like to book my airline ticket by myself. Thanks...I can recharge my mobile from my account in
any time with least amount 50 SEK. If I have to buy voucher from a store, there is no any voucher less than 100 SEK and it deducted tax up to 10% for the company and sometimes more than that where I got only 90 SEK in my mobile. So I prefer to charge my mobile from my bank account. (28 years\ Male\ Single\ Swedish\ Student).

Another Swedish participant with 22 years old and a graduate student at Umeå University to tell us about his experience while using Internet Banking Service.

“I like to use Internet banking because by use it I do not meet any bank employee in the bank. I don’t like the attitude and the behavior of the bank employees. As they always try to dominate me while there body language not politely dealing. You know why.....because I am student and they just welcome to those people who add more transactions everyday such as businessman. It’s not justification with me”.

While describing his experience he became emotional. He used online shopping 4 to 5 times in the year for buying books, CDs, DVDs and some other products. He does not travel a lot by plane so that he did not use Self-Check-In service.

“I use self-check-in machine rarely. I am hesitant of that machine. I feel if I do something wrong I will not claim to airline company. As it is matter to get plane. So if these mistakes held by employee of company they can manage and they accept their responsibility. I do not want to take any kind such extra stress. I feel more satisfaction by waiting in queue for check in rather than to use self-check-in. I like to buy on visiting stores rather to buy online. I am regular user of internet banking” (A female with 32 years old).

The use of these services depends on the situation and also more depends on the personality. Few people are more conscious about quality while others are conscious about price etc. We conducted interview with 50 years old man and he look toward quality of the product rather than the price. He told us

“I am using all these services. Well, regarding internet banking I am not regular user as my wife. I can do all such kind of activities. Sometime I like to use it to transfer money or to check my balance. I don't have any hesitation regarding adoption of new technology or services. I often use online shopping to buy books, airlines tickets. I do not have any security doubts such as to steal my money while using online shopping. The most important thing is the quality of the product. I do not like it if I do not get the same quality as it described at the internet. I became frustrated if that product is not according to my needs. For example, I need cover for my glasses but at the internet it’s hard to claim some time I have to reach the company in Stockholm for short notice, and then i have to buy online ticket at any cast”.

While talking about self-check in he told that

“It depends on airline and airport, like sometime I travel without luggage and I do not use self-check-in in this situation. Sometime it’s hard to press on self-check-in machine screen, I push so hard to write my reference number, but when I look to the screen there is nothing, I think the screen should be more sensitive”
Our participant feels comfortable at both places private and public. He has his old mobile “Nokia 3310” and he doesn’t think to change the mobile until its break. He likes touch screen technology; he said “it’s more fun to input by touch screen”.

It is really hard nowadays to believe if someone tells you that he/she does not have a mobile phone for doing his/her good public interaction, job and also have social life. But in our study we met a Swedish man with 45 years old and when we ask him about Smartphone and computer tablet, he smiles and replied

“Life is running without mobile why I should keep any Smartphone and computer tablet. I have a desktop computer and I use it to check my account information. I go to the bank for transactions. I only like to buy online musical instruments while my friends help me to buy airline ticket. I prefer to go to store to buy things. I rarely use self-check-in machine.” Also he adds “I use internet banking to pay my bills and transfer money. I do not like to buy among lot of peoples especially at occasion of Christmas and Easter so that I often do online shopping for these activities. I buy charismas gifts, books. I like to surf intent instead to go in town for shopping. As a regular user I use Malmo Airline all the time and I don’t use Self check-in machine. I also do not know about mobile-check-in service. I have smartphone and I did not use it for these services” (Male/ student 29 years old).

Few people like to keep simple mobile with them since these mobiles is stronger than any smartphone. One of the participants told us,

“I do not have smartphone and computer tablet. I just have iPod (mostly I use it for listening music). I only use it for internet banking when I am in emergen situations such as to pay some bills when my laptop computer does not work. I do not like to buy online shopping. I like to buy by visiting stores. I love to see, try and also to feel the products either it is clothes, shoes or my mobile. I feel good when i press keys on mobile and I did not feel comfortable while using iPod. I do not like smartphone as it is much sensitive if it fall it became damage not like simple phone it’s stronger. I am not much caring to keep things safely. I like to check-in by company employees. I do not have problem to wait in queue” (Female student with 24 years old)

6.1.1 Discussion of Qualitative Approach Findings

Sometime people have negative attitude about technology as North and Noyes portrays “technophobes” similarly as “people that have held especially negative attitudes towards technology” (North & Noyes, 2002).

Age and gender does matter a lot for making positive or negative attitude for technology. According to our analysis if people have positive attitude about technology they have less technology adoption hesitation and vice versa.

Levin and Gordon that boys find computers to be more fun, interesting, comprehensible, and more important than girls (Levin and Gordon 1989). Male have higher level of interest in computer related technology while woman have less interest (Agnetha Broos,2005.p,23)

Few users get inspiration from their family and friends for adopting new technology. One of the participants with 50 years old said that "If my family has negative experience to use any services while using online shopping then it effects on my decision for adopting such service
or technology” Another with 32 years old, he is from Iran and has advance knowledge of using computer but he is not regular user of online shopping due to his limited needs. Actually he has negative experience of using online shopping, he said that “Once I tried to buy laptop from www.blocket.se, I paid the money but I did not get a laptop”. Other said “I bought wrong voucher for Lycamobile from their website, when I claimed to get back my money, the company did not give me anything so I lose my trust to buy online shopping” And it depends on the user needs, budget and marital status. A Pakistani girl with 24 years old and live with her parents in USA said that

“I have iPhone to make call and iPod for listening music. I never used Internet banking and online shopping. As my father do both services for whole family. Mostly we use mobile check-in. But for me when I travel alone I like to use self-check-in machine at airport. It also depends on which time and from which airport I am taking my plane. I only stayed in line at help desk when there are a lot of people waiting to use self-check in machine”.

A Swedish woman with 48 years old has simple mobile phone said that “She uses internet banking regularly as it’s her responsibility to pay all bills and other financial activities for the family. I do not use self-check-in machine it is boring to do it by myself”.

