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An Exploratory Study of Consumer Attitudes Towards Mobile Ticketing in Sweden

(“Work in progress”)

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Abstract

Swedish public transport organizations have set an objective to double usage of the public transport during the next coming five years. This study attempts to investigate if the current ticket solutions support the goal of the public transport companies, and if the available mobile phone solutions can lower barriers for consumers. In order to do that, critical travelling moments for users of different market segments were estimated during a pre-study stage. The following focus group discussions helped to validate problems identified during the pre-study. At the same time, focus groups provided deeper consumer insights on general consumer perception of the transport service, ticketing, mobile payment, quality of service, consumer expectations related to the public transport services, and consumer satisfaction and loyalty.

The conducted research helped to identify problems existing in public transport ticketing and mobile payment areas, which have the negative impact on the usage of the public transport service and contribute with additional barriers for users. Moreover, this conclusion is supported by multiple examples that clearly illustrate what does not work, and why it does not work. Hence, mentioned solutions do not support the overall objective of the public transport operators. The comprehension of these problems and barriers can contribute to a better understanding of consumer needs and expectations, and help the public transport service providers to improve the service.

Keywords: Mobile Payment Services, Public Transport, Public Transport Ticketing, m-Ticketing, Focus Group, Consumer Expectations of a Service, Perception of a Service, Quality of Service, Customer Satisfaction, Loyalty

1 INTRODUCTION AND BACKGROUND

Currently, many market players express interest in the mobile payment. An increasing number of mobile payment service providers see new business opportunities and invest in new services in order to enter the market. Consequently, the number of mobile payment solutions offered in the market is increasing. Traditionally, public transport ticketing is being considered as a “killer application” for mobile payments. Moreover, due to a high level of penetration of mobile phones and opportunity to use them as payment instruments, it is possible to specify a societal demand for simple and easy-to-use mobile solutions. It needs to be mentioned, that in Sweden SMS payments were introduced in the public transportation sector more than five years ago in order to replace cash payments for single tickets on buses.

The main objective of this research is to study needs and possibilities related to an integrated mobile solution for the public transport. In the researchers’ opinion, the core functionalities of the integrated mobile solution for the public transport should include mobile ticketing, payment, and supporting location-related information systems on public transportation. Additionally, other types of services and values (i.e. discounts, coupons, and similar) can be integrated within the solution. However, the major challenge of the research is related to the specifics of Swedish transport system. There are a number of different local public transport operators providing services in different cities, districts, or regions. A lack of cooperation between them, different transport rules, and diverse types of tickets result in a lack of flexible integrated solution for users travelling on a longer distances.

Currently, a new law on public transportation is launched where one of the goals is to stimulate competition. In addition, the transport organizations want to double usage of the public transport during the next coming five years. SL (StorStockholms Lokaltrafik), the public transportation company in Stockholm, specifies following customer segments:

- Car drivers (*Bilister*): they prefer to use the car for most of their travels.
- Changing users (*Växlare*): this is a segment that uses different means of travel including SL public transport (subway, buses, tram, and boats), commuter trains, a car or a bicycle depending on the purpose of the trip.
- Loyal SL customers (*Lojal SL-resenär*): these travel daily with SL even though they have access to a car in the household.
- Everyday (or dedicated) SL travellers (*Hänvisade till SL*): these travel often with SL (daily or one to a few times a week), and are dependent on SL as they do not have access to a car in the household.

The company sees the opportunity to increase the public transport usage by attracting *car drivers* and turning *changing users* into more frequent travellers. Consequently, the research questions that are addressed in this paper are:

Do the current ticket solutions support an increase in the public transport usage?

Can mobile phone solutions lower the barriers for consumers?

The objective of this paper is to contribute to a better understanding of consumer expectations and needs regarding public transportation and a provision of practical findings on consumer perception of public transport in general and its specific aspects (ticketing, payment, and informational services). The research is carried out by KTH Royal Institute of Technology researchers. Partners of the project are the regional public transportation companies in Stockholm (SL) and Uppsala (Upplands lokaltrafik, UL), and Samtrafiken AB, which is an “umbrella” organization for public transport companies.

The paper is organized as follows: the literature and related work review is presented in the next section of the paper. Then methodology, data collection, and research approach are described. Next an overview of results and findings is presented. Finally, we summarize the findings and discuss consumer perception of and attitudes towards the current situation in the public transport ticketing and payment.

1.1 Ticket and Payment Solutions

As mentioned, in Sweden mobile and SMS payments have been in use for some time. When implemented on a mobile device, the mobile payment extends the functionality of the mobile phone. So, it can be used before, during, and after the purchase. In addition, it provides a direct communication channel to the users. The SMS ticket for the public transportation is a very good illustration of these aspects:

- The mobile phone is used as a ticket machine (to buy a ticket);
- The mobile phone subscription is used for payment (in Sweden until February, 2013);
- The phone receives the receipt of the transaction;
- The phone carries the ticket (used for ticket issue);
- The phone is used for validation (using a manual inspection or an optical reader).

The SMS tickets were introduced in order to carry out the decision to stop cash payments at buses. This was based on efforts by the work environment authority (“Arbetsmiljöverket”) and the unions as a response to the number of robberies at buses. Due to recent changes in mobile payment regulations and public transport ticketing, some additional facts should be mentioned.

1. First of all, before February, 2013, SMS public transport tickets were included in the mobile phone bills by mobile network operators. But starting from February, 2013, mobile operators cannot include payments for non-telecom services in their bills, due to EU directive (Markendahl, 2013). In response, the major mobile operators formed a joint venture, 4T Sweden, which launched a mobile wallet – WyWallet – service. Currently, in order to perform SMS payments, users have to register for WyWallet or a set of new SMS payment providers, and to provide personal data. The service has received lots of criticism from consumers used to the old SMS billing system and unwilling to provide personal data for micro-payments. The introduction of the new SMS payment system requiring registration resulted in a significant drop in sales of SMS tickets (up to 70–80%).

