Title: Future technology in public transportation – a qualitative study based on public transportation authorities attitudes

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Abstract:

The issue that this study addresses is the public transportation's difficulty to adapt and keep up with the continuously digitizing society. To address this problem, the purpose of this study will be to investigate what could be a contribution to the further improvements within public transportation systems. The study is established alongside with the recently started “Welcome onboard” project, where the purpose is to develop and extend the public transportation as we know it today. The aim is to through five different functional areas urge the utility, where crowdsourcing will play a central role.

We are distinguishing three public transport authorities attitudes towards the different functions of the project. We will investigate the attitudes towards the Welcome onboard-projects functions and if they could be a contribution to the RKM-companies future development. Furthermore, this thesis will also investigate how the RKM-companies would grade the different advantages of different functional areas, and in a extend what would be vital for an future implementation.

The empirical data collection consist of interviews of informants with a deep understanding of the development of the public transportations. First we interviewed two key persons of the Welcome onboard project, to get a deep understanding of the project. Later on we interviewed key persons at Värmlandstrafiken and Västrafik, that are two different regional public transportation authorities. To strengthen our results we also chose to interview Samtrafiken, which task are to develop collaborations and offer services within information and ticket solutions for the public transport industry. This is made in order to benefit both traffic the RKM and the travelers.

All the interviews were transcribed and analyzed, later the empirical data collection could be compared through different cases. These cases were categorized by information about the company that the interviewees where representing and the answers regarding the attitudes towards the “Welcome onboard”-project and its functions.

The result from the thesis will give an understanding of Västrafik, Värmlandstrafiken and Samtrafikens perspective of the functions and attitudes towards the further development of public transportation.

Keywords: Crowdsourcing services, Smart mobility, Information & Communication Technology, Digitalization, Public transportation system
Acknowledgments

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1. Introduction

This thesis will be executed side by side with an development research project, called Welcome onboard. The project strives towards making the public transportation easier and more efficient. The aim is to create an understanding of what could be developed in the public transportation with the help of technology. It also aims to create a understanding of what could be done with the help of solutions such as crowdsourcing. This thesis will hopefully increase the understanding of the usefulness of technology in public transportation and discover what could be done, mainly with the help of crowdsourcing.

Since the public transportation in Sweden today is provided through Regional public authority, in this thesis called RKM-companies. Our data collection will consist out of these companies, to get an understanding of the development of the public transportations and understanding of their attitudes towards the Welcome onboard project. The RKM-companies function is to offer an equal public transportation in Sweden as a whole. There is one RKM-company for each county in Sweden and every one has their own alignment when it comes to focus area and achievement. Since it is the RKM-companies task to attain an public transportation for everyone, the RKM companies is dependent on sanctions from the state, to continue being able to obtain the extended traffic (Regionala kollektivtrafikmyndigheten i Norrbotten 2018).

To get an perspective from a overall actor, Samtrafiken will also give their view on the subject. Samtrafiken is an service-developing company that focusing on the public transportation. They develop IT solutions with the goal to make the public transportation smarter and more innovated. Samtrafiken is owned by all the public transport authorities in Sweden. Samtrafiken therefore is an impartial actor on the field of transportation. That is also why they in a more operative way can aim to make the public transportation more available and easy for all the travelers. Through cooperation between the RKM-companies, they strive to make the public transportation more effective, profitable and sustainable (Samtrafiken 2017).

Some of the subjects that is recurrent in this thesis are Crowdsourcing, Smart mobility and ICT. Crowdsourcing is based on a huge amount of data that is collected through a crowd. The collection of data is often done through the internet and is contributing to a smarter and economical solution for collection of data. Crowdsourcing is an innovative way of organizing information that is retrieved from a huge amount of people, where the outcome could go in many different directions (Shepherd 2012).

Smart mobility and ICT are two subjects that can be connected in many ways. Since the ambition to improve the lives of those living in a city includes both smart mobility and ICT. Therefore the both subjects also can be connected to the phenomena Smart City. The driving force itself has in many ways been the advances of the ICT. ICT meaning information and communication technology, and is the component that makes is possible for individuals to interact with the digital technology. Smart mobility is in many ways permeated by ICT, since it is used to optimize the traffic. The function of smart mobility is to support and obtain services that improves the citizens mobility through an combination of an developed traffic services and smart technology. Therefore it is stated that; to reach the goal of smart cities, both ICT and smart mobility are vital (Šemanjski, Mandžuka & Gautama 2018).
1.1 Motivation

We are living in a world with a constantly growing population, where the biggest cities are invariably pushing their physical limits. Today urbanization is a well know phenomena and a contribution to why the bigger cities are continuously growing. In correspondence to this growth, there is a equally increasing need for the citizens to be portable. To constrain the different attributes within the city, it is essential that the public transportation is reliable and punctual. Several studies show that when individuals are traveling with public transportation are provided with the right information, at the right time, their overall experience seems to be more positive (Nandan, Pursche & Zhe 2014).

Although the cities are continuing to grow and strives for constant development, the public transportation has struggled to keep up with the rapid technological development. According to Alexander Seward, the public transportation today is similar to how the public transportation was in the 1970's and has not changed since then. An natural development for the public transportation would be to join the digitalization movement, to improve their services through new technological solutions, such as crowdsourcing and Artificial Intelligence (Veridict 2018).

What could be the reason be for the public transportation seems to have a hard time developing their businesses? According to Alexander Seward at Veridict, the organizations providing the public transportation knows what the travelers would like to have; it is just hard for the organizations providing the services and deliver it to them.

The public transportation plays a big part of Sweden's continued mobility. One segment in the continued ambition to strive forward within the public transportation is to explore what facilities there are available in today's digitizing (Veridict 2018). What role can the digital infrastructure have, such as smartphones, in developing the mobility of public transportation? This opportunity has previously not been explored. And in a extend, what role can crowdsourcing have in the future development of public transportation?

1.2 Problem statement

When using public transportation in Sweden today, there is no requiry nor expectation for the traveler to give out their identity to use the service. Unlike when using a carpool, taxi or a flight, when the traveler is required to give out personal information to use the service at all. Because of that the registration already is made through an account or an application in their smartphone, it is easy to add on some extra functions like data retrieval and in-real-time interaction with the user. This is a huge opportunity for both the companies that provides the service, and the users that can get customized information directly through their smartphone directly connected to their traveling.

These opportunities is not something that is taken advantage of in the public transport system in Sweden today (Veridict 2018). Since the anonymity in the public transport system is a keystone of the traveling, it is hard to change the view that travelers has on giving out their personal information. Therefore, the future of the public transportation system is not to give out people's personal information to improve the system; the future is to improve the public transportation through connecting the traveler to the vehicle it is traveling with anonymously. This further development would implicate less stress and waiting times for the travelers. It would also make it easier for the RKM-companies to allocate their resources the most
efficient way.

By reason of this, we want to investigate the attitudes of the providers of the public transportation in Sweden towards the new technology. Furthermore, how the RKM-companies attitudes towards new technology, such as crowdsourcing, and their attitudes towards the project “Welcome onboard”.

1.3 Purpose and aim

The aim of this thesis is to explore and describe how the attitudes towards the development in Swedish public transportation can and be improved through new technology, such as crowdsourcing. The interest of this thesis is to study the further development of the public transportation in RKM-companies and how their attitudes towards the project “Welcome onboard”. The purpose of the study is to take part of the RKM-companies attitudes towards the development of the public transportation and the “Welcome onboard” project and evaluate these views adequately.

The thesis will focus on exploring the attitudes towards functions like crowdsourcing, combined mobility and ICT. Furthermore the thesis will investigate if this kind of technologies could help the public transportation systems to progress and be more customer-oriented and make the public transportation more attractive. The aim is to create a insight of the prerequisites of implementing this kind of new technologies into the Swedish public transportation, by looking closer to the attitudes towards the project “Welcome onboard” and its functions.

1.4 Research questions

The questions we will use to reach the purpose is:
-What are the RKM-companies attitudes towards the project “Welcome onboard” and its functions?
-What are the attitudes towards crowdsourcing and anonymity in the public transportation sector?
- How does the attitudes on welcome onboard differ between different RKM-companies?

1.5 Delimitations

This thesis objectives is to investigate the RKM:s attitudes towards the development of the public transportation and the functions of the Welcome onboard project. To do so, certain alignments have been made, and therefore some fields have been opted out from the thesis.

Because of the limited time, we chose to narrow down the interviews. We therefore settled for one interview each with the RKM companies Västtrafik and Värmlandstrafiken, and finally one interview with Samtrafiken. The thesis will therefore consist of mainly Värmlandstrafiken, Västtrafiks and Samtrafikens perspectives and thoughts, and will not necessary match the overall view of the Swedish RKM:s understanding. The two chosen RKM companies that will be interviewed will however give an understanding of two different situations in the public transportation. Since Västtrafik is providing transportation for one of the most congested counties in Sweden, in contrary to Värmlandstrafiken who is providing public transportation for a less congested county. We want to get a understanding of these two RKM-companies attitudes, to compare these companies similarities and differences. To compensate the limited interview perspectives we chose to include Samtrafiken to broaden the
perspective of the Swedish public transportation. This is made since Samtrafiken has an overall view of the Swedish public transportation.

In consensus with that the thesis is written side by side with the Welcome onboard project, we realize that there is some limitations concerning the projects outcome. The project starts in January 2019, for that reason we won't take in consideration obstacles that may occur later on in the course of the project. We understand that because of it is an early state of the project, that functions may evolve and change during the projects time. We will therefore take use of the project and its content how it was presented to us in November 2018.

There are disadvantages and delimitations with crowdsourcing, such as loss of trust from the user and collection of inaccurate information. Although these disadvantages may occur we will not discuss them further.

Issues concerning hardware and software will not be discussed, they are considered beyond the limitations of this thesis. Furthermore, system implementation and issues concerning implementing different functions in the RKM-companies are out of this thesis limitations. Concerns regarding attitudes of change activities in organizations will not be concerned in this thesis.

The thesis purpose is focusing on attitudes towards the functions in the project and does not take in to account which costs that are related to each function. We want to make the reservation of that different costs of different functions may have some impact on the result. This thesis is discussing the functions and ranking them without knowing the costs related to any of them. The cost is therefore not presented to Västrafrf, Värmlandstrafiken or Samtrafiken during the interviews, to get and view of their attitude towards the function, with no information of what a future implementation would cost. This was made to easier compare the functions to each other.

2. Method

This thesis will use and adapt a qualitative, dynamic approach to reach our research aim and purpose. This will be conducted through an comparative study of three different cases, Värmlandstrafiken, Västrafrf and Samtrafiken.

2.1 Data collection

The qualitative research method will be conducted through interviews, which will be described further in chapter 2.1.1. In our interviews, we chose to have an interview guide with topics that we want this thesis to cover. Having an interview guide was necessary to be able to compare the similarities and differences in the different cases, to easier compare the different attitudes. An comparative study will be conducted since we find it interesting to see how the different perceptions are based on different geographical areas and size of RKM-company. The comparative study will be executed in three different cases, 1. Värmlandstrafiken, 2. Västrafrf, and 3. Samtrafiken. These attitudes will later be compared in chapter 5, Discussion.