The language issue has impact on adopting these services. Mostly participants want interfaces that support international languages since it is easy to understand. A female with 31 years old from Iran and doing her PhD study said to us that

“I have only simple mobile but I wish to get iPhone/iPad due to their advance functions. Often I use all these services but I do not understand Swedish language. Especially the interface such as Nordea bank website it is only in Swedish, I used Google translator to understand it all the time.”

A small number of participants do not use SSTs services due to the massive information and the difficulty to understand it.

“I feel scare due to the massive information on some interfaces while using Self-Check-in Machine and sometime few Self-Check-in Machines have really a complicated interfaces, so I prefer to wait in the queue for my check-in by getting help from the company employees ” (A female student from France with 32 years old)

Not all of the participants prefer to use technology and feel comfortable while use it since they are still likes to touch the physical shape of the service such as using ticket paper. Others feel more comfortable when they press the buttons of their simple mobile phone. As one of the participants tell us about these services

“I have normal mobile phone and I feel comfortable while pressing its buttons. I like to have paper boarding pass instead of electronic boarding pass so i do not like to get mobile check in. I rarely use online shopping; it’s only to buy airline tickets” (A Swedish female with 30 years old)

Participants feel comfortable while using desktop computers and laptops where they do not feel comfortable while using small screen technology. “Due to smaller screen of smartphone, I make mistakes due to smaller keyboard so I do not use it for internet banking or online shopping. I have iPhone just for listening to music and calling”. (Male student with 26 years old)
Trust play vital role for adopting services and technologies. Either its matter to pay money or trust in brands or stores we found in our qualitative data gathering that almost all participants are conscious about trust.

“I like to buy from only those websites that I have trust and good repute for them. I do not like to buy from unknown and new websites. I am afraid to lose my money while using the new online stores. I use only Norwegian Airlines while travelling by plane. I am regular user of Self Check in Machines and when it come to their self-check in machines I trust them and I feel comfortable while interacting with them” (Swedish female with 40 years old)

Another Swedish participant with 39 years old, said that

“First thing I do usually is to check the familiarity of any online store by searching in Google or sometime I get feedback about it from my family and friends. If I get positive feedback it increases my trust. But I do not buy anything online by using a smartphone or a computer tablet since I do not have any of them. I also do not use self-check-in machine”

The use of SSTs depends sometimes on the situation and the available alternatives. Some of the participants rely entirely on technology where all of their bills paid directly to the suppliers from their bank account without needs to do it manually. As one of the participants with 34 years old told us

“I have my iPhone since 2 years; I do not think if I have used it for internet banking, except once that was last date to pay my bill. I love to use my laptop. And I prefer to buy things by visiting stores unless if I do not found my required products in the market”.

Usually students do not use these services due to their fewer needs except to buy books or other stuff. A Romanian PhD student with 28 years old said that “I do not use internet banking frequently, I do not know why.... I think that I do not need much to do. I never used online shopping and self-check in machine.”

6.1.2 Summary of Qualitative Data

The response from participants was more positive in the age group of 20-30 years old where it is less in the age of 41-50 years old.

Table 2 summarized the adoption or not of SSTs by the participants. As shown on the table the demographic variables affect a lot on adopting technology specially SSTs.
### Table 2 Summary of adopting SSTs or not by the participants

<table>
<thead>
<tr>
<th>Age group</th>
<th>Male</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Smartphone/\tablet Computer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Users</td>
<td>Non users</td>
<td>Users</td>
<td>Non users</td>
<td>Users</td>
<td>Non users</td>
<td>Yes</td>
</tr>
<tr>
<td>20-30</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>31-40</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>41-50</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>7</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Female</td>
<td>20-30</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>31-40</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>41-50</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Smartphone and tablet computer used in age group 20-30 more than the other groups. Among 7 participants there are 4 participants who have smartphone and only one participant has tablet computer. These participants are usually using internet banking and online shopping. The male participants have more trends toward using internet banking than female participants. The female participants have also fewer trends for online shopping they prefer to buy from the stores and want to check by taking, trying the products either it’s mobile or clothes, shoes etc. Male participants are commonly using Self-Check-In Machine than females where females prefer to wait in a queue to get boarding pass from the company employees. Elderly participants do not have smartphone or computer tablet and they have fewer trends to use all these services especially online shopping. The participants in age group of 31-40 years old have intermediate trend to use smartphone only. The females in this age group have more trends to buy online shopping they are more conscious to buy online by visiting many online stores. The same trend for online shopping observed in the males who are on age group of 41-50 years old. Participants (Males and females) have almost the same trends to keep smartphone and tablet computer.

### 6.1.3 Conclusion from Qualitative Findings

Our findings from the qualitative approach can be concluded in the following points:

- The effects of new technology for adopting SSTs are still in its early stages. Since people using smartphones and tablet computers in emergent situations beside other usage.
- It takes time to make attitudes of people for using new technology.
• Demographic variables, marital status and income have effect for adopting new technology and SSTs.
• People do not use commonly online shopping just because the money issues such as getting their money by unauthorized person.
• People do not have sufficient knowledge how to use the SSTs.
• People get inspiration from their family and friends for adopting SSTs.
• Smartphones are not suitable for online shopping and internet banking due to smaller screen where computer tablet become more suitable for that.
• People feel comfortable while interacting with SSTs at private places especially if they use internet banking and online shopping.
• The interface of these services have important role for adoption where people prefer the interface that support the international languages since it is easy to understand such as building interfaces that support the English language.

6.2 Quantitative Approach Findings

The study conducted in 8th may 2011 to 15th may 2011 at Ålidhem, Umeå University and downtown Umeå city in Sweden and the data gathered by distributing 160 questionnaires on different participants where they selected randomly and their age between 21 to 50 years. While giving the questionnaire to the participants we inform them that we will come back after 10 minutes to collect the questionnaires while in the end we got back 155 questionnaires.