2. Starting from September, 2013, SL stopped the usage of paper single tickets and paper strip tickets (*remsa*) which consisted of a strip of 16 single tickets. Instead, a new prepaid ticket solution called *reskassa* was introduced. The main idea behind the service is to load a certain amount of money to the pre-paid plastic “blue card” (SL Access card). The minimum sum equals 100 SEK (≈12 EUR). In this case, the single trip price in the Inner Stockholm (zone A) is 25 SEK (≈2.9 EUR), compared to 36 SEK (≈4.2 EUR) when using an SMS ticket.

3. Several recent mobile ticketing solutions proved to be highly successful for *changing public transport user* travelling on the route Uppsala–Stockholm. No paper ticket or plastic card is used; instead, a ticket is implemented as a smartphone application. Ten single tickets for 72 SEK (≈8.3 EUR) each are purchased at the time, the tickets are loaded onto the phone and paid with a credit card. Each single UL–SL ticket is valid for two hours including local UL and SL travels and the new SL–UL commuter train.

Another integrated ticketing solution for the same market segment and the same route includes usage of a Swedish Railroads commuter train (Statens Järnvägar, SJ). A sample travelling situation could be as follows: a bus in Uppsala, a SJ commuter train from Uppsala to Stockholm, and the subway or a bus in Stockholm. However, this solution is more expensive than the previously discussed UL–SL solution: 124 SEK (≈14.4 EUR) one-way compared to 72 SEK (≈8.3 EUR).

4. UL recently changed the main ticket solution. Previously, different cards were used for regional bus trips and trips within the city of Uppsala. With the new solution the same card can be used for both regional and local bus trips. During a period of one week neither the old nor the new card could be used. Meanwhile, travellers were forced to use the SMS payment solution or mobile applications.

2 LITERATURE REVIEW

The defined research questions are related to concepts as customer expectations of a service, perception of a service, service quality, customer satisfaction and loyalty. These are the factors shaping service attractiveness for customers, and they are overviewed in this section.

Customer expectations are “pre-trial beliefs about a product ... that serve as a standard or reference points against which product performance is judged” (Zeithaml, Berry and Parasuraman, 1993). A conceptual model describing the nature of customer expectations of a service is proposed by Zeithaml, Berry and Parasuraman (1993). The researchers argue that customer expectations on a service exist in two levels: a desired level, as a service “should be”, and an acceptable level of a service, or an adequate service. “The difference between desired service and the level of service considered adequate” (Zeithaml, Berry and Parasuraman, 1993) represents the *zone of tolerance* or a range of acceptable service levels. The zone of tolerance may vary depending on individual customer’s demands or service attributes.

The level of a desired service is influenced by (1) *enduring service intensifiers* implying higher level of consumer sensitivity to service; and (2) different *personal needs* of consumers including physical, social, and psychological (Zeithaml, Berry and Parasuraman, 1993).

The level of an adequate service is shaped by (1) *transitory service intensifiers* or short-term individual factors increasing consumer sensitivity to the service; (2) *perceived service alternatives*; (3) *customer self-perceived service roles* or the level to which consumers can influence the level of the service they receive; (4) *situational factors* that are not controlled by service providers, such as accidents; and (5) comparison between *predicted service* and perceived service (Zeithaml, Berry and Parasuraman, 1993).

Moreover, level of both predicted and desired service is affected by (1) *explicit service promises* made by service providers; (2) *implicit service promises* which are “inference about what the service should and will be like” (Zeithaml, Berry and Parasuraman, 1993); (3) *word-of-mouth communications*; and (4) *past experience*.

Another discussed concept is a concept of an “*emotional payoff*” (Zeithaml, 1988). As presented below in *Figure 1*, the concept represents a chain of benefits that consumers gain when consuming a product or a service.

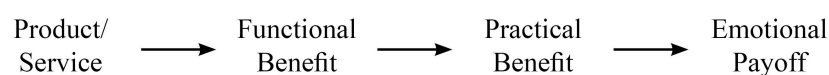


Figure 1. Chain of benefits for consumers (Zeithaml, 1988).

So, consumer expectations of the service used as a standard become an essential element in assessment of *service quality*, which affects the overall customer satisfaction of the service (Grönroos, 1982; Zeithaml, Berry and Parasuraman, 1993). Quality can be defined as “conformance to requirements” (Parasuraman, Zeithaml and Berry, 1985). Following observations are proposed by the analyzed literature (Grönroos, 1982; Zeithaml, 1988; Parasuraman, Zeithaml and Berry, 1985; Zeithaml, Berry and Parasuraman, 1993):

- The perception of service quality depends on comparison of consumer service expectations with actually experienced or performed service.
- The process of service delivery is also important for perceived service quality.

Additionally, Parasuraman, Zeithaml and Berry (1985) specify ten determinants of service quality: reliability, responsiveness of the personnel to provide a service, competence, access and easy contact, courtesy involved friendliness of the personnel, communication to consumers and keeping them updated, credibility of the service provider, security of the service, understanding of the consumer and his needs, tangibles include the physical evidence of the service (e.g. physical facilities, tools or equipment, and so on).

Furthermore, it is defined that it is not only service quality that shapes consumer attitudes and expectations, but also *price* and *value* (Zeithaml, 1988). The roots of a general “value” concept lie in the economic theory of “utility”. In marketing literature *consumer value* is related to a value gained from the consumption event (Payne and Holt, 2001). In order to define consumer value, a range of conducted researches was focused on consumer buying behavior and decision making. So, for example, a study carried out by Zeithaml (1988) served to deepen the understanding of perceived value in relation to price and perceived quality. This research resulted in four definitions of value: “value is low price”, “value is whatever I want in a product”, “value is the quality I get for the price I pay”, and “value is what I get for what I give” (Zeithaml, 1988).

Overall, analysis of factors positively affecting *consumer satisfaction and loyalty* is essential from marketing perspective. One of the significant aspects is a good understanding of consumer needs. Previous studies provide evidence, that improvement of services or products in accordance to consumer needs results in a greater level of satisfaction and an increased level of consumer loyalty (Flint, Blocker and Boutin, 2011).