We will use an iterative way of collecting data, since this makes it possible to go forward in the qualitative work and strengthen our theories, interview by interview. To collect data in the form of words it is important to collect the data in the natural way as possible for the interviewees. The purpose of this is to explore the interviewees perception, mediated in their own words. This kind of answers from the interviewees require a large amount of openness in
the questions asked is considered while doing interviews with RKM-companies (D I Jacobsen 2017). As qualitative researchers, we will have to make a choice by prioritizing different shades of beliefs on our theories prior to many informants.

This thesis will conduct an qualitative research method to get a sense of the interviewee’s attitudes and to understand the phenomena deeply and in detail, because that is one of the biggest advantages with a qualitative research method that would help us to reach our research purpose and aim (D I Jacobsen 2017).

2.1.1 The interviews

The relevant informants for this thesis is assessed to people with deep understanding of the project “Welcome onboard”, as well as representatives for RKM-companies and also an overall perspective of the swedish public transportation. The two RKM-companies interviewed is Värmlandstrafiken and Västtrafiken, and the overall perspective of Sweden's public transportations is in this thesis represented by Samtrafiken.

The empirical data collection consist out of six interviews. We chose to have semi-structured designed interviews so that the interviewee’s felt like they could come with their own angles and layouts of the subject (D I Jacobsen 2017). Based on this, the interviews was based on direct, indirect and interpretive questions. The flexibility of semi-structured interviews is necessary to get a sense of what the interviewee’s most important opinions are and to create a balance between spontaneity and structure. Thus, it was important to have a interview guide to be sure to talk through every topic this thesis purpose is to explore. We emanated from main topics that concerned the future development of the public transportation, the digitalizations role of the development and the views on the project “Welcome onboard”. The interview guide will be available in appendixes. To emanate from an interview guide was necessary to be able to compare the similarities and differences in the different cases, to easier compare the attitudes later on. Before the interviews, the interviewee was sent the interview guide per mail. This was made in order for the informants to get mentally prepared for which kind of questions and which topics that were relevant for this interview. This with a hope that the interviewee could reflect on the different questions beforehand to perform the most important thoughts to us in the interview. In the beginning of the interview we made a presentation of this thesis purpose and aim, this to get the interviewees to realize that their contribution is important for this thesis.

In this thesis we will conduct in-depth interviews with two actors representing the Welcome onboard project, two actors representing the RKM-perspective and finally an interview with “Samtrafiken”, which is an actor with an overall perspective of the Swedish public transportation.

Qualitative research method will be conduct by interviewing Daniel Rudmark, Senior researcher at RISE, one of the main persons in the project of “Welcome onboard”. We will also make repetitive interviews with Alexander Seward, CEO at Veridict, which is the software company responsible for the Welcome onboard project. This we will do to get a picture of the main functions of the project and their role in the development of the public transportation. Furthermore we want to look into how the RKM-companies see the further development in the branch and how their attitudes towards the project “Welcome onboard”. Therefore we choose to interview two persons responsible for the development in their businesses. We conduct interviews with Marketta at Västtrafik and Lena at Värmlandstrafiken. Lastly, a final interview where conducted with Gerhard at Samtrafiken.

In total we went through 6 different data collection events with a duration of approximately 1
hour each. To have six different in-depth interviews seemed like an necessity to create a solid foundation for later analyzes.

2.1.2 Timeline chart

<table>
<thead>
<tr>
<th>DATE</th>
<th>EVENT NO.</th>
<th>EVENT</th>
<th>ACT</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018-12-04</td>
<td>1</td>
<td>Preparations &amp; selections data collection</td>
<td>Read relevant literature &amp; prepare interview questions</td>
<td>Get an overall understanding of the subject</td>
</tr>
<tr>
<td>2018-12-04</td>
<td>2</td>
<td>Data collection 1</td>
<td>Interview Daniel at RISE</td>
<td>Introduction of the Welcome on Board-project</td>
</tr>
<tr>
<td>2018-12-06</td>
<td>3</td>
<td>Analysis</td>
<td>Transcribe and read data collection 1</td>
<td>Get to know the main functions of the project</td>
</tr>
<tr>
<td>2018-12-06</td>
<td>4</td>
<td>Preparations &amp; selections data collection 2</td>
<td>Read relevant literature &amp; prepare interview questions</td>
<td>Get an deeper understanding of the subject</td>
</tr>
<tr>
<td>2018-12-06</td>
<td>5</td>
<td>Data collection 2</td>
<td>Interview Alexander at Veridict</td>
<td>Understand the main problems in RKM-businesses</td>
</tr>
<tr>
<td>2018-12-06</td>
<td>6</td>
<td>Analysis</td>
<td>Transcribe and read data collection 2</td>
<td></td>
</tr>
<tr>
<td>2018-12-13</td>
<td>7</td>
<td>Preparations &amp; selections data collection 3</td>
<td>Read relevant literature &amp; prepare interview questions</td>
<td></td>
</tr>
<tr>
<td>2019-01-02</td>
<td>8</td>
<td>Data collection 3</td>
<td>Second interview with Alexander at Veridict</td>
<td>Get an deeper understanding of the Welcome on board project</td>
</tr>
<tr>
<td>2019-01-02</td>
<td>9</td>
<td>Analysis</td>
<td>Transcribe and read data collection 3</td>
<td></td>
</tr>
<tr>
<td>2019-01-02</td>
<td>10</td>
<td>Preparations &amp; selections data collection 4</td>
<td>Read relevant literature &amp; prepare interview questions</td>
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<tr>
<td>2019-01-03</td>
<td>11</td>
<td>Data collection 4</td>
<td>Interview Lena at Värmlandstrafiken</td>
<td>Investigate &amp; understand RKM posture to future development of public transportations</td>
</tr>
<tr>
<td>2019-01-03</td>
<td>12</td>
<td>Analysis</td>
<td>Transcribe and read data collection 4</td>
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<tr>
<td>2019-01-03</td>
<td>13</td>
<td>Preparations &amp; selections data collection 5</td>
<td>Read relevant literature &amp; prepare interview questions</td>
<td></td>
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<tr>
<td>2019-01-03</td>
<td>14</td>
<td>Data collection 5</td>
<td>Interview Marketta at Västrafik</td>
<td>Investigate &amp; understand RKM posture to future development of public transportations</td>
</tr>
<tr>
<td>2019-01-03</td>
<td>15</td>
<td>Analysis</td>
<td>Transcribe and read data collection 5</td>
<td></td>
</tr>
</tbody>
</table>
2.1.3 Data collection chart

Flow of data collection

- Data collection 2
  Alexander at Veridict

- Data collection 3
  Alexander at Veridict

- Data collection 4
  Lena at Värmlandstrafiken

- Data collection 1
  Daniel at RISE

- Data collection 5
  Marketta at Västtrafik

- Data collection 6
  Elias at Samtrafiken
2.2 Data Analysis

In this thesis, an thematic analysis will be made. Thematic analysis is conducted through identifying, analyze and present data the collection. We will have an mainly deductive way of reasoning through reading, rereading, intuiting, analyzing and synthesizing the interviews of the informants. We recorded every interview to make the analyzing and comparing easier. To describe our material, collected through interviews, we first transcripted our conducted empirical data collection. To simplify this, the transcript material were systematized. We also supplemented our transcribed material with our own notes and thoughts from the interviews, to broaden the perspective from the interviews. Through this described data, we explored and investigated the different connections between the interviews and the relationships between different categories and themes that could be found. After the systematization of the data, we reduced the superfluous and redundant data from our material. This is an necessary action to take when conducting an qualitative data collection, because the qualitative collected data often is unstructured and incomprehensive (D I Jacobsen 2017).

Thereafter we will categorize these themes to see similarities and differences in the interviews by the constant comparative method and coding. When coding we will go through the interviews line by line and study the informants words, thereafter we will assign different categories of the different codes and finally identify the core variables of the different informants. The categories created will later on be paired and create themes. These themes will be presented and concluded. Our collected data material was thereafter categorized into different categories based on different criterias, we emanated the categories from keywords like technology, development and combined mobility. Lastly, we linked these categories together to see the conclusions that could be drawn from our empirical data collection. This will make it easier and create an overview for us to see similarities and differences between our different cases (D I Jacobsen 2017).

We chose an deductive way of conducting this thesis, since that would be the most beneficial in a semi-structured interview situation. The deductive way of researching makes it easier for the researchers to ask relevant counterquestions to the informants, because of the previous knowledge in the subject.

The weaknesses with an deductive way of research is that you may be influenced by the theoretical frameworks and the previous research that had been done before in the chosen subject. To reduce that problem, we tried to ask many open questions.

2.3 Data Transferability

The external validity describes whether the thesis could be generalized to other, similar companies. The qualitative research methods strengths is to discover different fenomenas that could be transferred to similar situations. For this case it could be RKM-companies in similar geographical area or studies within the same area. To be sure to attain saturation in our data collection, we chose to interview three different kinds of perspectives. Saturation is ensured when new interviews wouldn't provide the thesis with new information (D I Jacobsen 2017). Of course the larger amount of interviews will automatically create an increased generalization to the study, but since the limitation of time in the study we chose three types of perspectives, based on their geographical location and amount of travelers. This choice was made since three types of perspectives increases the ability to make generalizations from results in qualitative studies (D I Jacobsen 2017). The proliferation is secured because we
make the assessment that Västtrafik is representative for large counties with a large population, and Värmlandstrafiken is representative for counties with a smaller population. Samtrafiken will create an saturation of our data since it is owned by all regional public transport authorities and most of the commercial traffic operators and will therefore represent the overall perspective of the RKM-companies (Samtrafiken 2019).

2.4 Data Validation

As qualitative researchers it is important that our study is reliable and credible. To ensure this, and validate our data, we performed 6 different data collection occasions with people of different perspectives. We will conduct interviews with 2 RKM companies that we hope will strengthen our theories and at last Samtrafiken that will support our material. In the beginning iterations of data collection we will have reliability in our theories which in next iteration will lead to validity and lastly, after the interview with “Samtrafiken” we will attain credibility. By this cause of action we will create a overall understanding of our chosen topic.

To ensure the reliability of the research question we read the transcribed interviews individually before we discussed them together and then came up with the same conclusions. To ensure the reliability of our thesis we have interviewed people with a long experience and knowledge in the subject and made it clear that we come from an academic independent background.

The challenges with our chosen method is that we will not get a broad perspective in our chosen subject with interviews, but rather a very narrow perspective, deeply and in depth. The data we collect will be very complex since it is full of different attitudes that is hard to see in coded text. Although it gives us a very rich and complex picture of the area of research (DI Jacobsen 2017). We will strengthen the trustworthiness of our study because we will investigate both the RKM perspectives through 3 interviews and two key people of the project “Welcome onboard” perspective.