During the analysis process we entered data for 150 questionnaires by using special analysis software called SPSS. We did not use 10 questionnaires in the analysis since 5 of the participants didn’t completely fill the questionnaire and the other 5 participants left the place without give us the questionnaires. By using SPSS software we have made our data analysis through using different cross tabulations. Table 3 shows the number of participants (male and female) who use SSTs and who do not use it.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Do you use self-service technology</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Male</td>
<td>10 (12.82%)</td>
<td>68 (87.18%)</td>
</tr>
<tr>
<td>Female</td>
<td>16 (19.51%)</td>
<td>66 (80.49%)</td>
</tr>
<tr>
<td>Total</td>
<td>26 (18%)</td>
<td>124 (82%)</td>
</tr>
</tbody>
</table>

*Table 3 Participants gender with response of using SSTs*

As shown on table 3 we got almost equal response from male and female respondents. There were 124 (82%) respondents who were using all these services “internet banking, online shopping, and self-check-in machine at airports) and 26(18%) respondents were not using these services.

Regarding participants marital status we got more response from single respondents with age 21-30 and least response from 41-50 years old respondents. Most of the participants are using all of the services especially who belong to the who belong to the age group of 21-30 years old and least participants found in age group 41-50 years old .The marital status for all respondents shown in the following table.
<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>159</td>
</tr>
<tr>
<td>Married</td>
<td>111</td>
</tr>
<tr>
<td>In a relation</td>
<td>49</td>
</tr>
<tr>
<td>Divorced</td>
<td>7</td>
</tr>
<tr>
<td>Widowed</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>33</td>
<td>70</td>
</tr>
<tr>
<td>16</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>17</td>
<td>32</td>
<td>49</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>72</td>
<td>78</td>
<td>150</td>
</tr>
</tbody>
</table>

*Table 4 Participants gender with their marital status*

There were only 30% respondents who had touch screen mobile phone, 11.33% had computer tablet and 52% had normal mobile phone. Were 6 respondents did not have smartphone or tablet computer or even not a normal mobile phone. The respondents of age group 20-30 years old had more trends to keep new technology as comparing to other two age groups while the respondents of age group 41-50 years old did not have interests to keep new technology. Table 5 shows which devices respondents have.

<table>
<thead>
<tr>
<th>Which Device do you have</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch screen Mobile(i.e iPhone)</td>
<td>45 (30%)</td>
</tr>
<tr>
<td>Computer Tablet(i.e. iPad)</td>
<td>17 (11.33%)</td>
</tr>
<tr>
<td>Normal Mobile Phone</td>
<td>78 (52%)</td>
</tr>
<tr>
<td>None</td>
<td>6 (4%)</td>
</tr>
<tr>
<td>Computer tablet + touch screen mobile</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Computer tablet + normal mobile Phone</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>25</td>
</tr>
<tr>
<td>31-40</td>
<td>16</td>
</tr>
<tr>
<td>41-50</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
</tr>
</tbody>
</table>

*Table 5 the age of participants with what kind of devices they have*

The results shows that respondents are using the internet banking often were online shopping used less than both services while self-check-in machine used by a small number of respondents. Also in the results we can see that females are more interest to use online shopping comparing with the number of male respondents. The details of using different services presented in table 6.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which service do you use?</td>
<td>Internet Banking</td>
<td>Online Shopping</td>
<td>Self-Check in at Airport</td>
</tr>
<tr>
<td>Internet Banking</td>
<td>11</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>Online Shopping</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Self-Check in at Airport</td>
<td>4</td>
<td>1</td>
<td>27</td>
</tr>
</tbody>
</table>

*Table 6 the gender of participants and which services they use*
Depending on the age groups, we can see that the respondents with 20-30 years old use all services while others with 41-50 years old not completely interested to use all services. As shown in table 7, respondents usually use internet banking more than any other service while they don’t like to use self-check-in machine as much as other services.

<table>
<thead>
<tr>
<th>Age</th>
<th>Internet Banking</th>
<th>Online Shopping</th>
<th>Self-Check in at Airport</th>
<th>Internet + Online Shopping</th>
<th>Internet+ Self Check in at Airport</th>
<th>All</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>26</td>
<td>2</td>
<td>30</td>
<td>71</td>
</tr>
<tr>
<td>31-40</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>13</td>
<td>3</td>
<td>10</td>
<td>32</td>
</tr>
<tr>
<td>41-50</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>5</td>
<td>5</td>
<td>44</td>
<td>7</td>
<td>46</td>
<td>124</td>
</tr>
</tbody>
</table>

*Table 7 the age of participants with which service(s) they use*

Most of the respondents “Males and females” had almost equal trend to use self-check-in machine at airport while females use mobile check-in more than males. See table 8.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Check in at airport</th>
<th>Using device</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self check in machine</td>
<td>Help Desk</td>
<td>Waiting in queue</td>
</tr>
<tr>
<td>Male</td>
<td>28</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>31</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>41</td>
<td>9</td>
</tr>
</tbody>
</table>

*Table 8 the gender with using devices for Self-Check in Machine*

According to the results, the majority of respondents prefer to use their devices in private places rather than in public places while respondents with 41-50 years old can use SSTs in public place. For more details see table 9.

<table>
<thead>
<tr>
<th>Age</th>
<th>Public place</th>
<th>Private Place</th>
<th>Both</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>9</td>
<td>22</td>
<td>45</td>
<td>76</td>
</tr>
<tr>
<td>31-40</td>
<td>10</td>
<td>17</td>
<td>14</td>
<td>41</td>
</tr>
<tr>
<td>41-50</td>
<td>2</td>
<td>16</td>
<td>15</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>55</td>
<td>74</td>
<td>150</td>
</tr>
</tbody>
</table>

*Table 9 the age group with where the participants feel comfortable while using SSTs*
As we mentioned before that our questionnaire contain two sections were section 1 belong to those who use the services and section 2 was filled by all those respondents who did not even use one or all service(s).

Our findings shows that 63 among 74 respondents who did not use internet banking, online shopping and self-check-in machine because they have fear of making mistakes while using the SSTs and difficulty to correct their mistakes. See table 10.

<table>
<thead>
<tr>
<th>People hesitate to use for fear of making mistake.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>No</td>
</tr>
<tr>
<td>20 -30</td>
<td>1</td>
</tr>
<tr>
<td>31- 40</td>
<td>5</td>
</tr>
<tr>
<td>41-50</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
</tr>
</tbody>
</table>

*Table 10 the group of age with hesitation of use and fear of making mistakes*

Also in the results we can see that 66 respondents did not understand technology matters easily.