2.1 Review of Empirical Studies

A number of exploratory studies of consumer expectations have been implemented in different areas. For example, Johnson, Nade, and Fornell (1996) investigated “consumer expectations, perception of performance, and satisfaction for bank loans”. The main finding of the research is a defined specifics existing in consumer expectations in bank loans services, and perception of performance had no impact on consumer satisfaction.

Another example of study on customer expectations was implemented by Lidén and Edvardsson (2003). The researchers have performed a study on customer expectations on service guarantees in the public transport in Stockholm. Conducted seven focus group discussions and method of charting consumer expectations confirmed that consumer expectations are affected by the situation in the industry, service characteristics, and the service guarantee.

A problem of consumer expectations in cross-cultural contexts was explored in a number of researches. An example of this type of a research is presented in a study implemented by Li et al. (2011). The research is focused on Chinese outbound tourists’ travel expectations in the United States of America, and provides practical findings based on 11 focus group discussions.

2.2 Proposed Research Framework

In order to understand how to facilitate the usage of the public transport service and to increase its attractiveness for consumers, an exploratory study has been performed (Li et al., 2011). The major analysis criteria were specified based upon overviewed literature:

- General perception of the transport service.
- General perception of the public transport ticketing and mobile payment service.
- Perception of the price of the public transport service.
- Consumer expectations of both the public transport and mobile ticketing services.
- Perception of the quality of the public transport service.
- Consumer satisfaction and loyalty.

Methodology of the research is presented in the next section. It provides the overview of data collection, research approach, and research stages.

3 METHODOLOGY

3.1 Data Collection

We have collected primary data from two groups of actors: consumers and service providers. Input from consumers have been collected during focus group interviews, these are described in a separate sub-section below.

Interviews with different types of actors dealing with mobile payment services and solutions have been conducted since 2009. The main groups of actors are: i) service providers making use of mobile payment solutions, ii) providers of mobile payment and ticketing services, and iii) providers of technology solutions (that may also provide services).

A first round of interviews was conducted during 2010–2011 in order to understand the market position and plans for different actors. This is reported in (Markendahl, 2011). During 2011 mobile payment solutions, drivers, and obstacles were discussed in-depth with Swedbank, the mobile operators Telia and Tele2, and with the payment providers PayEx and PayAir. Within a project on cashless society, a number of workshops with participants from the banking industry were organized in March 2012. Another workshop on the cashless society and mobile payment services was organized in June 2012 with representatives from different sectors: parking, retailing, and transportation (Arvidsson, 2013).

A second round of interviews was done in 2012 in order to understand: i) the objective and scope of different pilot projects and trials, and ii) strategies and plans for both solution providers as well as users of the upcoming “new” SMS payment services. The 21 interviews were made with:

- Parking operators in Stockholm, Västerås, Linköping, and Gothenburg;
- The mobile parking payment provider Easypark;
- The regional public transportation companies in Stockholm (SL), Uppsala (Upplands lokaltrafik UL), Linköping/Norrköping (Östgötatrafiken), and Veolia;
- Providers of mobile payment, ticket and/or security solutions and services: Accumulate, Nets, Payair, PayEx, Samtrafiken, Seamless, Swedbank, Unwire, and WyWallet.

In February 2013, after the launch of the “new” SMS tickets for public transportation, around ten interviews were made with public transportation companies in the five major cities/regions of Sweden (SL, Västtrafik, Skånetrafiken, UL, and Östgötatrafiken) and with some of the providers of the ticket and payment solutions: IPX, Mobill, PayEx, Samtrafiken, Seamless, and WyWallet.

3.2 Research Approach

The research process has been performed in several stages. During a pre-study stage different travel situations have been developed in order to understand different needs of different user segments. These travel situations include a specific type of a traveller in a specific setting; and for each of these we have looked into different ticket and payment solutions. This has been done in order to understand whether these solutions work satisfactory or not. Mentioned scenarios have been validated during interviews with public transport operators.

Currently, the project is in the next stage, with several completed and a number of scheduled focus group discussions with real public transport users. Not a big number of people participated in focus group discussions so far. At the same time, the process of empirical data collection is not complete, yet. However, by using the first empirical set of data we want to illustrate how we will present different aspects of the research. A description of the methodology used during mentioned research process stages is presented below.

3.2.1 The First Stage: Pre-study

During the pre-study stage scenarios of different travel situations for different types of users representing different market segments were developed (see *Figure 2*). We have identified the main groups of travels: local trips, regional trips, and long distance trips including both local transport companies and the Swedish long distance train company (SJ). In this paper we focus specifically on local trips performed in the Stockholm area (SL/UL).

The developed scenarios helped to estimate critical travelling moments and the need for ticketing, payment, and information service for each segment and type of a travel. For each travel situation we looked into what ticket and payment solutions that are available for different types of users, here we have applied the customer segmentation used by SL:

1. An **Everyday user of SL/UL** has a good knowledge about the public transport, its ticketing and pricing, and uses the public transport to travel to (and back from) work or school on an everyday basis. The size of this segment in Stockholm is about 39%. The most common type of tickets used by this category of users is monthly or longer term tickets. Possible additional service that could be provided to this category of users is additional informational service on alternative routes in the case of longer traffic problems and in critical situations.
2. A **Changing user of SL/UL** easily switches between different means of transport combining a car, a bicycle, and the public transport. Users belonging to this category use the local public transport (SL/UL) for travelling a few times per week. The size of this market segment in Stockholm is about 26%. The most predictable types of ticket solutions used by *changing users* are single SMS tickets or prepaid tickets on the SL Access smart cards. Possible additional services that could be provided to this category of users are mobile trip planners, additional informational service on alternative routes or parking information.
3. A **Car driver** uses *SL/UL* very seldom and performs most of the travelling by a car. The size of this segment in Stockholm is about 35%. The most predictable types of tickets used by car drivers are single SMS tickets or prepaid tickets on the cards. Possible additional services are mobile trip planners, information on traffic and parking.