3. Key theories and concepts

The purpose of the thesis is to investigating the attitudes towards the development of public transportation and the welcome onboard projects functions. Both these questions are focusing on systems and technology where concepts such as crowdsourcing, ICT and information systems are at focus. To take on these concepts there has to be an distinct understanding of what part they play within the public transportation development.

To be able to grasp the different functions and to get an understanding of them, the attributes that are included should be described. To understand what functions are operative in the development within public transportation, the aspects that are included should be described. All these aspects play a role in the development and therefore should be clarified.

The ICT is mentioned partly because the development of the public transportation would not be possible without it, but also to gain understanding of its involvement in system development of information systems. Regarding crowdsourcing, as it is such an broad method and is therefore brought up to target solutions based on crowdsourcing within public transportation. Smart mobility is a innovative and relatively new way of thinking about individuals mobility. It is therefore an subject that is relevant to look in to and furthermore see what factors are involved regarding the development of public transportation and the aims towards the smart city.
3.1 Public transportation and information systems

The public transportation has over the years gained from the different developments regarding information and communication technologies, "ICT". The ICT has even been proven to affect the travelers transport behavior. Social platforms tend to have an impact on people's willingness to travel with public transportation. Therefore there have been several researchers on the connection between public transportation and ICT. Especially after 2007, the year the smartphone was launched. Because of the continual development of the technology, the possibilities has opened up in forms of application and reaching out to more people.

3.1.1 Which values do ICT bring to public transportation systems?

The development of ICT gave both opportunities within the public transportation, but could also reduce the travellers. For now many assignments could be done inplace. It was Carrasco and Miller that found that the interest of public transportation depends on the actually distancens to the destination but also the importance of the association in the network (Miller & Carrasco 2005).

Later on Nobis and Lenz granted the idea that the increasing use of transportation is connected to the use of smartphones. They also claimed that a change in life habits often cause changes in the use of smartphones, and therefore also causes changes in the travel behavior. The study was made before the use of smartphones and apps had their breakthrough, but they still found the connection (Nobis & Lenz 2009).
Aguilera, Guillot and Rallet stated that ICT helps the public transportation to improve by giving the travelers a better experience. Only by having the smartphone on you, gives a sense of security. Also by using the phone, the travelers get the impression of productivity, and therefore get an overall better impression of the public transportation (Aguilera, Guillot & Rallet 2012).

Cohen-Blankshtain and Rotem-Mindali also found that ICT affects the view on distance, availability and approachability (Cohen-Blankshtain & Rotem-Mindali 2016).

To improve internet platforms such as social media and applications starts to become more relevant for the providers of public transportation, since they facilitates traveling, contributes to make it easier to coexist when living far-off and furthermore gave an opportunity to expand the social capital. An example of this what Cohen, Prayag and Moital concluded, that social media is affecting how travelers chose to travel, and furthermore a contribution to why they choose to share their mobility patterns. Social media can also have the impact to keep the traveling competitive and change its identities in both a collective and identitive way (Gössling 2017).

The transport information systems have changed a great deal during the last years. In this included updated functions in applications to make the travelling experience more convenient for the travellers. One of the most crucial developments is the function that integrates different kinds of transports. This allows you to find a route that is most convenient for you, both the closest bus stop, nearest departure and fastest route. Later on these functions developed, and started to show different cost options of the destination, and then recalculated when one route is missed or delayed. More recent non-profit websites has started to compare various public transportation routes to produce the traveler with the most convenient route. To optimize the platforms for the users, it is also common to let the users contact the transportation companies. In that way the travellers can inform disturbances in the traffic or if there where any issues during the travel (Brakewood & Watkins 2018).

ICT has recently been elaborated in making the traffic more optimized, and therefore being a part of the decreasing of congested roads. This has in turn made the traffic able to run more smoothly. These functions gives the travellers information about the planned route, such as recommendations to change the route if there is traffic jams, road work or accidents along the planned route. These functions are designed to provide the travellers with alternative routes, to avoid delays and ques in the public transportation and therefore made the traffic run more smoothly (Gössling 2017).

It has been proven that the many complex functions of ICT has improved the public transportation, the developments over the past decade has been affecting the travellers transport behavior and its outcome have given a durability for the future of the public transportation. The interest for sustainable travel is positively affected by ICT, in result of that it influences more people to choose a sustainable way to travel (Gössling 2017).

3.1.2 Trends

When working you are either performing that work as a distansworker or a teleworker. As a distance worker you operate outside of home, and therefore are dependent on ICT. This is to obtain better stability in life, make work more streamline and subside commuting needs. Since 1999 the distance workers have increased in a rapid pace in both America and Europe and this has affected the public transportation (Gössling 2017).
To accommodate these demands there needs to be various transportation options that are flexible and convenient enough to meet the travellers expectations. Since 2001 the number of people that choose to travel with the public transportations has increased. With the constantly developing countries there is several challenges that needs to be taken into consideration. These challenges are for instance the rising of the costs and senescent of the transports (Coalition for urban transitions 2017).

When looking at new startups within mobility, more than half of them are in the category within shared data. Many of these solutions rely on the users data, to streamline the consignment and record the travels. When looking at startups that are oriented in consumer experience, it is 70% that focus exclusively on analyzing and providing of the public transportations information. This is an undertaking that has been granted with support from the government, in forms of them choosing to share their data about transit system operators. The remaining startups that focuses on consumer experiences are the ones that outline and plan the the ticket sales of the trips with several models of transportation. There is also certain startups that specializes in data driven decision making. By collecting data from several parts of cities transit system, it’s purpose is to analyze this data and thereby help the transportation companies with decision making. The services concerning mobility is such new subsidy on the market could be a reason why the cities are not yet maximizing the use of them. It may take some time to find the perfect combination of these services, but it is certain that the new services within mobility will have an important role in the future (Coalition for urban transitions 2017).

3.2 Smart mobility: solutions based on crowdsourcing

Today more than half of the population in the world lives in cities or urban areas (Sampaio et al. 2019). Therefore, logistics demand an well-integrated and well-functioning public transportation solution. The fast growing population and urbanization requires new business models and innovative solutions for cities to be profitable, yet sustainable. To be sustainable and profitable one needs to allocate their resources the most efficient way.

The new trends in logistics for cities are infrastructure sharing and service integration that aims to develop a more sustainable and economical solution. Together with the development of information and communication technology and the ubiquity individualism of smartphones, the shift to new cooperation consumption is trending, states Sampaio et al. This kind of cooperation consumption is often talked about as shared economy, which can be explained as managing the physical assets as services. It also to perceive the potential benefits of a third part using the service for a long or a short time period to allocate the resources the most efficient way. The most challenging part of using crowdsourcing as an solution is reaching the captious crowd.

3.2.1 Crowdsourcing

The preponderance of the information technology (IT) is a reason to why crowdsourcing has emerged as a popular problem solver through transmitting crowds for problem solving on the internet (Tucci, Afuah, Viscusi, 2018).

Crowdsourcing incorporate “crowd” and “outsourcing”, thus; outsourcing to a crowd rather than to a contractor. The challenge of many problems is to find the right person to solve them; crowdsourcing is a solution that is based on crowds collaborate to solve problems and thereby creating and capture value at a low cost.

The act of opening up the solvation of a problem to anyone who wants to solve it, is the core of crowdsourcing. The crowdsourcing model is fortunate for both the solution solver and the solution seeker. This wikipedia-type of model is creating high-value solutions at a very low
cost. Problems can therefore be seen as outflows of an organization, and the solutions can be seen as inflows of an organization. This outflow of problem solvation is very similar to the phenomenon “open innovation”.

One example of crowdsourcing when it comes to personal transportation is Ride-sharing; in which drivers offer free seats to other passengers who has similar routes and time schedules. This set-up is not only a advantage for the passenger that gets a ride cheaper than they are used to, but also for the driver who gets money for gas or fuel and maintenance for the car. This example has an influence for the urban transportation regarding efficiency and mobility, less vehicles are used in traffic which makes the traffic jam lighter as well as less gas and fuel that affects the environment less.

However, this kind of transportation is based on the convenience of the independent provider at the time, which is voluntary; there is no customer and company-arrangement between the service provider and the crowd. This makes it quite a hard way of commuting if you need to relay on it on a everyday basis. Public transportation or professional drivers may be available, professional drivers are more expensive but can provide you with the service when you need it.

Overall, Sampaio et al claims that cities infrastructure need to take advantage of the new technologies in the future for further development. They are for example proposing integrated sensors in public transportation to improve the mobility and the utilization in the cities (Sampaio et al 2019).

H.K Liu writes about studies that shows how an government can take advantage of crowdsourcing to gather information and through this technology solve public issues. This would make cities more efficient through so called citizen-sourcing. Liu also states that crowdsourcing could help governments to engage citizens in the development of public sectors. According to her this is a good way for governments to streamline their businesses, lower the costs and get inventive ideas from citizens. Crowdsourcing has in the past gain great success and will be an growing phenomena for the public sector (H.K Liu 2017).

### 3.2.2 Smart mobility

Smart cities is a term that is been used more and more frequently nowadays. Rosa M Arce writes that cities are in an revolution; like smartphones and smart TV we also want our cities to be smart; Smart cities. Smart cities are classified by 6 different topics; Government, Mobility, Environment, Economy, People and Living (Giffinger, 2007). They are reflecting on the fact that Smart mobility play an bigger role in the urban growth than before, and that the utilization of an smart public transportation system can solve many issues.

As well as H.K Liu are they on to the path that crowdsourcing can be the answer to innovation issues, as the development of the public transportation system to be sustainable through technology and engagement from the citizens.

The focus in Smart mobility is to develop the infrastructure in cities through integrated ICT. This smart mobility could he an useful tool to make cities more sustainable and make the traffic run more smoothly through supporting logistics in congested cities (Cledou, Estevez & Barbosa 2017).
3.2.3 Requirements and conditions for crowdsourcing-based solutions

The issues we constantly have to face regarding the environment is many; the increasing use of car transportation is one of them. Air-pollution, traffic jam and energy consumption is only a few of the issues concerning car as transportation, A.Dolinayova is discussing. The solvation, she claims, can be made by people choosing public transportation instead and it is the way to build up an sustainable mobility. To increase the use of public transportation airplanes, harbours, metros, trams and busses needs to be linked into multi-connection platforms. According to the european commission the shift towards a reliant railway is the way to develop the european transportation system. Through user workshops and specialists interviews they came up with the main purposes of an application supported by crowdsourcing:
1. The usefulness of the application; the application needs to make transportation easier.
2. Better protection of the passenger rights: the application should give full assistance when disruptions occurs.
3. Accurate and reliable information: the customer needs to feel safe with that they get the best travel solutions according to their own preferences and needs. Total transparency regarding the user data.

3.3 How to create smart mobility services?

When developing smart mobility services, there needs to be specialized requirements that look direct into the interests demands and thereby get an understanding of their needs. The challenge is to take into consideration and process all the experiences from all the cities around the world that have profitably injected smart mobility services. Although, when looking closer at that cities have injected these services, they appear to be unstructured and flat. Guillermina Cledou, Elsa Estevez and Luis Soares Barbosa wanted to address this problem. They wanted to direct the issue by using taxonomy when developing smart mobility services (Cledou, Estevez & Barbosa 2017).