Using SSTs influenced by several factors. One of the main factors is the money were most of the respondents who do not use internet banking, online shopping and self-check-in machine do not use it due to money factor. Figure 3 present the factors that affect on using SSTs.

**Figure 3 Factors affect on using SSTs**

6.2.1 Summary of distributed Questionnaires

Internet banking service used more regularly and frequently than any other service. Were 69.35 % of the respondents using it for checking their accounts. Regarding online shopping, 49.51 % of the respondents using this service regularly and 44% use it occasionally. While self-check-in machine at airports used commonly from 23% of the respondents. Among 124
respondents there were 32 who have never uses self-check-in machine due to the lack of knowledge about how they can interact with it. In addition to 74 respondents who have fear to use SSTs mistakenly where they cannot correct the mistakes by themselves if it’s happen. All respondents in the three age groups have the same opinion about the fear issue for using SSTs as the result shows that 97.22% of the respondents have this fear while 2.22% do not think about this fear while using SSTs.

Concerning new technology there were only two respondents who are using smartphone and tablet computer for internet banking and online shopping services where they prefer more to use their laptop or desktop computer to do that.

6.2.2 Conclusions of the Distributed Questionnaire
Based on 150 questioners that were distributed during the study in different places at Umeå-Sweden we conclude our findings in the following points.

- The Age of the respondents has a strong effect for adopting SSTs and other technologies.
- Elderly people represent the age group of 41-50 years old. They do not like to use technology for getting a service since they like to get a service by meeting people either for internet banking, online shopping or for check-in. (Table 10, Table 5)
- Adult people represent the age group of 31-40 years old. They have fewer trends to use new technology.
- Young people represent the age group 21-30 years old. They like to learn about new technology. Moreover, they use these services commonly and regularly. (Table 7 and Table 5)
- People do not use these services due to several factors such as lack of knowledge, fear of making mistakes even they have knowledge of how to use technology. (Table 10, Figure 3)
- All respondents of the three age groups (who use SSTs or not) have fear of making mistakes while using SSTs since they do not know how to correct it if it happened. This fear is found more in the age group of 20-30 years old while other age groups have the same fear. (Table 10)
- People in age group 21-30 years old, feel comfortable in public and private places while using these services. Where other people in both age groups (31-40 and 41-50 years old) feel more comfortable in private places. This becomes a main reason for not adopting SSTs in public places. (Table 9)
- People like to use our selected SSTs if the interfaces designed in an understandable language such as English.
- Smartphones are not suitable for using the service such as internet banking, online shopping etc. due to the smaller screen while computer tablets are much better for the same purpose.
- Males and females have equivalent behaviour for adopting and using SSTs.

6.3 Online Questionnaires Findings
In order to cover larger areas of people who use new technologies and SSTs we made an online questionnaire which contain the same questions as our paper questionnaire. We use
Google Document (GD) website to create the questionnaire. The online questionnaire sent randomly to different people and posted at Umeå University group on Facebook as well as on other groups. Respondents of the online questionnaire belonged to different countries such as Pakistan, India, Bangladesh, Morocco, Palestine, UAE, Thailand, China, Libya, Iran, Iraq, Italy, France, German, Denmark, Sweden, Norway, UK, USA etc.

6.3.1 Findings of the Online Questionnaire

Our online questionnaire sent to many people in order to cover larger zone. But we got a response from the respondents who get personally our request to fill the questionnaire where we sent personally request for 150 respondents. In the end we got response from 64 respondents living in different countries with different age groups. The questioner analyzed by using the summary of responses feature from GD website. The following section describes our findings from the online questionnaire. We got response from 48 males and 16 females where they distributed into three age groups as shown in figure 4.

![Figure 4: The number of respondents who participated to fill in our online questioner](image)

Our online questionnaire covers 78% of the respondents who lives out of Sweden and 22% who live in Sweden.

Regarding to respondents knowledge of using technology we got 3 with basic knowledge, 34 with regular knowledge and 27 with advanced knowledge. They are using different technological devices for getting the service as shown in figure 5.

![Figure 5: Which device respondents have](image)

Most of the respondents have master degree while 3 have higher education and 7 still studying at school. See figure 6.
Regarding the trust issue while using technology in public and private places we found that respondents feel more comfortable in both public and private places with percentage 73% while some participants feel more comfortable in private places with percentage 23% and some other in public places with percentage 3%. This directly affects on adopting SSTs.

Not all of the SSTs used by respondents, some of them use all and some others use just two as well as some others don’t use any service as presented in figure 7.

There were 81% who use all these services and only 19% were not using any of these services. We get this result by asking them the following question:

Do you use Self Service Technologies (i.e. Internet Banking, Online shopping and Self-Check in at Airport)? Yes (go to Section I), No (go to Section II).

Section I used for the people who use the services and section II for those who didn’t use the services. Figure 8 shows the response of this question.

Regarding new technology (smartphone and computer tablet) respondents perform their service by using technological devices that make them feel comfortable while use it. Table 11 shows the result of which devices make the respondents feel comfortable to use it while performing the service. For internet banking and online shopping respondents feel comfortable while using their laptop computers on the other hand the self-check-in machine respondents feel comfortable when they use the self-check-in machine. In table 11 the highest number of
respondents and percentage are the sign for feeling comfortable while using this technology or method to perform the service.

<table>
<thead>
<tr>
<th></th>
<th>Internet Banking</th>
<th></th>
<th>Online Shopping</th>
<th></th>
<th>Self Check In Machine</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Users</td>
<td>Percentage %</td>
<td>Users</td>
<td>Percentage %</td>
<td>Users</td>
<td>Percentage %</td>
</tr>
<tr>
<td>PC</td>
<td>28</td>
<td>48%</td>
<td>28</td>
<td>51%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laptop</td>
<td>51</td>
<td>88%</td>
<td>47</td>
<td>85%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Tablet</td>
<td>5</td>
<td>9%</td>
<td>3</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smartphone</td>
<td>10</td>
<td>17%</td>
<td>4</td>
<td>7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple phone</td>
<td>3</td>
<td>5%</td>
<td>2</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Check In Machine</td>
<td>19</td>
<td>83%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help Desk\</td>
<td>12</td>
<td>26%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waiting in the queue</td>
<td>9</td>
<td>19%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile check in</td>
<td>9</td>
<td>19%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 11 where respondents feel comfortable while performing the service

Respondents use the internet banking service for different purposes as shown in figure 9.