Market segment	Within SL/UL	UL <-> SL	UL <- SJ -> SL	SL/UL-SJ -> xL	xL-SJ -> SL/UL
Everyday user (always, most of the times)	1				
Changing user (sometimes)	2				
Car driver (never, seldom)	3				

Local
Regional
Long-distance

Figure 2. Matrix representing different travelling situations, SL stands for Stockholm public transport company (StorStockholms Lokaltrafik), UL – Uppsala public transport (Upplands Lokaltrafik), SJ – Swedish Railroads (Statens Järnvägar), and xL – any local transport company in another region.

Consequently, different user categories have different sets of needs. During the pre-study stage, we have identified different sets of needs and performance of existing solutions in terms of prices, time, flexibility, convenience, and so on. Having a user perspective in minds, we have identified solutions that are good, solutions that are underdeveloped and need an improvement, and several solutions that do not work (although they should). Additionally, the pre-study helped to determine obstacles that should be removed in order to increase or facilitate the use of public transport.

3.2.2 The Second Stage: Focus group discussions

The execution of the focus group discussions has served multiple purposes. First of all, the focus groups helped to understand the motives of public transport users behind selection of one or another type of transport. It also provided insights on consumers' attitudes towards public transportation and existing payment methods, and their thoughts about additional services that mobile ticketing could provide. Secondly, focus groups allowed getting responses from a number of respondents on several topics of interests, meaning considerable saving of time. In addition, group discussions have been used for validation of researchers' assumptions identified during the pre-study stage.

According to recommendations on focus group execution (Adams et al., 2007; Morgan, 1996), following aspects were considered: (1) focus groups were composed of homogeneous people representing the same market segment of users; (2) the size of the focus group was up to eight people; (3) three researchers participated during the discussion, one was facilitating the discussion and others were taking notes of important observations; (4) in addition, the discussion was recorded; (5) discussion time was limited to one hour and a half.

Questions for focus group discussion were developed in order to reflect identified analysis criteria defined in the section 2.2 *Proposed Research Framework*. The procedure of the focus group discussions was as follows: (1) in the beginning the moderator briefly presented the research purpose and discussion group aims, (2) then focus group participants briefly introduced themselves, and (3) discussion of proposed questions was facilitated. The main discussion points were:

- Attitude on public transport in general and experiences of SL.
- Discussion of ticket and payment solutions including pricing.

The questions used for focus group discussion are presented in *Appendix A*.

4 RESULTS AND FINDINGS

In this section we present results and practical findings obtained during both stages of the current research. A description of pre-study results is followed by practical findings from focus group discussions.

4.1 Pre-study Results

While looking into the different travel situations, the usability of different ticket and payment solutions were analysed. Below a number of situations for different type of travellers are described, all involving trips by SL.

Everyday users using a long-period ticket on SL Access card

An *everyday SL user* travels by the public transport to (and back from) work or study. The frequency of usage can be up to several round trips per day minimum four-five days per week. This is why the user has a good knowledge of SL transport. The most obvious ticketing solution is one of available long-period ticket options (for example, a 30 day, 90 day or yearly tickets). The ticket is stored on a prepaid SL Access card (see *Figure 3*). There is a price discount for youth, students, and pensioners. This ticketing solution is convenient and functions well.

Changing users using the prepaid SL solution for single ticket

SL previously offered a prepaid paper strip (*remsa*) with 16 coupons that can be used in multiple ways (see *Figure 4*). The same paper strip can be used for one or several persons, e.g. a family. In addition, different number of coupons are used for travelling between different city zones.

A new prepaid solution with money loaded onto the SL Access card (*reskassa*) enables the traveller to pass the gate quickly. A price of a single trip is withdrawn automatically when passing the gate. The ticket is valid for one hour to use on all possible means of the public transport. This solution has a number of drawbacks:

- It is impossible to see on card how much money is stored on it. This can be checked with a ticketing machine in the subway. Before, this was obvious by checking the paper strip.
- The card needs to be pre-configured for the number of zones of a standard trip, in the case of a trip across different number of zones, the card should be re-configured before the trip using a ticketing machine.
- The card can be used by just one person

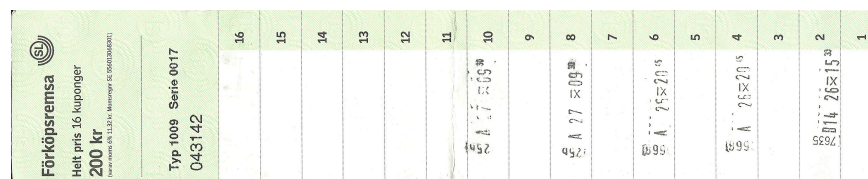


Figure 3. SL Access card.

Figure 4. A prepaid paper strip (*remsa*).

A case of a tourist arriving to Stockholm

A tourist arriving with a short-term visit to Stockholm has no previous knowledge about the ticketing used in the public transport. In order to use the public transport, a tourist needs to purchase an SL Access card (20 SEK≈2.3 EUR) and to top it up with one of available short-period ticket:

- 24 hour ticket costing 115 SEK (≈13.4 EUR).
- 72 hour ticket costing 230 SEK (≈26.7 EUR).
- A seven day ticket costing 300 SEK (≈34.9 EUR), if the period of visit is longer.

A tourist cannot use SMS payment for single tickets, because he will not be able to register for the SMS payments service. Another problem that will experience tourists is a lack of information on public transport services, traffic and schedules.

The previous single tickets and prepaid paper strips can be considered as better solutions for temporary visitors.

Single tickets for a commuter using the SL train Uppsala – Stockholm

Finally, this is an example of a case with a user-friendly solution: a mobile phone application with pre-paid single tickets. As it was mentioned in sub-section 1.1 *Ticket and Payment Solutions*, ten tickets are purchased at the time and then activated before the travel. Each single ticket is valid for two hours in all UL and SL area. This has a number of advantages:

- The pre-paid single ticket is cheaper (72 SEK ≈8.3 EUR) than the single ticket bought in a ticketing machine (112 SEK ≈13 EUR). In addition, if you travel by a bus to the train station in Uppsala, you have to pay a single bus ticket (i.e. another 25 SEK ≈2.9 EUR).
- The user will experience less stress and save time because there is no need to line up in front of a ticketing machine and to wait for a turn to buy a ticket. In addition, there is no need to take an earlier bus in order to be in time for the train.