3.3.1 A taxonomy for planning and designing smart mobility services

Guillermina Cledou, Elsa Estevez and Luis Soares Barbosa claim that a taxonomy would make it easier to understand discussing and sharing information about these services. They want the taxonomy to include eight parts, which is: type of assistance, ripeness level, the user, technologies that are used, delivery types, advantages, recipient and joint functions. The subsidy from the proposed taxonomy is to function as a tool to steer decision makers. This can be made by identifying a section of mobile services that can provide who, when delivering them, what techniques what would be used and what value is needed to motivate the implementation. Furthermore taxonomy can be used to develop domain through the taxonomy determining similar functionalities (Cledou, Estevez & Barbosa 2017).

When looking at taxonomy it is often portrayed as an hierarchy, a tree or faceted. Guillermina Cledou, Elsa Estevez and Luis Soares Barbosa think that mobile services would benefit the most if through the faceted structure. They argue that one of the advantages with this structure is: hospitality, that you do not need to have full understanding of the domain, which makes it easier for those who have changed or are new within the domain, such as smart mobility domain that are continuously changing due to the developments in technology (Cledou, Estevez & Barbosa 2017).
When using a taxonomy structure it is an iterative design. Where every iteration one development method is selected, and in the end of the iteration it is analyzed if the categories are rightfully defined, is in need to be combined or if new ones can be determined. It is Guillermina Cledou, Elsa Estevez and Luis Soares Barbosa’s belief that when approaching smart mobile services taxonomy gives it a broader view by considering different dimensions (Cledou, Estevez & Barbosa 2017).

3.4 Compilation of lessons from theory and concepts

It had been found in the Key theories and Concepts chapter that ICT actually has an influence on people's transportation behaviour since the smartphone came in 2007. The smartphone has had an impact on the public transportation and the travelers perceived safety, view on distance, availability and approachability. It also has shown that ICT affects the way people travel.
Furthermore it is shown that the most important function to travelers is that smartphones and ICT has enabled to integrate different kinds of transports. Overall, ICT has affected the public transportation in a positive way. It has had impact not only people that chose to travel sustainable, but also making the traffic more optimized and thereby less congested roads which makes the whole system of public transportation run smoother than before.

Over the years, urbanization and the increased distance workers need for transportation has affected the public transportation demands. The demand for flexible and convenient transportation is a fact and has to be taken into consideration when city planning. To achieve this flexibility, combined mobility is important. Mobility is a crucial factor for infrastructure and more than half of the startups within mobility is focused on shared data. The new services within mobility will have an important role in the future even though they have not been used to their fully extend yet, due to the lack of prerequisites that they are relatively new on the markets.

It has also been found that crowdsourcing has emerged as a popular problem solver through transmitting crowds for problem solving on the internet. The increased urbanization in the world craves a sustainable and utilized public transportation solution which could be helped through crowdsourcing as a innovative business model. Crowdsourcing could also help governments to engage citizens in the development of public sectors through getting inventive ideas from citizens, so called citizen-sourcing. It is stated that crowdsourcing can be the answer to innovation issues.

To easier implement and develop smart mobile services one needs to use taxonomy. If taxonomy is used one can easier take in and process all the experiences from the cities around the world, which can be a challenge without taxonomy. In extend this would mean that one can create a overall understanding when discussing and sharing information about smart mobile services.
4. Result

The result will be presented in different cases, to easily get an overview of the different attitudes. To make the understanding of the project “Welcome onboard” deeper, this will be presented before the cases.

4.1 Welcome onboard

Welcome onboard is a Swedish project that is focusing on developing the public transportation system. The project’s aim is to develop the public transportation through putting the traveler in focus in a larger extend, through developing services that would make it easier for individuals to travel and thereby be more attractive. This will hopefully increase the amount of travelers of public transportation and decrease the use of car for transportation. This would in turn create more sustainable and mobile cities around the country. Alexander Seward at Verdict, which is the project manager of Welcome onboard, claims that customers know what they want, the only problem is for the RKM-companies to give it to them. Alexander wants to explore what can be developed with the public transportation today, not fifteen years from now.

4.1.1 The project

The project is based on crowdsourcing and active traveler involvement. The purpose is to understand the customers needs for keeping an competitive environment and attract travelers. To understand the customers needs, the project will initiate interactive functions and services together with confidence strengthening actions. The Welcome onboard project will evolve the technology of AI, crowdsourcing and the increasing use of smartphones (ICT) to create solutions for long-term issues that the public transportation is dealing with. The technology behind the services is based on automatic connection between the travelers smartphones and the vehicle the are traveling with. AI-based technology enables matching the right person to the right vehicle through the GPS in the smartphone. All of the technology is cloud based, so there is no need for the implementing RKM-companies to think about infrastructure for the functions. All data is based on full disclosure and on constant consciousness from the traveler when giving out their information. If a lot of travelers give out their information about broken vehicles and disruptions they could help other travelers and in a larger extend themselves in the future. This type of technology based on crowdsourcing could be an enabler for easier public transportation solutions and creates new opportunities for the public transportation in Sweden.

4.1.2 The project functions

The project consist out of five different areas of functions; based on different technology.

1. Improved traveler interaction
This function makes it easier for the traveler to give the RKM-companies feedback in forms of customer satisfaction and damage reports, on the bus or in a bus stop. It can also include vehicle-specific disruptions, traffic status and possible solutions. This function is all about that the traveler easily can send observations to the RKM-companies. The benefit for the RKM-companies is that they can fix errors or broken things quickly.

2. New interactive user functions
Includes the service that the traveler can use their smartphones to communicate to the vehicle as well as the driver of the vehicle, to communicate which bus stop to get off on. This would
of course create the most value for people in a wheelchair or with a stroller. This is because they easier can communicate with the driver if the they wish more time to get of the vehicle or they need help from the driver to get off the vehicle in a convenient way. Creating a safe environment in the public transportation is another interactive user function. It is based on that travelers could make an alarm to an security guard directly through their smartphone.

3. **Support long-term city planning and infrastructure**
   The projects purpose and this function in particular, is to use crowdsourcing to better understand and analyze the travelers travel pattern to better understand different transport needs. This could benefit an increased mobility in a city. This function would make it easier to distinguish personal patterns that origins from public transport vs. other types of transportations, cars or bicycles for example.

4. **Direct delivery of important traffic information**
   This functions purpose is to make it easier to reach specific travelers on a specific vehicle or line through a display in their smartphone. This is useful for people that speak other languages and the travelers that is hearing or visually impaired. The long term goal with this function is that the display should look the same regardless in which city in the world you are traveling in, Alexander Seward says.

5. **Third-party communication**
   This part is user-centric functions for an improved travel experience. It contains services that automatically communicates arrival time for vehicles and disruption in traffic. This could be useful if someone has an doctor or dental appointment and has been stuck in traffic. This would create the possibility of the doctor to help someone else in queue instead of waiting. It could also be to optimize taxis in a city, through automatic booking. This would make the whole society more efficient.

(6). **Anonymity**
Since the traveling of public transportation is characterized by spontaneity, the view on integrity is that it always needs to be anonymous. The anonymity is not a function in itself, but it is seen like a cornerstone of the technology crowdsourcing and public transportation, this is why this thesis will treat it like an own function. Unlike an flight, which is often planned several months in advance.

### 4.2 Case 1 - Värmlandstrafiken

Värmlandstrafikens main duty is to organize public transport in Värmland County. Together with various partners, they provide passenger traffic by train, bus and special vehicles in scheduled traffic, call-controlled traffic and service traffic (Värmlandstrafiken 2019).

#### 4.2.1 The interviewee

Lena Thorin is development manager at Värmlandstrafiken. She was a former consult to Värmlandstrafiken before she got employed by them. Lena says, the biggest difference between being an consultant or an employee is that she experiences that she has a lot more influence. Nowadays she has influence in all projects and in all stages of the project, instead of just in the beginning. She is in the board of Värmlandstrafiken, which means she has a lot of influence in their following development and insight in the operations that is made.
4.2.2 Future development of public transportation

2018 was a year that Värmlandstrafiken were less service-oriented than they have been the most recent years, this because of the restructuring of the region of Värmland that Värmlandstrafiken is a part of. Since putting the traveler in focus is something that the project “Welcome onboard” project seeks for, it would be really interesting for Värmlandstrafiken to join the project. The restructuring was a change that had to be done though, and the goal was that the travelers wouldn’t be noticing it. This change will hopefully make the public transportation more attractive in the long-term, Lena says.

Lena focuses a lot on larger projects that focuses on combined mobility in her daily work, with a lot of different external parties that could teach from each other. The combined mobility is the future, Lena says. She looks bright on the future and thinks the key to develop the public transportation lies in the external partnerships and investments, this could imply that the “Welcome onboard”-project is very interesting for Värmlandstrafiken.

Värmlandstrafiken had about 17 million travelers during 2018, and Lena says that the travelers increases every year. The continuously increased travelers is partly because of urbanization of the city Karlstad, but also that they have increased their offers of public transportation towards customers that has made it more attractive. Lena says that it is hard to keep an high qualitative public transportation because it is connected to higher expenses. Although the public transportation is continuously growing, Lena states that there is potential to grow even further. As of today Värmlandstrafiken are allocating their resources where they reckon has the largest needs at the time. To see where their resources are most needed, they are using different kinds of approaches but trusting the municipality is the most frequent one, this is since Värmlandstrafiken is in the belief that the municipality are closest to their own citizens. Värmlandstrafiken is not taken advantage of the opportunity of crowdsourcing as of now, they are using CRM-systems to get to know their customers. The customer's need to be anonymous is very important and if we use crowdsourcing the customers can’t travel anonymous anymore, claims Lena.

But they need to learn a lot more about their customers, recent years they have not done a lot of customer related work, Lena says. This could implicate that a way to learn about their customers would be to use crowdsourcing, partly to know how their customers are traveling and also to make it easier to communicate with them. Värmlandstrafiken has limited resources, so it is important to them to allocate the different customers they have and meet their demands, the way to this is maybe to have an “basic” public transportation but be able to add services depending on the customers different needs, Lena adds.

Despite this, Värmlandstrafiken is trying to work the division of;

“It is contradictory, everything is happening so fast and customers learn new technologies very fast. The customers want new and transformed services - at the same time as older customers is not as digital as the younger ones”, states Lena. This requires different kinds of services for different kind of customers. As of now, Värmlandstrafiken is a very accustomed service with the approach of being a public good, that has a lot of areas that are in need for development.

Another way to allocate their resources the most efficient way is to use some kind of “on-demand” service of public transportation. It means that the bus doesn't go if someone isn’t calling for it.