Respondents use the online shopping service for different reasons as shown in figure 10.

Respondents use the self-check-in machine service at the airports for different reasons as shown in figure 11.
Concerning new technology, a small number of respondents have smartphone and computer tablet but they do not use them for performing these services. While asking them whether they will use the new technology in the future for performing these services? They answer the question with a positive attitude where 61% of the respondents want to use new technology for internet banking, 56% for online shopping and 67% for self-check in machine at the airport. See figure 12.

![Figure 11 reasons for using Self-Check-In Machine Service](image)

Using new technology for adopting SSTs have been ranked by the respondent from 1-5 where this rank used to examine whether the importance of using new technology in the future for performing the services. Ranking results for each service presented in figure 13.

### Internet Banking

<table>
<thead>
<tr>
<th>Rank</th>
<th>Importance</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Least</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>13%</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>19%</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>22%</td>
</tr>
<tr>
<td>5</td>
<td>Most</td>
<td>17</td>
</tr>
</tbody>
</table>

![Figure 12 Using touch screen devices to adopt SSTs in the future](image)
Respondents think that using new technology is suitable to perform Internet Banking and Online Shopping. As we see in figure 14 there were 26 respondents who thought that using new technology are not suitable while 29 think that using new technology are suitable for both services. In figure 14 we can see two answers where “No” mean that respondents think that new technology are suitable while “Yes” it is not suitable.

The reasons for making new technology not suitable for performing internet banking and online shopping services are due to several factors that shown in figure 15.

![Figure 14 number of users who think that touch screen devices are suitable or not for using SSTs](image)

![Figure 15 due to these reasons new technology not suitable for using SSTs](image)
By looking to figure 15 we can see that respondents think that new technology not suitable to use while performing SSTs due to the small screen size and habit to use these services by computer while 12 respondents thought that new technology not suitable, since they do not feel comfortable when they use it for Internet banking and online shopping.

The respondents who did not use any one of the services or use all of the services have fill section two of the online questionnaire. This section explains the reasons why respondents did not use any service where this is due to the following reasons it is matter of money, do not trust on machine, do not know how to use, complex interface, technology anxiety, and inner fear.

6.3.2 Conclusions of the Online Questionnaire

The following points summarize our findings of the online questioner where it summarizes the result of 64 respondents.

1. The number of male respondents more the females who fill the online questionnaire (Figure 4)
2. The online questionnaire filled by the young respondents with age group 20-30 years old more than the other age groups.
3. The trend of using new technology to perform SSTs is not much used. But this trend increased with passage of time. Respondents still like to keep simple mobile phones with them more than smartphones or tablet computer. (Figure 5)
4. Most of the respondents are doing their master studies where we get the highest response of filling our online questionnaire from them. (Figure 6)
5. Internet banking and online shopping used also outside Sweden where self-check-in machine at the airports used also outside Sweden but less than the other services this due to the lack of knowledge about how they can use the machine as well as taking a risk responsibility if any mistake happen by interacting wrong with the machine. (Figure 7)
6. There are more than 81% of the respondents have more trend to use these services. (Figure 8)
7. Respondents like to use smartphone and computer tablet for performing SSTs in the future.
8. The ability to use internet banking and online shopping services via new technology is higher than using self-check-in machine.
9. Respondents did not like to use new technology (smartphones) for Internet Banking and Online Shopping due to their smaller size and habit to use their desktop computer.
10. Respondents do not use SSTs when it comes to the involvement of money.

7 Final Discussions

Our research study started with general expectations regarding the use of technology in the daily life where we are looking to find answers for our expectations. We started our expectations with asking each other if the new technology (smartphone and computer tablet) have effects for adopting SST services (internet banking, online shopping, and self-check-in machine at airports). What are the main factors behind the adoption of SSTs? We found that not only new technologies have impact on the adoption behaviour of SSTs but also demographic variables affect on this behaviour. How much computer knowledge has an importance to adopt SSTs? Do people feel uncomfortable at public places than private places
while interacting with SSTs? Our research focused on three age groups 20-30, 31-40 and 41-50 years old.

In this research we started by conducting a pilot study where 13 different participants has been selected. We use both qualitative and quantitative approaches for gathering data. The pilot study was conducted on four SSTs (Internet Banking, Online Shopping, Self-Check-In Machine at Airports and Mobile Bus Ticket). On base of our findings from the pilot study we have choose three SSTs (Internet Banking, Online Shopping and Self-Check-In Machine at Airports) where we use them to perform our Empirical study. We continue using our two approaches that used while conducting the pilot study. We use qualitative and quantitative approaches to conduct the Empirical study method and gathering the data. Regarding to the quantitative approach we made a form of 28 questions (questionnaire) divided in to two sections. The first section contains 12 questions that covered demographic data profile of participants, education, computer knowledge, occupation and new technology device. This section filled by all of the participants who were using any one or all services. Moreover, the section two contains the remaining questions that filled by the participants who were not using any one of the SSTs (Internet Banking, Online Shopping, and Self-Check-In Machine at Airports) or not using all services. In section one also the questions covered factors of using each service and also give description about when, where and how people access to use these services.

Our study conducted in three major areas at Umeå-Sweden where we found that 18 of the respondents belong to three age groups. After conducting the study we realize that young respondents with 20-30 years old were giving the maximum response. While the age of the respondents increased the response of them turn out to be decreased. Young respondents considered to have high percentage of having smartphone and computer tablet comparing with the other age groups. The new technologies add new effects for adoption SSTs (internet banking, online shopping and self-check-in machine at Airports). Furthermore, the culture has also effect on adoption of SSTs. Respondents who belong to Sweden have more positive trend to use SSTs comparing to other respondents which they belonged to other countries. We distributed our questionnaires in Umeå-Sweden for 150 different respondents. With help of using SPSS program we did our data analysis where we got almost equal response of male and female for data gathering.