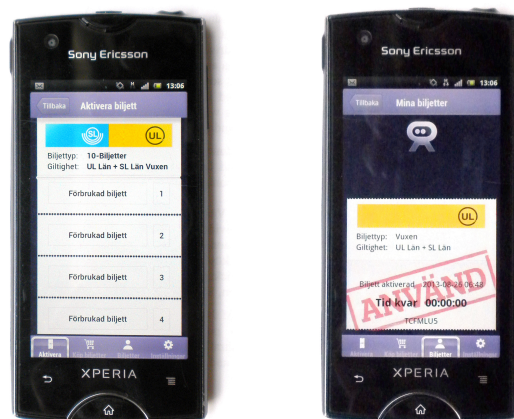


Figure 5. UL mobile ticketing application for smartphones.

Summing up, developed cases have highlighted the different needs and the performance of different service solutions. The analysis of the cases helped to determine the driving forces and obstacles for each of the travelling scenarios. In addition, the analysis of user experience helped to get insights how an integrated mobile payment/ ticketing/ information service can be designed in order to reduce barriers for public transport usage.

4.2 Results of Focus Group Discussions

The focus group discussions were held at campuses of KTH Royal Institute of Technology located in Stockholm. Institute professors, researchers, master and PhD students were recruited as discussion participants. Overall, two focus group discussions were carried out with the total number of participants equal to 12. There were eight males and four females. The age of the participants is distributed in the range from 24 to 65 years old. Most of them were 24–30 years old ($n=7$). The biggest part of their usual travels is performed within Stockholm city. This implies discussion focus on consumer attitudes towards SL, Stockholm public transport company. One group included representatives of *changing* public transport users, and another represented *everyday* users.

4.2.1 Focus Group 1

The participants of the first focus group were KTH employees working at the main campus of KTH Royal Technical Institute. All of them live in the downtown area or close to it. Some had actually moved here because of the travel reasons.

From a travelling perspective, they were all “non-car” users using a bike or a public transport (a bus, a subway and a boat) for daily travels to and from work. Only one person had monthly card, all others used other ticket and payment solutions. Previously, the prepaid paper strip (*remsa*) was used but now this solution is replaced by the pre-paid plastic “blue card” (SL Access card, that also can be loaded with a monthly ticket).

From a segmentation perspective, they belong to the group *dedicated SL users*. That is most of the respondents have and use a car but anyway prefer a public transport for daily travels.

The respondents pointed a number of motives for a car usage. So, a car is mainly used for weekend travels due to longer distances, a lot of luggage/children, or due to a lack of knowledge about how to use the public transport outside Stockholm.

All in all, it is possible to characterize the focus group participants as *changing users*. This is explained by their behaviour: to choose a type of a transport due to the needs at that specific time.

Attitude on Public Transport in General and Experiences of SL

The attitude on public transport in general was positive or very positive. So, for example, a bus was seen as a slow but comfortable solution. It was described as a place where “you can sit, relax, and read the morning paper”.

In turn, the subway is perceived as a fast but not so comfortable mean of transport. The main comments were following: “you cannot sit”, “it is crowded, you cannot bring small children or bags”.

The majority of the respondents agreed, that a bike is the fastest solution. However, it is very stressful (due to traffic) and not so comfortable (due to being warm and sweating).

A bike is preferred whenever the weather allows it, but public transport is more often used during the winter. However, the commuter trains (and subway) are not reliable during the winter due to snow problems.

About Ticket and Payment Solutions Including Pricing

In general, the discussion participants, representing *changing users*, would like to use public transport without a SL Access card. Currently, available ticketing solutions require pre-

registration, cause uncertainty both about ticket price in different city zones, and about content of the SL Access card, if it is empty or not. The respondents think, there should be easier ways to understand the ticket options and to buy tickets. In addition, the system should be designed not assuming very well informed and very well organized users.

At the same time, a monthly or yearly ticket on the SL Access card is perceived as a good solution for *everyday users*. The holder of such a card has no problems or uncertainty when using the public transport service.

The previous pre-paid solution for multiple travels, the paper strip with many coupons (*remsa*), was evaluated as a very good solution:

- It was clear how many trips could be done.
- It could be used by a group of persons (a family).
- It could easily be used for travels over different zones, i.e. using different number of coupons on the strip.

The new pre-paid solution, where you put money on the SL Access card (*reskassa*), is perceived as a bad solution in all aspects mentioned above, although, you can check remaining amount at buses and be notified. The only advantage is that you can pass quicker through the subway gates or pass the reader at the bus.

The previous SMS ticket solution for single tickets was perceived as good. It was a simple solution replacing cash, and, at the same time, it was easy to use solution in the case of spontaneous user's decision to take a bus or a subway.

None of the people in the group had registered (and consequently not used) the new SMS ticket solution. They had not even tried (although they are highly educated people and used to all sorts of new technology and services / authors comments).

4.2.2 Focus Group 2

The participants of the second focus group were KTH employees mainly living next to KTH Royal Technical Institute's Kista campus or close to it. Some selected to move closer to the campus because of travel expenses.

From a travelling perspective, four participants currently are *everyday public transport users* using pre-paid SL monthly cards. Other two respondents were everyday users before, but now moved to live next to the campus and usually walk. In addition, they use a combination of a car and public transport for their trips. These two respondents can be defined as *changing users*.

Attitude on Public Transport in General and Experiences of SL

Three respondents evaluated their attitude on the public transport as positive, two remained neutral, and one had negative attitudes due to previous negative experience. Overall, the public transport service (that is subway and buses) was considered as "very good and convenient", running "on schedule", "efficient", and "easy to use".

However, some subway lines (Green line) are perceived as unreliable. In addition, respondents highlighted a malfunction of subway and bus delays during winter snowfalls.

Changing users perceive a car as a better and faster alternative. It would be a preferred choice to use during weekends, and in winter. Compared to cars, the subway is a more preferred and faster solution during rush hours.