Lena is also out of the belief that the public transportation's responsibility is to uphold and maintain some kind of basic transportation system, which is a part of the public transportation
system is built out of trust and stability. Lena thinks that this must be a part of building the public transportation and making it reliable; and then these actions will have a effect of increased traveling with public transportation.

Especially in a countryside, which is what Värmlandstrafiken is operating in, it is hard to get people to leave their car, Lena states. An example is that Värmlandstrafiken had made a huge rearrangement in a city called Hammarö, where the public transportation went from almost nonexistent to frequently buses that departs on 10-20 minutes intervals. The public transportation had a slow start but a few years later the traveling increased significantly. So Värmlandstrafikens task is to create a range of buslines with frequent departures that makes it so easy for the travelers so they would rather go with the bus than their own car. This investment in an further public transportation and increased traveling would implicate that there is an need for this kind of public transportation in Värmland.

4.2.3 Technology

Lena states that Värmlandstrafiken is not as digital as they would like to be. As she mentioned earlier, they are providing a basic public transportation. This is in forms of offering a wifi, mobile-charging possibilities and a screen of each vehicle that gives information to the travelers. There is a lot of services that could be added, in order to make the public transportation more attractive. Especially more digital services that could help and benefit the customers to interact with Värmlandstrafiken. The application they use today is working fine, the primary purpose of it is buying tickets. There is one for individuals and one for companies, in which individuals in duty can buy a ticket and then invoice their employer. Travelers can report broken things in the buses and the public environment related to public transportation through a form online or you can call customer service. Lena convey that they are not satisfied with this system of working with interactive customer related errands and hope for an improvement in the future. This improvement of Värmlandstrafiken technological solutions could imply that projects such as “Welcome onboard” could be beneficial for Värmlandstrafiken.

The technology is not an obstacle that is stopping Värmlandstrafiken from developing; the money is. Since Värmland is a small county it doesn't has a lot of resources in form of money, the is not willing to put extra money into the budget due to develop the public transportation which makes it hard to develop. If Värmlandstrafiken does not get extra money for developing the services, it is hard to make progressions and still maintain the standards for public transportation. Regardless of this, Lena says that technology is not the issue, she is insecure of that Värmlandstrafiken really know what technology they would want and need even if they could get it. Värmlandstrafiken are lacking the skills of developing and ordering the right technology, even if they could. Therefore it is useful that they have created a region together with the healthcare for the citizens of Värmland to come further.

A development that Lena really want to see happen is intelligent systems to increase the availability for the customers, at all times. She would like the traveling to connect the vehicle to the traveler and make it easier for travelers to make active choices for their traveling. An example of this could be a vehicle that is crowded, nevertheless, everyone that is traveling at the time is really eager to get on that bus because they don’t know that there will come another bus that is empty just a few minutes later. Lena states that this is a obstacle that could be helped through the use of technology. Värmlandstrafiken needs a easy way to give the right information, to the right traveler, at the right time; which is an challenge. This may
imply that the “Welcome onboard”-project could be a solution for Värmlandstrafiken.

4.2.4 Welcome onboard

An comparable view on the attitudes against the different functions that RKM-companies has, discussed with the interviewee function by function.

1. Attitudes towards functionarea 1: Improved traveler interaction
   Lena thinks that Värmlandstrafiken already has a reasonable solution for this issue; as a customer you could either go on Värmlandstrafikens website to create a customer arrend or call customer service. As a customer you could already do this with your smartphone, which means she thinks it is unnecessary to have an application for the customers to do it in. Lena thinks that Värmlandstrafikens resources should be focused on functions they don’t already have a solution for.

2. Attitudes towards functionarea 2: New interactive user functions
   This is interesting, Lena states. Värmlandstrafiken have been looking on a similar solution before, an application especially developed for individuals with special needs. From that perspective this is really interesting for Värmlandstrafiken and a function that we could implement into our business. It is a benefit for both the RKM-company and the individual if they could communicate before and during the traveling to avoid misunderstandings. Lena is out of the belief that some travelers feel too unsafe to use public transportation today and this would be a way to attract them. Värmlandstrafiken would gain through knowing the travel patterns of their customers, which they of course would gain from.

3. Attitudes towards functionarea 3: Support long-term city planning and infrastructure
   This is an important function that Värmlandstrafiken already has begun to develop through an European union project. The risks, Lena claims, is that you make the public transportation optimal for travelers today, and don't take the future travelers into consideration. To do this the right way you need to make beta versions of bus routes and try them before implementing them to an full extend. If Värmlandstrafiken implement this function, they will do it with carefulness, Lena says.

4. Attitudes towards functionarea 4: Direct delivery of important traffic information
   This is an function the travelers are longing for and therefore so do Värmlandstrafiken, declare Lena. The main thing about traffic information is that it usually is too broad for the traveler. The purpose is to reach all the travelers, and sometimes it does not suit. Värmlandstrafikens challenge is to customize the information to the travelers, and that may be possible with this function.

5. Attitudes towards functionarea 5: Third-party communication
   This is a important function that would be interesting to explore especially since Värmlandstrafiken is driving medical appointments-travels. A dilemma is that Värmlandstrafiken is trying to affect, it that the employers should get their employees to travel with public transportation, and the employers counterargument is that the departure does not fit the meeting slots. Sometimes you need to think outside the box, maybe it always should be the public transportations task to adjust to the world, maybe the world sometimes should make adjustments to the public transportations? This is interesting, Lena remarks. This is also a part of the work of increased mobility that is a focus for Värmlandstrafiken. All ways of transportation has to be more synchronized and communicate with each other to utilize everyone's part of the chain. Public transportation needs to be less static and more flexible. This is the future of the public transportation, adds Lena.
(6). *Attitudes towards function area “6”: Anonymity*

Värmlandstrafiken opinion on anonymity is that it is not possible to deliver a useful service if
the traveler is anonymous. Lena thinks that travelers may not want to identify themselves
even though google knows everything about them and what they are doing. Lena is out of the
belief that at least the younger passengers would want to share their information, that
anonymity is not going to be an issue. If a traveler share their information they will get
something back, and those who don’t, won't get something back from Värmlandstrafiken, is
Lenas opinion.

4.3 Case 2 - Västtrafik

Västtrafik is responsible for public transport in the western parts of Sweden. Every day, over
400,000 customers choose to travel with Västtrafiks buses, trains and boats. By developing
and offering sustainable travel and smart services, they want to be the obvious choice when
traveling (Västtrafik 2019).

4.3.1 The interviewee

Marketta Jurmu is a innovation leader at the regional public transport authorities company
Västtrafik. She's the one that drives the innovation area to move forward and improve their
services, to work towards the future. She has been working at Västtrafik for 13 years and
through these years have had different roles. Although the titles has changed over the years
she has constant been working with leadership within IT and activity.

4.3.2 Public transportation development

For Västtrafik the development of the public transportation is in many ways about looking at
it in a broader and bigger perspective then the traditional public transportation. To not only
focus on busses and trains that often are associated with the traditional transports, but to
combine new ways of traveling to make it more sustainable. The different combinations of
transportations could be bicycle- and carpools, then to tie together them with traditional types
of transports. This could be done to offer transportations services for the entire trip, to thereby
contribute in a broader way to a more environmentally friendly way of traveling. It is
Markettas belief that this is where the biggest potential for development lies, in the combined
ways of traveling. This statement may imply the good will for combined and smart mobility
within Västtrafik.

One focus area for the last year has been to be rethinking and to start from the beginning with
the customers needs. This statement may insinuate that the “Welcome onboard”-project could
be useful to them, since this is the project's main focus.
Marketta states that just a few years ago the main problem was technological, it seemed to
often be both challenging and expensive. Though this is no longer a problem, they are now
facing a new dilemma, to identify the customer demands. The context looks different than
before, therefore Marketta thinks that it is important to understand how to use technology as
an enabler. It concerns the understanding of requirements and context and then meet these
with the technology, an opportunity for understanding the customers need would be to use
technology such as crowdsourcing.

Västtrafik has made a customer travel map, that is a part of the methodology to understand the
travelers travel patterns all the way; from when choosing route, when they are taking the bus,
to arriving at their destination. They are at the moment tracing how the customers are feeling during these steps, to see when and where there are disturbances. Through this collections of information they can see in which areas they need to prioritize to develop further and improve. An example of a problem area for Västtrafik is when a disturbance appears in the traffic, they are facing difficulty in reaching the affected customers to inform them about delays. It has been shown that it is when this information is absent the customers often tend to feel precarious and lost. Therefore has informing and being able to reach travelers been a prioritized function for Västtrafik. Even though Västtrafik attends to make it easier for the customers to contact them when they have comments and complaints, right now they mostly focus on themselves reaching out to the customers and rather than the other way around. They want to meet the customers in the reality, everyday life to get a justified picture of their needs. This information Västtrafik use to understand travel patterns and how the travel needs look like, to meet these. The information collected when reaching out to the customers Västtrafik use to see if new line layouts are needed or if the capacity needs to be broaden somewhere.

Västtrafik is not using crowdsourcing right now, but thinks that the phenomenon has great potential and that it would be to their advantage to use it in the future. Marketta states that using crowdsourcing would be a effective way to make both customers and other partners involved in the collection of valuable data and developed public transportation. Today Västtrafik is collecting information about traveling patterns by installing sensors that counts how many travelers getting on and off their vehicles. Through this, they can see how many people that travels with them, which stops they are using and then Västtrafik can get a picture of a approximately travel pattern. With this system they can’t see how every individual chooses to travel, just an overall picture of where travelers frequently goes on and of vehicles. To complement the information from the sensors, Västtrafik calls selected customers to collect information about traveling patterns, requests and concerns. According to Marketta, right now this is mainly how they gathers information to use as foundation when making decisions about how the different routes should go.

When looking at what developments are planned for 2019, Västtrafik are still focused on the combined mobility and as mentioned earlier, how to make new travel methods incorporate with the more traditional ways of traveling. One of the investments that was made is the popular scooters that are placed around Gothenburg. The idea is that they will play a part in the everyday traveling and to broaden the perception of transportations, to be more open to combined mobility. When looking at the future and 2019 Marketta is concern about how the project Västlänken is going to affect the traffic of Gothenburg. Västlänken is a project that started the previous year and is planned to be finished 2026. The project involves a new railway for both shuttle trains and regional trains. Furthermore three new stations will be built. This is a project that will affect the current transportations, and is therefore Markettas concern. The effect of the project will force the public transportation to move bus stops and redirect traffic lines. All of Gothenburg will more or less be concerned by this, and everyday travelers will be forced to adapt during these years. Marketta alarms that in this situation they will have to manage both disturbances that will occur and that the entire traffic planning process can handle rapid changes. This is why Västtrafik states that they in 2019 will continue prioritizing and improving the systems for them to reach and inform customers about these disturbances. Previously they have been facing problems with making all their channels to integrate and show the same information. When the channels does not display the same information, irritation occurs for the travelers and that reflects badly on Västtrafik. This could denote the weight of an smooth way for the RKM-companies to reach their travelers at the right time.
4.3.3 Västtrafik's attitudes towards Welcome onboard

An comparable view on the attitudes against the different functions that RKM-companies has, discussed with the interviewee function by function.