In order to check the trend of new technology and the use of SSTs (internet banking, online shopping and self-check-in machine at Airports) in other countries we conducted online questionnaire. We made our online questionnaires by using Google Document website. The online questionnaire sent to many people by using different virtual groups on Facebook and messengers (Skype, msn and yahoo). But in the end we got positive responses only from the people to whom we wrote personally request. The result shows that we got more positive response from both males and females. The effect of new technologies for adopting the SSTs was very minor. The most important factor for adoption SSTs is the demographic variables and the personal attitude of respondents.
8 Final Conclusions

Technology has become an integral part for adopting SST services. The term Self-service can mean different significances to different participants, depending on their perspective. In this research, we have identified several factors that appear to influence the satisfaction and the dissatisfaction with technology-based service. We have shown that participants are increasingly willing to help themselves. Although the Web-based sample was appropriate for this study and provides substantial benefits, the sample presents limitations that should be addressed in further research. It is possible that the participants in the online questioner have a generally more positive attitude toward SSTs than the general population. This bias could prevent additional categories from being identified. After analysing our data we conclude our findings in the following list:

1. Demographic variable are one of the variables that have impact on adopting SSTs and the use of new technologies.
2. Participants aged 20-30 years old have more trends to use Internet Banking and Online Shopping comparing with other age groups (31-40 and 41-50 years old).
3. The trend of carrying new technologies (smartphone and computer tablet) has seen more in age group 20-30 years old than other age groups. In other words, the increase in participants’ ages lead to a decrease in the use of new technology, from 30 and above.
4. Participants prefer to use Internet Banking more than Online Shopping and Self-Check-In Machine at the Airports.
5. Participants do not like to use smartphones for Online Shopping due to their smaller screen.
6. Participants do not like to use smartphones for Internet Banking due to their performance where they need to go through many steps in order to do a transaction.
7. Participants do not like to use SSTs when it is come to the money issue.
8. The trend to carry smartphone is higher than computer tablet.
9. Participants are habitual to use SSTs by using their desktop or laptop computer.
10. Not all the participants who use one of the services are using the remaining two.
11. Participants feel more comfortable while using the services at private places than public places.
12. Participants do not want to use Self-Check-In Machine at Airports because they are afraid of making mistakes.
13. Participants feel more comfortable to buy clothes from the physical stores instead of interacting with technology since they want to try and touch the product material before they buy it.
14. Knowledge in the use of the computer does not have much impact on the adoption of SSTs or on the use of new technology.
15. Knowledge in how to operate any machine or service is important for participants.
16. Participants are affected by their families and friends when they adopt any SSTs or when they want to buy a new technology.
17. Both genders (Males and Females) have almost the same orientation toward adopting and using SSTs.
18. Participants prefer to use SSTs that support comprehensible language interfaces i.e. English language interfaces where the interface language play a big role for adopting SSTs.

19. There is a rare effect of new technology on adopting SSTs. Because the participants using the smartphones and the tablet computers in emergent situations in addition to other usage.

20. Marital status of participants does not affect the adoption of SSTs.

21. Education plays an important role for adoption of SSTs.

Regarding future work, we belief that SSTs participants are in continuously increase and that led us to think more and mentioned for further research in this area. Although in this research the focus was end users of SSTs where the interface of using SSTs are very important and that what we suggest for researchers to work on and design a simple interfaces that help the people to adopt the SSTs easily.

9 Limitations

We conducted our research study in Umeå, Sweden. Sweden considered as one of the most developed countries in Europe regarding the use of technology by the people. Moreover, Sweden’s population can adopt and use the technology easily. Our Findings and results can be different if the study conducted in English-speaking countries and also different in non-developing countries. Umeå is a small town with a population of 75000 people while at Umeå University there are 30000 students and 4500 staff. We did not conduct our research in the whole Umeå town where we just covered only three main areas in Umeå. Most of the research study participates are students where a few of them residents of Umeå or other Sweden cities. Conduct our research study in a big city of Sweden or a big city in other countries by taking more participants as a sample for the study will give different results. We get less response from elder people of age 41-50 years old so our sample of this age group cannot cover the whole population in this age group at Umeå city. During our research we have used just English language and we believe that using Swedish language to conduct the study will led to find more useful results. Due to time constraints we did not conduct more participants from small towns and villages where they have less education. We got response from the participants who live out of Sweden while conducting the online questionnaire. So our respondents cannot present adoption attitude of total population of their native countries. We just send our online questionnaire by sending message to those people who are in our list of friends on Facebook. Furthermore, most of our respondents have master degree. Our findings from the online questionnaire can be different if it is filled by random people who belong to different field of studies. We covered general issues and factors for using three SSTs where we did not cover other technical issues. Additionally, we did not conduct our research at Umeå Airport where we can observe passengers while using Self-Check-In Machine since we found that our respondents do not travel by flight a lot. If our research study conducted at big Airports then the results will be different regarding the use of Self-Check-In Machine.
10 References


11 Websites


12 Appendixes
The following section contains our research study Glossaries as well as useful information regarding the research methodologies (Pilot and Empirical Study).

12.1 Appendix A: Glossaries
The glossary section contains a description of the key words for our research study in order to help the readers to understand it easily.

Self Service Technologies SSTs
The purpose of SSTs is to provide technological interface to do task which is independent on direct contact or service involvement of employee (Meuter et al., 2000). The main advantage of using SST is to save cost, reduce time consumption, more control over service and delivery (Meuter and Bitner, 1998). By using SSTs users and employers receive many benefits i.e. company want to serve more customers by utilizing fewer resources that will be a good source to reduce the cost while on the customer side, he/she can use it anytime such as ATM, Online purchasing, pay at pump station etc. some other SSTs that users can use self-check-in, self-payment machine) when it is convenient for him/her (Hsieh,Chang-tseh.2005).