SL personnel is seen as not helpful. In a number of discussed situations, the personnel could not help or did not know how to help.

At the same time, the discussion participants were satisfied with the level of information available about public transport schedules. They mostly access this information using SL online site and / or a mobile application.

About Ticket and Payment Solutions Including Pricing

In general, the focus group participants agreed that SL public transport system is not convenient for people using it for the first time, tourists, and guests of the city. The experience is needed in order to understand how to use the system.

Another problem is related to the difference in a single ticket price when moving between zones A and B. The zone B single ticket's price equals 150% of zone A ticket's price. The respondents perceive the increase in ticket's price as being too high, when the travelling distance is short (two-three stations). This does not apply to monthly tickets.

The focus group respondents also noticed that there are a limited offering of ticket solutions for non-everyday users. There should be more options of available tickets covering shorter period of time (7–10–15–20 days).

During the discussion, the ticket pricing became a topic of a high importance. The focus group participants agreed that the public transport ticket prices do not encourage usage of the public transportation. Short and long term tickets are perceived as too expensive. For example, a family, where both need to travel with SL monthly cards, is considering opportunity to buy a car, since this is perceived as a cheaper option.

The pricing issue was especially true, when there is a need to travel just on a short distance (e.g. 3–4 stations). Bigger granularity, smaller zones, special price for 10 or 40 tickets were proposed as possible solutions.

The old SMS system was described as convenient and easy, whereas, the new mobile payment solution is perceived as unattractive. The respondents resisted providing sensitive personal data for service registration.

The new pre-paid solution where you put money on the monthly card (*reskassa*) was a controversial solution. Some of the respondents liked it for its simplicity; others disliked it, stating that this solution is inconvenient for visitors or group of people using SL public transport.

The public transport tickets were mainly bought using credit cards in ticketing machines or in kiosks "Pressbyrån".

Finally, following additional services could be coupled with SL Access card:

- Discounts;
- SL Access card could be used for purchases in vending machines and at different stores;
- Real time traffic information about delays, cancelled busses.

Summing up, the focus group discussions exposed a variety of consumer evaluation of the public transport service. They also helped to identify unaddressed consumer needs and experienced problems related to available ticketing and payment solutions. The focus group findings will be discussed and analyzed in more details in the next section of the paper.

5 DISCUSSION OF RESULTS

The public transport service can be understood as a complex system uniting a number of services and solutions, such as transportation of passengers from point A to point B, suggested range of transportation means, developed infrastructure, available ticketing and payment solutions, and so on. Quality and performance of each element are important for a positive service experience by consumers. Hence, a positive perception of the public transport in general and its specific components in particular is needed in order to increase usage of the public transport and to attract new consumers from *changing users* and *car drivers* market segments. In addition, existing barriers for the public transport usage should be defined and lowered.

In this section consumer perception of the public transport service, ticketing system, payment solutions, quality of the service, price, ability of the service to meet consumer needs and expectations, and identified barriers will be discussed. The discussion is based on findings obtained during the focus group discussions.

5.1 General Perception of Transport Service

It is possible to summarize, that a general perception of the public transport is positive (as presented in *Table 1*). The users perceive the service as efficient, fast, coming on time, and convenient. According to the results, *changing users* use the public transport more frequently in winters. However, the performance of the public transport during winter is considered unreliable due to traffic problems and delays in the operation of busses, subway, and commuter trains.

The most preferred public transport means are subway and buses (see *Table 1*). Bikes, walks, and cars are the most popular alternatives to the public transportation. They are selected depending on trip purposes, available time, distance, and destination.

It needs to be mentioned that *everyday users* know the public transport system well and are mainly satisfied with the level of available information. SL website and mobile application are popular solutions used for the planning of the travelling and checking the schedules of buses and subway trains. In turn, *changing users* require more information about ticketing and payment.

Table 1. SL users' attitudes on public transport in general.

	Individuals
General attitude towards public transport service	12
Very positive	1
Positive	7
Neutral	3
Negative	1
Preferred transport alternatives	12*
Subway	8
Bus	7
Boat	1
Bike	5
Walk	5
Car	4

* The overall number of participants who discussed the question. The same participant during the discussion expressed more than one opinion.

5.2 General Perception of Public Transport Ticketing and Mobile Payment Service

The respondents in the both focus groups expressed similar opinions about the public transport ticketing and mobile payment services (see *Table 2*):

1. The old SMS tickets and paper tickets (both single tickets and the prepaid paper strip (*remsa*)) were generally considered as very successful ticketing solutions. They were understandable and easy to use. So, the old SMS ticket solution was clear, easy, and convenient service using short number for SMS payment. In turn, the paper *remsa* was an obvious ticketing solution. It was easy to see how many tickets are left. Another benefit was an opportunity to use it by several people or a group travelling together.
2. The respondents expressed negative attitudes towards the new SMS ticketing coupled to the new mobile payment solution. None of the participants tried to use it. It is possible to specify following major disadvantages of the solution: (1) a need to register a separate service account; (2) a requirement to provide personal data; (3) a registration or purchase of a ticket in advance because consumer identification takes some time; (4) in general, the service is perceived as too complicated. Hence, the new SMS ticketing together with the new mobile payment solution set additional barriers to a service usage.
3. A new solution – the *reskassa* implemented on the SL Access card – is a complicated solution for people travelling from time to time (*changing users*). They do not remember if they have any tickets left on the cards. Additionally, they need to re-configure cards for travelling in-between Stockholm's zones (A, B, and C) having different fees. A card re-configuration is also needed in order to travel as a group. The solution is convenient for people travelling alone within one zone for a longer distance (since the ticket is valid for one hour). Many of the respondents highlighted that this solution is inconvenient for city visitors, tourists, and people living outside Stockholm in the areas where there is no opportunity to top-up the SL Access card. These groups of travellers are unfamiliar with the new ticketing system and require additional education.
4. The long-term tickets allowing travelling within all city zones (monthly and yearly tickets on SL Access card) are perceived as good and convenient solutions.