1. Attitudes towards functionarea 1: Improved traveler interaction
Västtrafik has this functionality today, either through contacting customer service using a chat, mail, online form or call customer service. We have not perceived this as a function that our customers would like to simplify, Marketta explains. Västtrafik’s focus is to an high extend their customers and try to focus the development out of the customers needs as much as possible. Although, Västtrafik has an interest in that all of their ticket vending machines is working of course, so travelers can buy their tickets, says Marketta. Improved traveler interaction is an important function but not something that Västtrafik is prioritizing at this time, Marketta says.

2. Attitudes towards functionarea 2: New interactive user functions
This is an important function since we focuses a lot on how we can facilitate for all of our different types of travelers, Marketta explains. Västtrafik tries to simplify for travel types such as kids and disabled. This function area will increase the perceived security for all travelers and the driver of the vehicle which is positive for Västtrafik, states Marketta. Västtrafik is experiencing this function so important that Västtrafik already is exploring this type of functionalities.

3. Attitudes towards functionarea 3: Support long-term city planning and infrastructure
Västtrafik is experiencing that they already has a good prerequisites for this function. The challenge is to understand how the travelers needs looks like. Today individuals travel a certain way because that is what the public transportation offers, if the travelers rather would prefer another travel route, Västtrafik wouldn't know. So that is a function that Västtrafik would prioritize. A issue that Västtrafik is struggling with is that the county is expecting a certain range of public transportation, depending on their needs. If Västtrafik only would prioritize thebuses that are popular, the individuals in the countryside wouldn't be offered any busses at all. This is although a function that Västtrafik perceive as important.

4. Attitudes towards functionarea 4: Direct delivery of important traffic information
Direct delivery for traffic information is a super important function for Västtrafik, explains Marketta. Experienced unsafety is always connected with traffic disruptions. The traveler would want to know, “When do I arrive to my destination?” , “Which options do I have?” and such. According to Västtrafik's customer surveys this is the function their travelers prioritize the highest. We believe in this solution because if one traveler gets helped by another traveler at some time, next time this traveler is more likely to help someone else, states Marketta. Västtrafik think it is crucial to get the right information, to the right traveler, at the right time.

5. Attitudes towards functionarea 5: Third-party communication
This is not a function that Västtrafik beforehand can express a high demand for. Västtrafik see the value of the function group-wise rather than on a individual level. This could be a useful function in terms of keeping track of children, Marketta reflects on. Västtrafik believe that if could come in handy if a parent would like to follow their children's way to and from school, to increase the safety for the children. It is an important function, but not a priority for Västtrafik right now, Marketta says.
(6). Attitudes towards functionarea “6”: Anonymity
Västrafik consider the anonymity of the traveler as complex. For Västrafik to give a traveler the right information, at the right time, the travelers can’t be anonymous, claims Marketta.

4.4 Case 3 – Samtrafiken
Samtrafiken’s mission is to create added value for the entire industry by linking the country's public and private traffic actors, coordinating the entire country's public transport data and developing and managing ticket and payment standards (Samtrafiken 2019).

4.4.1 The interviewee
We interviewed Gerhard Wennerström that works as the CEO at Samtrafiken. His everyday tasks as a CEO is to execute the board's decisions. Gerhard has been the CEO for Samtrafiken for 12 years. He has had the same role within the company except for his first year at Samtrafiken, when he worked as a business developer.

4.4.2 Public transportation development
When looking at the public transportations development Gerhard says that there are two areas that are included in the public transportation, the classical transportation and traffic with shared resources. The classic transportation means mass-transportation, and independent vehicles such as busses and boats. Gerhard claims that we are leaving the classic way of traveling and replacing it with traffic within shared resources. In the new transportation other types of transports can be part of the public transportation. That the public transportation goes from being an mass-transportation movement, to now being an traffic-messenger resource. It is Gerhard belief that this is and will continue being a big part of the development within the public transportation. This statements would imply that combined and smart mobility is an cornerstone of the future transportation system.

When it comes to the technology, Gerhard describes that Samtrafiken has different divisions for the various areas. They have one department who handle development for the vehicles, then the department who works with the systems which allows communication with the customer and one for the development of apps and information flows. Gerhard thinks that technology is a key factor when looking at how to more effectively meet supply and demand. He is concerned about the future, that the urbanization will make the cities even more compact. The public transportation will therefore have to develop, to be able to meet the increasing demands. In the coming years he hopes that the use of cars will dramatically reduce. A would means that a way to reduce the car using would be to make the public transportation more attractive. Last year's growing anxiety over the climate changes, that lead to a shame over choosing to fly, will this year extend to an car-shame. Gerhard therefore declares the importance of the RKM-companies using their resources the most effective way. That is, the utilization rate of the traffic that is produced everyday would be much higher. And that counts for all vehicles, both private and within the public transportation. According to Gerhard there is far to many vehicles today which are too empty, regardless of whether they are buses or cars.

Gerhard says that Sweden is very deregulated country and therefore there is many suppliers of public transport. All there suppliers are in their own way trying to make the public transportation more efficient and developed, and thereby be more attractive for the travelers.
The RKM-companies are partly competing with each other, but also with the “worse” alternatives, such as cars. One project that RKM-companies within this business branch has in common is the initiative “Fördubblingen”. It is an project they have been working with for several years, which aims to double the number of people traveling collectively within the next 10 years. This project focus has been on the mass-transportation and to reduce the car trips that are less than 5 km. They started the initiative together in 2006 and although they failed to reach the goal, they have moved the goal 10 years further and are hoping to be able to reach a dubblication in 2026. Although this is the goal, Gerhard claims that they probably won't succeed. He means that as long as we are not an country that has an plan-economy where the state has the right to step in and conduct what needs to be done, the target to reach an dubblication can not be done. Gerhard claims that it is countries with less democracy, as China that has a better chance of succeeding in a conversion.

According to Gerhard, Samtrafiken’s technical abilities have in some sections come a long way, and in others sections there is a lot that can be improved. Their already existing functions, that are in different ways providing information, are well developed and up to date, Gerhard says. Though, when it comes to digitalization at an higher abstraction level Samtrafiken have more to learn. The whole industry of public transportation have not yet implemented functions that presents a condition and then lets the data optimize itself, which would allow the entire traffic system to gradually optimize itself. For Samtrafiken to be able to implement this type of functions in the future, a huge amount of data needs to be collected and stored. Gerhard says that Samtrafiken recently has started to collect real time data and that the next phase would be to store this data. Over time this data will grow to the amount that it would be interesting for an AI (artificial intelligence)-application to start working with it. Gerhard believes that the different public transportation organizations will begin start working with AI in about two years.

Today Samtrafiken is not working with crowdsourcing but Gerhard states that it is something that he thinks would be useful in several areas. Everything that has to do with open innovation is something that Samtrafiken advocates. He believes that a lot of the different innovations that are seen today is based on data from crowdsourcing and that from the outcome new functions can be developed. This statements would implicate that Samtrafiken is positive to the project “Welcome onboard”.

4.4.3 Welcome onboard

An comparable view on the attitudes against the different functions that Samtrafiken has, discussed with the interviewee function by function.

1. Attitudes towards functionarea 1: Improved traveler interaction
This function is connected to an idea that Gerhard had several years ago, that included a person that was commuting was made “bus stop manager” over their usual bus stop. To be a “bus stop manager” the tasks were to look after the bus stop and act like an surveillance eye. It also included to report if something was broken, and if it was; ensure that it was fixed and report it further. And to in return get to travel with public transportation for free. Gerhard believes that it needs to be on an individual level, a lot of the tardiness comes from group activity. He also declares that this kind of function requires feedback to the travelers to work. If a traveler report something to help the RKM-company, the travelers need to see that their reporting actually has effect and that the broken thing that was reported actually was fixed. To succeed with this kind of function the RKM companies also need to think about to reduce the distance between the individual traveler and the RKM-company. The travelers doesn't really need to have responsibilities for looking after their bus stop for example, they just have
to feel like they do, he says.

2. Attitudes towards function area 2: New interactive user functions
This is a function that some RKM-companies already is working with somewhat. In that case it is a “safety number” to call when feeling insecure and in most cases the guard is in the bus just the next bus stop, but this is going to develop even further with an application. The reason to why this function already exists in some level in the area of Stockholm is thanks to the political influence and the pressure from there.

The sense of being secure is very important, regardless where you are and what you are doing, states Gerhard. Furthermore Gerhard explains that one should separate safety-functions and comfort functions, like communication with the driver in different cases. He believes that RKM-companies already is putting a lot of focus and resources into simplifying the traveling for disabled travelers. He states that safety is prior to comfort.

Regarding safety actions Gerhard is out of the belief that a holistic approach should be taken, and not to be only the RKM-companies responsibility, but the whole society. Although, Gerhard sees a use for crowdsourcing here in terms of looking for someone to join to the bus stop for increased safety.

3. Attitudes towards function area 3: Support long-term city planning and infrastructure
Gerhard thinks this is a really important area that somewhat already has been explored. If you dive into this kind of functions it is really important to take into account those who don’t travel with public transportation already. What really would be an achievement is to look into all individuals travel patterns, not only public transportation travelers. If this functions regards only public transportation Gerhard think it would be much more beneficial to look into people's whole travel patterns.

4. Attitudes towards function area 4: Direct delivery of important traffic information
The service where you can subscribe on selected bus lines already exists in some extend. This is because it is an important and requested function. In a bigger extend Google has the same function, where travelers can get traffic information in real-time. This is an important function that Gerhard hope can develop and be implemented to a full extend.

5. Attitudes towards function area 5: Third-party communication
Gerhard this may be a way for individuals to disclaim from responsibility. A issue could also be how to communicate between these parties, to get the right information without getting “over informed” with to many messages everywhere.

Samtrafiken made an investment earlier with a service that was called “Traffic management collaboration” that included information about the traffic in real time to make adjustments to make the whole transportation chain to flow smoother. This service did not work because of the rigid public transportation system that exists today.

As long as the system is such a rigid system it is hard to implement, this kind of function requires a flexible transportation system in a larger extend, Gerhard express.

(6). Attitudes towards function area “6”: Anonymity
Generally, this is a overall view that goes beyond public transportation. Gerhard conceive this to be a highly personal thing, if one cares about the integrity or not. It is hard to be fully anonymous in today's society, almost nobody is. Although, this information never reaches the governments, especially not in Sweden, only the software companies in Silicon valley does, claims Gerhard. Furthermore Gerhard explains that the perceived avail needs to be bigger than the right to be anonymous for people to give away their identity. Smartphone is an example; if a individual is using it, it basically means that Google knows all about this individual, but most people does not care since the perceived avail is so great.
5. Discussion

5.1 Summary of results

To increase the amount of travelers that chooses public transportation rather than the car for transportation, the public transportation needs to be attractive. The different RKM-companies has different focuses for making their public transportation attractive, since they have different customers with different travel patterns to take into account.