Smartphone
A word describing the mobile devices that are similar to the normal mobile phone but it has more advanced computing ability than contemporary phone. It has functions of mobile phone and PDA. On Smartphone users can run multi-task applications such as making call, messaging, internet browsing etc. most of the smartphones has camera, Wi-Fi, touch screen etc. There are many companies producing smartphone devices with distinct features such as Android, iPhone, Blackberry, Symbian, Rim etc. [3]

Tablet Computer
It is kind of mobile computer that has larger screen than mobile phones and PDAs in addition to flat touch screen. Users interact with it by using their physical body such as fingers, hands, etc. through touching the screen where its help them to navigate the screen easily. Computer tablets have virtual keyboard rather than physical one where sometimes the keyboard is attached to the touch screen by slide joint. One of the most famous examples of the Tablet Computers is the iPad. [4]

Internet Banking
It is one of the Self Service Technologies where people can use it to do transactions by using the bank website. The internet banking service provides several features for the people who use it such as checking the account, transferring money from one bank to others etc. Today, the bank transactions are just far from few clicks of the computer mouse so in order to use internet
banking service people need visa card (debit card), PIN number, bank account number and internet access on any computer or any other device. [5]

**Online Shopping**
It is kind of Self Service Technologies that are designed to provide a shopping environment for people to buy products on the internet from the merchants directly. The products displayed to the people on the internet where they can see the picture of any product they want as well as details about it these products can be books, clothes, shoes, electronic accessories etc. [6]

**Self-Check in Machine at the Airports**
Another type of Self Service Technology and what distinguishes it from the previous two that it is a machine that used by passengers at the Airports to help them to print the boarding pass. The process can be done by implementing couple of easy steps. Through using the service passengers check in and check their travelling companions where the check in process is usually the first procedure that passengers do when they arrive the airport, as airline regulations require passengers to check in by certain times prior to the departure of the flight.

**Adoption of new Technology**
It’s the use of technology services by a person or a company in order to achieve their objectives.

**Public Place Interaction**
It is anywhere people allowed to interact with SSTs freely. This would include public transportation areas, such as subway terminals and train stations, interactive kiosks, ATM, self-check in machine at the airports, beverage wending machine, self-scanner in the super markets, paying money by card at petrol pump or gas stations etc.

**Private Place interaction**
The use of SSTs belongs to some particular person where it can be used at homes, offices, or some other places. When a particular person need to do a private tasks such as online shopping, online bank transaction etc. by using tablet computer, smartphone, personal computer etc. the person can have more concentration and get more satisfaction while using such a private place for using SSTs.

**12.2 Appendix B: Personas Questioner**
We are master students from the Informatics department at Umeå University. Currently, we are conducting a survey about the effect of new technology “smartphone and computer tablet” for adopting Self Service Technologies. This survey is part of an academic research and the results of this survey will be presented and used for our research. Your cooperation will be highly appreciated and we thank you for taking your time to answer this survey.

1. **Your Gender**
   - Male
   - Female
2. Your Age

[ ] 21-30 [ ] 31-40 [ ] 41-50

3. Are you __________________?

[ ] Single [ ] Married

4. If your marital status is Married, Do you have any children?

[ ] No [ ] Yes.

5. How many? ____________________________

6. What is your home country?

[ ] Sweden [ ] other

7. What is your native language?

[ ] Swedish [ ] other

8. Your Education (the higher status currently possessed)

[ ] High School [ ] Bachelor

[ ] Post graduate [ ] Other

9. Your Occupation ____________________________

10. What are your interests?

________________________________________________________________________________________

________________________________________________________________________________________

11. What are your hobbies?

________________________________________________________________________________________

________________________________________________________________________________________

12. What a typical day look like for you?

________________________________________________________________________________________

________________________________________________________________________________________

13. Which SSTs are usually do you use?

a. Online Shopping

________________________________________________________________________________________

________________________________________________________________________________________

b. Internet Banking

________________________________________________________________________________________

________________________________________________________________________________________
c. Self-Check in Machine at the Airports

14. Why do you like to use each one of the following SSTs?
   a. Online Shopping

   b. Internet Banking

   c. Self-Check in Machine

15. What are the major frustrations when you trying to achieve your goals while using each of the following?
   a. Online Shopping

   b. Internet Banking

   c. Self-Check in Machine

16. You have ______ knowledge about how to use a computer.
   [ ] Basic  [ ] Average  [ ] Advance

17. Do you like to use technology?
   [ ] Yes  [ ] No

18. In order to complete your tasks while interacting with SSTs does you ask for help?

19. Does the service help you to save your time or the time is not important for you while using these services?
20. Your Goals, attitudes, beliefs (conscious and subconscious)

<table>
<thead>
<tr>
<th>SST's Opinion</th>
<th>Goals</th>
<th>attitudes</th>
<th>beliefs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Shopping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet Banking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Check in Machine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank you for your cooperation 😊
12.3 Appendix C: Questioner Form

We are master students from the Informatics Department at Umeå University. At this time we are conducting a survey about the effect of new technology “smartphone and computer tablet” for adopting Self Service Technologies. We perform this survey for our academic research study and the results of this survey will be used and presented in our research. Your cooperation will be highly appreciated and we thank you for taking your time to answer this survey.

Please Read this NOTE BEFORE you start
-(If your age is less than 20 and greater than 50 please don’t fill the survey and give it back empty)

-A Tablet Computer  It’s a handheld device that are larger than the mobile phone and smaller than the Laptop Computer, where you interact with it by using an onscreen virtual keyboard or a digital pen rather than a physical keyboard.

1. Your Gender
   - Male
   - Female

2. Your Age
   - 20-30
   - 31-40
   - 41-50

3. Your marital status
   - single
   - Married
   - In a relation
   - Divorced
   - Widowed

4. How many children you have?
   - No any one
   - Less than 3
   - 3 and above

5. What is your home country?
   - Sweden

6. What is your native language?
   - Swedish

7. Your Education (the higher status currently possessed)
   - School
   - Bachelor
   - Master\MS
   - Others

8. Your Occupation
   - Top management/Professionals
   - Supervisory/Middle management
   - Self-employed/Own business
   - Student
   - Pensioner

9. You have ______ knowledge about how to use a computer.
   - Basic
   - Average
   - Advance

10. Which one of the following devices you have (Choose as many as applicable)
    - Touch screen mobile(i.e. iPhone)
    - Computer Tablet (i.e. iPad)
    - Normal Mobile phone
    - None

11. Where do you feel comfortable while using services/devices?
    - Public places
    - Private place
    - Both

12. Do you use Self Service Technology (i.e. Internet Banking, Online shopping and Self-Check in at Airport)
    - Yes (Go the Section 1)
    - No (Go to Section 2)

**Section 1**

13. Which one of the following SSTs do you use? (If you don’t use any service please go to section 2)
    - Internet banking
    - Online Shopping
    - Self Check in At Airport

Note: If you don’t use at least one service continue filling both sections.