In general, the respondents of the both focus groups expressed a general opinion that currently there is no convenient solution for people using the public transport from time to time (more about consumer expectations in sub-section 5.4 *Consumer Expectations of Both Public Transport and Mobile Ticketing Services*).

Table 2. SL users' perception of public transport ticketing and mobile payment solutions.

	Individuals	
	Positive	Negative
Perception of public transport ticketing solutions	7*	6*
Old SMS tickets (billing by mobile operators)	2	
Paper tickets and prepaid paper strip (<i>remsa</i>)	3	3
New SMS tickets with registration		4
<i>Reskassa</i> solution on the pre-paid SL Access card	3	3
Long-term (monthly/yearly) tickets on the pre-paid SL Access card	4	

* The overall number of participants who discussed the question. The same participant during the discussion expressed more than one opinion.

5.3 Perception of the Price of the Public Transport Service

The discussion participants in the both groups consider a price of a single trip as being too high (see *Table 3*). This is especially true, when *changing users* need to travel on a short distance. Considering too high price of the public transport service, they select other travelling alternatives.

The price of a monthly card with student discount is mainly perceived as an acceptable cost. However, the price of a full monthly card is perceived as too high, especially if usual travelling distance is short. The consumers lack more sensitivity in the price differentiation depending on a travelling distance and find the existing pricing discouraging. Moreover, the existing pricing model can turn *everyday users* into *car drivers*.

Another problem is related to travelling for short distances in-between city zones with the *reskassa*. In this case, the price of a short travel becomes very high due to additional zone's fee.

Table 3. SL users' perception of the price of public transport tickets.

	Individuals	
	Too high	Acceptable
Perception of the price of public transport tickets	6*	2*
Single trip price (using <i>reskassa</i>)	5	
Monthly cards with student discount	1	1
Monthly cards, full price	1	1

* The overall number of participants who discussed the question. The same participant during the discussion expressed more than one opinion.

5.4 Consumer Expectations of Both Public Transport and Mobile Ticketing Services

During the focus group discussions, the respondents specified some expectations about the service and specific needs that are currently not addressed by the public transport service provider:

1. People travelling in-between city zones from time to time, think that more thoughtful solution is needed, for example, SL zone cards.
2. Another expectation is related to additional zone's fees, which are applied when travelling on short distances from one zone to another. Travellers expect a fair and reasonable price differentiation based on the distance they travel.
3. Non-everyday public transport users expect to see more ticketing alternatives at lower prices for single trips. The current price of single trips is perceived as too high, especially when travelling on a short distance (for example, several stations).
4. Some of the respondents expect the *reskassa* solution to be user-friendlier. The current solution is highly inconvenient for tourists, visitors, people living outside Stockholm, and elderly people. The major limitations of this solution are: (1) users need additional knowledge and education about the service; (2) it is not informative compared to previous paper solution (*remsa*), and (3) it requires additional concerns and card re-configuration when travelling in-between zone or as a group of people.
5. The users would also like to have more flexible solutions for travelling as a group. One of the suggested solutions is an introduction of family tickets.

6. The discussions helped to identify a gap that currently exists in the suggested public transport ticketing options. Available tickets do not cover periods of 10-14-20 days. The respondents see the opportunity to introduce solutions combining 10 or 40 pre-paid tickets.
7. The full long-term monthly tickets on the pre-paid SL Access card are also considered as too expensive. The respondents expect a bigger price differentiation based on travelling distance.
8. The old SMS ticketing service was easy and convenient. In order to increase the usage of the new SMS ticketing and mobile payment service, it should be less complicated.

5.5 Perception of the Quality of the Public Transport Service

The quality of the public transport service is discussed applying those determinants of service quality (Parasuraman, Zeithaml and Berry, 1985), which were addressed during the discussions. Following determinants are discussed below: reliability, responsiveness, competence, access, communication to consumers and keeping them updated, understanding of the consumer and his needs, tangibles includes the physical evidence of the service (e.g. physical facilities, tools or equipment, and so).

1. In terms of *reliability*, the performance of the service was considered very good with buses and subway being on time. However, the public transport is not reliable in wintertime and some subway lines are underserved.
2. Online and mobile tools are used for a travel planning, checking schedules and finding a real-time information about transport situation. These tools can be evaluated as a good *responsiveness* of the transport company to provide a service.
3. In general, SL *competence* as a transport service provider can be considered very good. However, some ticketing and mobile payment solutions are too complicated. Moreover, the personnel are lacking knowledge about new services and in some situations are unable to help or to provide an advice.
4. The newly introduced mobile payment and ticketing solutions complicate *access* to the service for some groups of consumers.
5. It is possible to define some gaps in the *communication* to the end users about the services. For example, not all of the focus group participants were aware about functionality of the *reskassa* and a need to re-configure a SL Access card according to travelling needs.
6. The discussions revealed some lack of *understanding of consumer needs*. This is an essential problem in suggested ticketing options and mobile payment solution. Indeed, the respondents expect more flexible ticket pricing, more ticket options for *changing users*, more convenient SMS ticketing and payment solution.
7. Some travellers consider the *reskassa* on SL Access card (*tangibles*, the physical evidence of the service) as a example of unpractical and inconvenient solution.

5.6 Consumer Satisfaction and Loyalty

The implemented focus group discussions revealed that both *everyday* and *changing users* are mainly satisfied with the performance of the public transport service in general. However, their dissatisfaction is related to the existing ticketing solutions and pricing.

So, *changing users* are unsatisfied with the existing ticketing solutions and pricing: “transport service is perfect, but ticketing is inconvenient and pricing is too high”. It is possible to state, that new types of tickets (*reskassa* on SL Access card and the new SMS ticketing and mobile

payment solution), a lack of information about them, and a lack of personnel's competence to provide help negatively affect consumer satisfaction of the service.

The *everyday users* are unsatisfied with a lack of more flexible ticketing solutions for longer periods (15–20 days): “we do not see too many options”. They find the ticket's price too high, as well.