"Värmlandstrafiken has increased their offer to the traveler to make it more attractive, that has showed that the increased range of buses has also increased the amount of travelers", Lena at Värmlandstrafiken says. This would implicate that the people living in Värmland wants to travel with public transportation as long as they are offered a good selection of public transportation. Lena at Värmlandstrafiken claims that a lot of services could be added to their service, in order to make the public transportation more attractive. Especially more digital services that could help and benefit the customers to interact with Värmlandstrafiken. Lena at Värmlandstrafiken also says that customer service is the most prioritized area for them this year. This kind of statement implicates that the “Welcome onboard” functions would be useful to Värmlandstrafiken, to make the public transportation more attractive for the travelers.

5.1.1 RKM-companies in congested vs. uncongested areas

The difference between the two RKM-companies Västtrafik and Värmlandstrafiken is of course obvious. The difference shows in terms of focus areas and budget. Since Västtrafik is an actor in a “big city”-area and Värmlandstrafiken is an actor in a relatively uncongested area, the number of travelers differs a lot between these two RKM-companies. This is also a reason to why they have different focus areas within transportation and development. Värmlandstrafiken, whom has many uncongested areas are facing challenges with busses that runs empty. They are therefore facing challenges with streamlining their routes, to fit the travelers the best. On the contrary Västtrafik, as a larger county are finding it hard to reach out to their travelers. As providers of transportation in a bigger city there is often delays in traffic. Västtrafik therefore has a need to reach out to the affected travelers in an efficient way. For Västtrafik this is one of their major issues, they receive complains whenever there is problem with traffic, and there is lack of information regarding delays. In contradiction to Värmlandstrafiken, who are facing problems with locating the travelers needs, to make the routes more effective. The subject of receiving critique when failing to reach the user can be connected to chapter three and ICT. There it is found among other things, there is a clear connection between how information is presented to travelers and their overall experience of public transportation. There has been found that the lack of information has an impact on the perceived security in public transportation.

5.1.2 Ecosystems of system developments

Another conclusion that can be be drawn is that, because of the limited budget in the RKM-companies, the development has to be done together with similar companies. This is important in order to take advantage of economies of scale. Instead of every RKM-company developing their own advanced application, the conclusion can be drawn that the RKM-companies can join their forces to develop an application for all of the RKM-companies to help each other. Since it is stated that development of public transportation is highly connected to increased expenses. Another way to develop the public transportation would be to look at solutions all around the world and learn from them.
5.1.3 Crowdsourcing

All the informants were positive when asked how they feel about the concept of crowdsourcing, even though they were not presented with a context to the notion. As mentioned in chapter 3, there are several types of use of the concept of crowdsourcing and even though the interviewees have their own theory and idea of the concept crowdsourcing, they all were confident that crowdsourcing is an key factor to the future development of public transportation. The positive feedback and the overall view from the interviews may indicate that they are facing an lack of feedback from their customers that crowdsourcing could be the answer to. Marketta at Västtrafik states that using crowdsourcing would be an effective way to make both customers and other partners involved in the collection of valuable data and developed public transportation.

One of the main focuses for Västtrafik is the connection between them and their customers. This is also the field that they are facing most obstacles with. They are receiving feedback from their customers that they are feeling frustrated when Västtrafik fails to update when with information about delays. “When it occurs disorders, it is often then the customers feels insecure and lost. What applies now, how will i get there now, typical questions that needs to be answered. So much around disturbance information, we are putting a lot of effort in how we can use digitization to solve this”, said Marketta at Västtrafik. From this statement, it could be concluded that this is one of the situations that need to be solved. As crowdsourcing is an effective way of looking at a big crowds opinion, it could be an first step to solve the problem. As determined in chapter 3, crowdsourcing could be a way for Västtrafik to comprehend the problem through outsourcing questions to a greater mass. The outcome of the queries would be the foundation to understanding and then targeting the problem. When they have fully analyzed and can understand the problem, Västtrafik can start to find a solution to the problem. This would be an solution that is similar to the citizen-sourcing, which is a way to make the cities more effective. After Västtrafik has distinguished the problem with the connection with their customers, both function one and function four would be a suitable solution. Although the most prioritized and appreciated function overall was function area number four, to make it easier for the RKM-companies to reach their travelers. In function area four the keywords are “To deliver the right information, to the right traveler, at the right time”. This is clearly the function that the RKM-companies reckon the travelers to crave for the most.

Värmlandstrafiken describes one of their main problems to be that the traffic is not fully optimized, with many empty busses and not knowing where the travelers are. A reasonable solution to the problem would be to collect information about travel patterns through crowdsourcing. This way they both could get an understanding of how people travel today, but also how they would like to travel in the future. To send out questions about travel patterns and let people who otherwise doesn't travel with the public transportation answer which routes they usually use. This would give Värmlandstrafiken an wider understanding of both their customers and also from future potential customers. All of Samtrafiken, Västtrafik and Värmlandstrafiken expressed an concern of excluding the collection of patterns of those who don't travel with public transportation today. Mainly because if they could get an understanding of these patterns, they could include them when deciding on the line drawing of the routes. This would be a potential way to plan and even change how the routes is drawn today, to adjust to these potential customers. A potential solution to Värmlandstrafiken would be to in the future implement function three in the Welcome onboard project. Since the long term idea of the function is to collect information about travel patterns through location sharing.
5.2 Attitudes towards the project “Welcome onboard”

Concluded attitudes towards function area 1:
Improved travel interaction is an solution area that Värmlandstrafiken wouldn't focus on since they believe that they already has an somewhat functable solution for this issue. This is not something that Värmlandstrafiken is going to focus on, to get closer to their travelers. From natural reasons the issue to get people to leave their car for the bus is larger in a more uncongested area such as Värmland in a large extend is. The same goes for Västtrafik but with another angle, they have not seen some expressed frustration over this issue and therefore it is not an solution that they are going to put resources on at this time. However, Samtrafiken is expressing that it is important for the RKM companies that they get closer to the travelers needs and get them to feel like they have some responsibility for the public transportation.

Concluded attitudes towards function area 2:
New interactive user functions is an really important function to get more people to choose the public transportation in Värmland, where it is hard to get people to leave their car, Lena says. Västtrafik also experience that this kind of functions will increase the amount of travelers for them through attract the disabled travellers that thinks that the public transportation is too complicated for them today. Samtrafiken view of this kind of functions is that it is and should be relatively explored in the RKM-companies today. Although, the safety perspective always is important. It is so important that it should be taken into a more holistic approach by the society.

Concluded attitudes towards function area 3:
To support long term city planning and infrastructure is a function where all three interviewees where positiv to the idea, but for various reasons thought that there were some shortcomings in the function. Gerhard at Samtrafiken was concerned that this function would exclude the people who doesn't travel with the public transportation right now, and therefore would fail to give the correct information. Lena at Värmlandstrafiken was on the same track when she argued that this function only would be useful for travelers today, and in that way not consider future travelers when collecting travel patterns. The same was for Marketta at Västtrafik who thought that it would be more use to distinguish the travel needs. In conclusion they all thought the function would be more useful if it would include people outside the frames of public transportation.
As both the RKM companies are having trouble with understanding their customers travel patterns this would seem to be suited function to start to understand the different routes of their customers. Since none of the companies has an functioning system for this at the moment, it would be a suitable function to start with to later start collecting information about routes outside of the public transportation.

Concluded attitudes towards function area 4:
They all agreed that direct delivery of important traffic information is a function that has been requested and would be a service that would contribute to the public transportation. Västtrafik and Värmlandstrafiken both felt that it is of importance that the information that is presented is optimized to the user. Lena at Västtrafik claims that this function would make the travelers feel more secure. Samtrafiken is certain that this function is of such importance that it is not long to a similar function will be launched. In conclusion this is a function that is awaited amongst the public transportation. Particularly when the user can receive specified information, depending on where the individual are located. It has been stated in chapter three that it is when information about the travelers trip is absent the customers often tend to feel precarious and lost.
**Concluded attitudes towards function area 5:**
Both Västtrafik and Samtrafiken if not out of the belief that there is a need for an communication with an third part. Västtrafik can however understand and see that there is a kind of value in this function, but feels that this kind of function could be provided by other actors. Värmlandstrafiken however thinks that this function would work along the medical appointments-travels they are providing. They think that it is an interesting function and that it could connect different types of transportations. This is an function only Värmlandstrafiken would find interesting to implement. Even though Västtrafik understands the benefits from the function, they don't see a need from the users.

Even though both Marketta at Västtrafik and Gerhard at Samtrafiken expressed the importance of alignment against the combined traveling they thought that the communication with an third part was unnecessary and not a function that is requested from their customers.

**Concluded attitudes towards function area 6:**
The anonymity of the travelers is not something that is stated as an issue, especially not in the public transportation. The informants see the anonymity rather as an issue for the whole society than in public transportation. Lena at Värmlandstrafiken and Marketta at Västtrafik believes that it is impossible to provide an personalized travel service without the travelers giving out their identity. “The customer's need to be anonymous is very important and if we use crowdsourcing the customers can’t travel anonymous anymore”, claims Lena from Värmlandstrafiken. When discussing the issue of anonymity in the public transportation none of the interviewees thought that this was an important factor. Even when presented with the possibility to collect the same information, through crowdsourcing, only that the travelers identity is anonymous, they still felt that the function of being anonymous is irrelevant. As mentioned in the introduction of Welcome onboard in chapter four, the anonymisation is something that is of importance to the project, since it is presented as one of the functions. Therefore the RKM:s and Samtrafikens understanding of the anonymity does not correspond to the comprehension of the project.

It is all three interviewees belief that the users needs to share their information in exchange to be presented with specified information. Samtrafiken claims that no one is anonymous in the internet and if the gain of sharing information about their location is enough, the user won't have a problem with it. Värmlandstrafiken expresses some concern that the older users could find not being anonymous as an issue, but same as Samtrafiken they think that if they benefits from it is big enough they would not mind. Västtrafik thinks that when it comes to the gains, the users wont see the not being anonymous as an problem. They feel that the users should contribute when it comes to functions that would be in their favor.
### Function 1: Improved traveler interaction
- **Värmlandstrafiken** already has a good and function solution for this. No priority for Värmlandstrafiken at this time.
- **Västrafik** already has a function like this, experiencing this as an important function but not a top priority at this time. Necessary to smaller the distance between the RKM-companies and the travelers. This kind of functions requires feedback to the travelers.

### Function 2: New interactive user functions
- **Värmlandstrafiken**
  - Interesting and important for Värmlandstrafiken.
  - Not an priority for Värmlandstrafiken, not an issue that Värmlandstrafiken recall.
- **Västrafik**
  - This is a very important functionality area for Västrafik. Very prioritized.
  - This function already exists in some form. Functions regarding safety needs to be taken into consideration by the whole society.

### Function 3: Support long-term city planning and infrastructure
- **Värmlandstrafiken**
  - Not an priority for Värmlandstrafiken, not an issue that Värmlandstrafiken recall.
  - This is an important function for Västrafik Important. Has already been explored in some extend.
- **Västrafik**
  - Extremely important.
  - This is an important and requested function area. Somewhat already explored but has a lot of potential to develop even further.