14. For each one of the SSTs you consider yourself as a ________ user. (please tick for each technology as below)

<table>
<thead>
<tr>
<th>Service</th>
<th>Regular</th>
<th>Occasional</th>
<th>Irregular</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet banking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online Shopping</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self Check in At Airport</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. Which device/devices do you use to perform the service (Choose as many as applicable)

<table>
<thead>
<tr>
<th>Service</th>
<th>Device</th>
<th>Touch screen mobile(i.e. iPhone)</th>
<th>Simple Mobile phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet banking</td>
<td>Computer\PC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online Shopping</td>
<td>Computer\PC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check in At Airport</td>
<td>Self-Check in Machine</td>
<td></td>
<td>Mobile check in</td>
</tr>
</tbody>
</table>

16. By using which device you feel more comfortable while performing the following service? (Choose as many as applicable)

<table>
<thead>
<tr>
<th>Service</th>
<th>Device</th>
<th>Touch screen mobile(i.e. iPhone)</th>
<th>Tablet Computer (i.e. iPad)</th>
<th>Mobile phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet banking</td>
<td>Computer\PC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online Shopping</td>
<td>Computer\PC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check in At Airport</td>
<td>Self-Check in Machine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6
### Online Shopping

<table>
<thead>
<tr>
<th>Computer\ PC</th>
<th>Laptop</th>
<th>Touch screen mobile (i.e. iPhone)</th>
<th>Tablet Computer (i.e. iPad)</th>
<th>Mobile phone</th>
</tr>
</thead>
</table>

### Check in At Airport

<table>
<thead>
<tr>
<th>Self-Check in Machine</th>
<th>Help desk</th>
<th>Mobile phone</th>
<th>Tablet Computer (i.e. iPad)</th>
</tr>
</thead>
</table>

17. **For which purpose/s do you prefer to use the service? (Choose as many as applicable)**

<table>
<thead>
<tr>
<th>Internet banking</th>
<th>Online Shopping</th>
<th>Self-Check in At Airport</th>
</tr>
</thead>
<tbody>
<tr>
<td>For payment utility bills</td>
<td>Products are not available in market</td>
<td>Lots of people in queue</td>
</tr>
<tr>
<td>Check your balance</td>
<td>Concession to buy online</td>
<td>getting late</td>
</tr>
<tr>
<td>For transfer of money in other account</td>
<td>You are busy</td>
<td>With your family \ friends</td>
</tr>
<tr>
<td>All</td>
<td>looking for best price</td>
<td>All</td>
</tr>
</tbody>
</table>

18. **Would you like to perform the service by using new technology “smartphone i.e. iPhone and computer tablet i.e iPad” (select Yes or No)**

<table>
<thead>
<tr>
<th>Internet banking</th>
<th>Online Shopping</th>
<th>Self-Check in At Airport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

19. **If you don’t like to use iPhone/iPad to perform the service, tell us why?**

20. **Please select rank from 1-5 for using a service via smartphone and tablet computer (1 for least important and 5 for most important)**

<table>
<thead>
<tr>
<th>Internet banking</th>
<th>Online Shopping</th>
<th>Self-Check in At Airport</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

21. **You can easily understand the interface of each service if it is in**

<table>
<thead>
<tr>
<th>Mother language</th>
<th>English language</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Both languages</td>
</tr>
</tbody>
</table>

22. **Do you think smartphone and tablet computer are not suitable for online shopping and internet banking?**

<table>
<thead>
<tr>
<th>Screen size</th>
<th>Difficult interaction</th>
<th>Don’t have application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less advertisement</td>
<td>Less knowledge</td>
<td>Not feeling comfortable</td>
</tr>
<tr>
<td>Habitual to use pc\laptop</td>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>

23. **If you don’t use any one of the following services, tell us why. (Give reason/s for not using the service)?**

<table>
<thead>
<tr>
<th>Internet banking</th>
<th>Online Shopping</th>
<th>Self-Check in At Airport</th>
</tr>
</thead>
</table>

24. **You don’t use the services due to lack of (Please tick for each attribute “YES” or NO”)**

<table>
<thead>
<tr>
<th>Its matter of money</th>
<th>Complex interface</th>
<th>Technology anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t know how to use</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Do not trust on machine</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

25. **Do you have difficulty to understand technology?**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

26. **You do not use the services due to fear of making mistakes that you cannot correct.**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

27. **How would you like to learn about new technology (Choose as many as applicable)**

| Advertisement | Demonstration | Listening from a friend |
28. How much your family & friends are important for affecting and changing your decision to adopt the SSTs?  
Please select one rank. (1 for least important and 5 for most important)

<table>
<thead>
<tr>
<th>Service</th>
<th>Rank 1</th>
<th>Rank 2</th>
<th>Rank 3</th>
<th>Rank 4</th>
<th>Rank 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet banking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Online Shopping</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Self-Check in At Airport</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Thank you for your cooperation 😊

12.4 Appendix D: Online Questioner
Our online questionnaire form can be founded here:
https://spreadsheets.google.com/spreadsheet/viewform?hl=en_US&formkey=dE1iZ3dJTEJUdE5manNsVmI5Rnc2SXc6MQ#gid=0

12.5 Appendix E: The Data
The data analysis form generated automatically by using the summary choice on Google Document where the summary contains graphs and other statistics. To see our data analysis by using this tool, visit these links:
https://spreadsheets.google.com/spreadsheet/gform?key=0AkHML5P_rJuQde1iZ3dJTEJUdE5manNsVmI5Rnc2SXc&hl=en_US&gridId=0#chart