Summing up, currently, the ticketing system seems to be designed for a well-organized person knowing everything about the system. However, people in real life make reactive and spontaneous decisions when selecting a public transport means. And then they realize that they have either wrong tickets, or not enough of money, and so on. The current system is inconvenient for the users, and one of the examples is a need to buy a ticket in advance when using SMS ticket. In addition, the current system is not flexible and requires constant consumer concentration on and thinking about their actions, payments, and ticket. This leads to consumer dissatisfaction and low loyalty in the segment of *changing users*. So, they prefer alternative types of transport (a car, a bicycle, or a walk).

5.7 Summary of Findings

According to the analyzed literature (Grönroos, 1982; Zeithaml, 1988; Parasuraman, Zeithaml and Berry, 1985; Zeithaml, Berry and Parasuraman, 1993), consumer expectations of a service are used as an ideal standard and are compared to the actually experienced service. This way consumer expectations affect attitudes towards a service and its general perception. Consumers will positively accept the actually experienced service if it located within the interval between desired level of the service and the level considered adequate, that is within the *zone of tolerance* (Zeithaml, Berry and Parasuraman, 1993).

It needs to be mentioned, that the general consumer perception of the transport service is good or very good. It is definitely in the zone of tolerance of consumers both *everyday* and *changing users*, despite some traffic problems. However, the analysis of the practical findings shows that the new ticketing and mobile payment solutions are perceived as bad or very bad, and such criteria as convenience, ease of use, price, and value are currently unsatisfactory and result in negative consumer experience.

It is possible to state, that the new SMS ticketing together with the mobile payment solution are beyond the zone of consumer tolerance. None of the respondents for any of the different age groups had tried it. The solutions are perceived as too complicated, user-unfriendly, and inconvenient. As a result, the *reskassa* on the Access card is the alternatives to the new SMS tickets, with payments performed using credit cards. At the same time, easiness and convenience of the old SMS ticket, as a past experience, affects reluctance of consumers to use new SMS ticketing and payment solutions.

Another alternative of tickets for single trips is the *reskassa* on the SL Access card. For a number of *changing users* this ticketing solution is also beyond the zone of tolerance. Consumers are not willing to use the *reskassa* when travelling on a short distance within one or across several city zones due to perceived high price of a single trip. In this case, alternative means of transport are used, that is a bike, a car or a walk. At the same time, past experience of paper *remsa* affects reluctance of *changing users* to use *reskassa*.

The monthly and yearly tickets on the SL Access card are mainly perceived as good and convenient solutions. However, consumers mostly travelling on a short distance perceive the price of a ticket as being too high. Moreover, this perception of the combination of ticket price and value motivates them to use an alternative to the public transport (a car), which is perceived as a cheaper solution. So, a perceived high price becomes a reason turning *everyday users* into *car drivers*.

6 CONCLUSIONS

Overall, the main objective of the public transport companies is to increase the usage of the public transport services by attracting *car drivers* and turning *changing users* into more frequent users. In order to do that implementation of simple-to-use, flexible and attractive ticketing and payment solutions, including usage of mobile phone based solutions, can support the overall objective.

However, the results of general observations made during the per-study stage allowed us to specify problems caused by changes in SL ticketing and mobile payment areas. These findings were supported by the outcomes of the focus group discussions. Different actions undertaken by different actors resulted in changes in ticketing and mobile payment areas that have the negative impact on the usage of the public transport service. Instead of lowering barriers for public transport usage, new solutions contribute with additional barriers. Indeed, the *changing* public transport users are dissatisfied with new solutions:

- With the change from paper strip *remsa* to *reskassa* on SL access card.
- The system became complicated. It is difficult to use for city tourists and visitors.
- New mobile SMS payment became too complicated and is not used by consumers.

Hence, the implemented changes in the ticketing and the (mobile) payment system do not support the overall objective of the public transport operators. In order to attract new consumers, the public transport service should lower the existing barriers for *changing users* and *car drivers*. In order to do that the ticketing and payment services should be simplified, to be more convenient, understandable, and user-friendly.

At the same time, needs and expectations of the *everyday* SL users should also be addressed in order to increase the level of their loyalty. Otherwise, they can select the alternative means of transport.

The main practical implications of this research are better understanding of customer needs. The results of the research can be used by the public transport service providers in order to address the identified consumer needs, and to improve the service and its different aspects according to the consumer service expectations.

The main limitation of this research is too small number of carried out focus group discussions. Only two focus groups were organized so far. However, more focus groups are scheduled in collaboration with UL and SL.

Another limitation is that currently only two market segments were addressed: *everyday users* and *changing users*. Focus group discussions with representatives of *car drivers* segment is planned as a continuation of the research.

The future work over the project will imply further work with focus group discussions. We will also look into transition period between old and new UL card, when the public transport users were forced to use other solutions (SMS payment and mobile apps).

The consumer insights that will be mapped during the focus group discussions can be used in order to propose new ticketing, payment, and business model solutions. Indeed, the importance of a focus group discussion is in deeper understanding of consumer needs. These insights can be used to develop a service bundle that meets consumer expectations in the best possible way.

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Appendix A: Focus group discussion questions

A. Questions about motives behind selection of one or another type of transportation

- What is the usual frequency of travelling: by car / bus / underground / bicycle / etc. per week
- Under which circumstances do you travel: by car / by bus / by underground / by bicycle / etc.
- What is good (benefits / advantages) about travelling by different means
- What is bad (disadvantages) about travelling by different means

B. Questions about usage of SL services

- What is your experience of SL usage: positive / neutral / negative / etc /
- Are you satisfied with the service of the public transport 1-2-3-4-5
- How do you plan the trip? Do you use online tool/mobile app?
- Do you find the ticketing system: easy to use / sophisticated / need help
- What types of tickets do you usually use: SMS / automat / *remsa* on SL card (*reskassa*) / etc.
- Is the amount of informational service used at SL enough for you to navigate?

C. Questions about payment / mPayment

- How do you usually pay for travelling tickets: cash / bank card / via sms / via internet / via mob. app
- What kind of additional services could be related to mobile ticketing: reminders / discount coupons / collection of points for further discounts / discount at hotels / etc ...