### Function 4: Direct delivery of important traffic information
- **Värmlandstrafiken**
  - Interesting and important for Värmlandstrafiken.
  - Not an priority for Värmlandstrafiken, not an issue that Värmlandstrafiken recall.
- **Västrafik**
  - Extremely important.
  - This function already exists in some form. Functions regarding safety needs to be taken into consideration by the whole society.

### Function 5: Third-party communication
- **Värmlandstrafiken**
  - Interesting and important for Värmlandstrafiken.
  - “Nice to have” but not an priority at this time.
- **Västrafik**
  - Not interesting. Requires a flexible transportation system in a larger extend.

### “Function 6”: Anonymity of the travelers
- **Värmlandstrafiken**
  - Not an issue.
- **Västrafik**
  - Complex, but not an issue.
- **Samtrafiken**
  - Anonymity issues goes beyond public transportation.

### Function Ranking

<table>
<thead>
<tr>
<th>Function Ranking</th>
<th>Värmlandstrafiken</th>
<th>Västrafik</th>
<th>Samtrafiken</th>
</tr>
</thead>
</table>
| Important - really important to | Function 2  
Function 4 | Function 3  
Function 4 | Function 2  |
| Function 5 | Function 2 | Function 4 |
| Function 1 | “Function 6” | Function 1 |
| Function 3 | Function 1 |
| Not a problem - not a priority to implement | “Function 6” | Function 5  
Function 5 | Function 6  |

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5.3 Result vs. Key theories and concepts

As mentioned in the introduction, urbanization is an issue that RKM-companies need to address. The recurring solution seen in the interviews is that the informants believe that technology is the key to the problems that urbanization entails. Technology in forms of combined mobility, combined traveling and ICT is also a common conclusion to the further development of the public transportation.

The view on combined mobility is that it is the answer to the urbanization, together with new technology. The public transportation needs to be seen as a whole in an further extend than today and all vehicles must be taken into consideration.

Based on the different collection of perspectives, the combined mobility seems to be the future according to our interviewees. According to them, it is important to look at the travel patterns as a whole and not just the public transportation part of travel patterns. That seems to be the way to attract individuals that are currently travelling with a car or another vehicle. Since traveling with a car still is very common in Sweden, there still is possibilities for the public transportation to expand and attract even more travelers. With an increasing air pollution and congested cities, the only way to a sustainable future is travel with public transportation in an higher degree, as stated in Chapter 3.

Since it is found in chapter three that ICT and the evolving use of smartphone actually has an impact on individuals travel patterns, it is something that the companies providing the public transportation needs to take into consideration. One way to address this phenomena is to create customer oriented services. With this information, the attitudes towards the use of smartphone as a continuing development is not that compelling, based on our interviews. The concept of so called citizen-sourcing is only something that Samtrafiken actually can address and has a concrete vision of how it could be done through having “bus-stop” managers for each bus-stop a RKM-company is providing.

As read about in the result chapter, the further development of the public transportation in Sweden and the attitudes towards using crowdsourcing as a tool to develop differs a lot between the different informants, representing the RKM-companies perspective.

6. Conclusion

Even though the attitudes towards all the functions are positive, the interviews conducted indicates that the RKM-companies are not willing to put efforts and resources in to actually implementing them. Since it also is a question about costs and implementing resources. The differences between the “congested county” and the “uncongested county” are many and their views on the “Welcome onboard”-projects as well.

The attitudes towards the future development of the public transportation is hopeful and the view on the functions of “Welcome onboard” is “nice to have”, concluded from our interviews. According to our concluded interview material, the technology is not an obstacle for the RKM-companies continuing development.

6.1 Concluded attitudes

From the compilation of the interviews and previous research we came to the conclusion that the functions of the Welcome onboard project is necessary to speed up the developments of both the systems and the efficiency. All of Samtrafiken, Värmlandstrafiken and Västrafik has different priorities when it comes to the functions, even though the interest of the function will depend on what the company gains from the function, the overall outcome will be a
benefit for them. Since technology is constantly developing it could be that if the companies of public transportation won’t adapt to the evolving environment we are living in that they later on will either be overtaken by other private owned companies or even will be forced implement similar functions to keep the competitive environment and be attractive to the travelers.

When comparing the interviews, there were several differences between how Västtrafik and Värmlandstrafiken chose to prioritize. They also showed some differences when it came to the attitudes towards the Welcome onboard functions. This could partly depend on what functions they already have an functioning plan for and therefore does not experience as a problem. Although it could also depend on the size of the city and the amount on people they are supplying transportation for. As Västtrafik is facing problems with informing travelers about traffic delays could be a result of a metropolitan problem, since they supply a different flow of traffic. As well as Värmlandstrafikens problem with optimizing traffic and empty busses could be seen as a small town problem.

None of the interviewees expressed any concern regarding the technology behind the functions of Welcome onboard. Even though they were not presented with an plan of how the functions would be implemented. This could imply that when it comes to the development of public transportation the technology it not what is stopping them. In this case it would rather be that the companies willingness to invest in the developments is what's standing in the way. It was also found that some factors indicate that the implementation process is difficult when it comes to implementing new technology. It would be a challenge for both the staff to adapt and learn new ways to carry out their work, but also for some of the travelers. For example the older travelers that don’t use a smartphone as frequently as the younger travelers.

When asked Samtrafiken and both the RKM companies thought that crowdsourcing is a good method and had a positive attitude to the phenomena. Although none of them are using crowdsourcing today, they understood the benefits from the method and would be willing to use it in the future. This information indicates that both Samtrafiken and the RKM companies has an positive attitude when it comes to crowdsourcing and its methods. Therefore would an future implementation of such method be approved.

When it comes to the anonymity of the user none of the interviewees thought that it was an important factor. Even though that a concern about the user's attitude against sharing their information was brought up by Värmlandstrafiken, was the user anonymity not an issue. As mentioned earlier is the public transportation a service where the user can be anemones. The user has always been able to travel without having to share any of their information. The outcome from the interviews showed that Samtrafiken and both the RKM companies thought that they anonymity is not a function that is important. This indicates that their attitude against anonymity is that it is not an important factor. As they imply that the gain would be enough for the user to willingly share their location.

6.1 Quality of Data Transferability

The external validity of this thesis is evaluated as high. The same conclusions that could be drawn from our interviews with Värmlandstrafiken could for example be drawn for another uncongested county like Dalarna or Gävleborg, which creates an overall generality for RKM-companies for uncongested areas. The possibility for them to have the same types of traveling patterns to take into consideration is judged as very likely. The transferability is also very high because we could see a clear difference in “uncongested county issues” and their
attitudes, and “congested county issues” and how they evaluate the same functions in a very
different way.
For example, is the function area 3, called Support long-term city planning and infrastructure
is not something that Värmlandstrafiken thinks is an important function at all, and Västtrafik
thinks that it is an important function.

The same phenomena could be applied for a larger city county such as Skånetrafiken and SL
that with the highest probability would drawn the same conclusions as Västtrafik would.
Therefore, it is likely for the conclusions that this thesis has reached, would be transferable to
other similar counties RKM companies, based on how congested the county is.
Since we first have make our thesis reliable in the interviews with the RKM-companies, we
later on strengthened these theories in our interview with Samtrafiken. Samtrafiken attitudes
did not come up with some new information about the subject, though it gave the thesis an
broader spectra and description of the topics.

6.2 Further research

This study has included two RKM companies and Samtrafiken’s opinions on the development
of the public transportation and furthermore their thoughts on the functions of the Welcome
onboard project. Today there is 21 RKM companies that are active in Sweden, the outcome
might differ if further research would collect several more companies input on the subject.
(Sveriges kommuner och landsting 2019)

Trafikverket is an state owned managing company that is responsible for the infrastructure in
public transportation. They make sure that there is transportation possibilities within the
public transportation for everyone, regardless of where you live. Trafikverket is therefore also
an actor that would be interesting to include in further research, since they are as Samtrafiken
an impartial managing that might come with valuable input.

The study has presented seven different functions that involve the technology of development
in the public transportation. These functions has been presented with no further reflective of
the implementation. Since all companies within public transportation has different priorities
seeing that they provide traffic for various number of people and has diverse prerequisites.
Some of the companies may already have an existing strategy for one or some of the
functions, and therefore won’t need so much support when establishing the welcome onboards
functions. Contrary to another company that is struggling with their development and
therefore will need to implement the functions straight off. Research involving how these
functions could be implemented depending on how the RKM companies previous strategies
have been structured would be an support.

An follow up-study to see the actual outcome of what functions that actually was
implemented and how these were affecting the different RKM-companies would of course be
in interest. Further research on what functions was most effective would also be interesting
for the future development within public transportation. Through investigating thoroughly
what affects the functions showed and compare them to see which one gave the best result.
When looking at the effects of the function it would also be possible distinguish how effective
location sharing and crowdsourcing is when it comes to systems within public
transportation.
7. Sources


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8. Appendices

8.1 Interview Guide

About the interviewee:
- What is your role in the company?
- What kind of work tasks do you have?
- What does your background in the company look like?

Future development
- What is your view on the future development of the public transportation?
- If there were no constraints, how would you like the future public transportation to look like?
- Do you work on any development projects at the time, how does these look like?
- How are the company working today to make the public transportation more attractive for the travelers through digitization?
- Do the company use the technology of crowdsourcing today?
- What are your attitudes towards crowdsourcing?
- Do your company keep track of customers travel patterns today? if so, how? Do you share this collected information to any third part?
- Is there any development that you would like to do but there is something stopping you? (Maturation, legal or costs aspects)
- Which area do you perceive the has most potential development?
- Which services especially would you like your company to improve?

Welcome onboard:
(Present function 1-6 and talk through every function area with the interviewee)
- How would you evaluate X function? Why? Why not?
- Is there any function that you think is good, but would be the wrong focus for your company right now? Which one?
- Which function(s) do you see would be the most potential use for your company right now? Why?
- Which function(s) do you see the least potential use for your company right now? Why?

- Is there any information given by you through this interview that would want you to be anonymous in the thesis?
Thank you for your time. We will make a transcript out of this interview and get back to you if we need to validate our theories further.
8.2 Welcome onboard powerpoint presentation

VÄLKOMMEN OMBORD!
Ett samveransprojekt för morgondagens kollektivtrafik

Reserarch Institutes of Sweden
RISE Viktoria

Resenären i centrum!

- crowdsourcing och aktiv resenärsmedverkan kommer bli allt viktigare för bibehållande av kollektivtraffiks konkurrenskraft
- förståelse för resenärs behov, införandet av nya interaktiva funktioner och tjänster, samt förtroendeskapande åtgärder - är alla viktiga drivkrafter
- ny teknik inom AI tillsammans med hög smartphone-penetration kan lösa gamla problemknutar
- flera initiativ utomlands – Sverige behöver vara del av denna utveckling