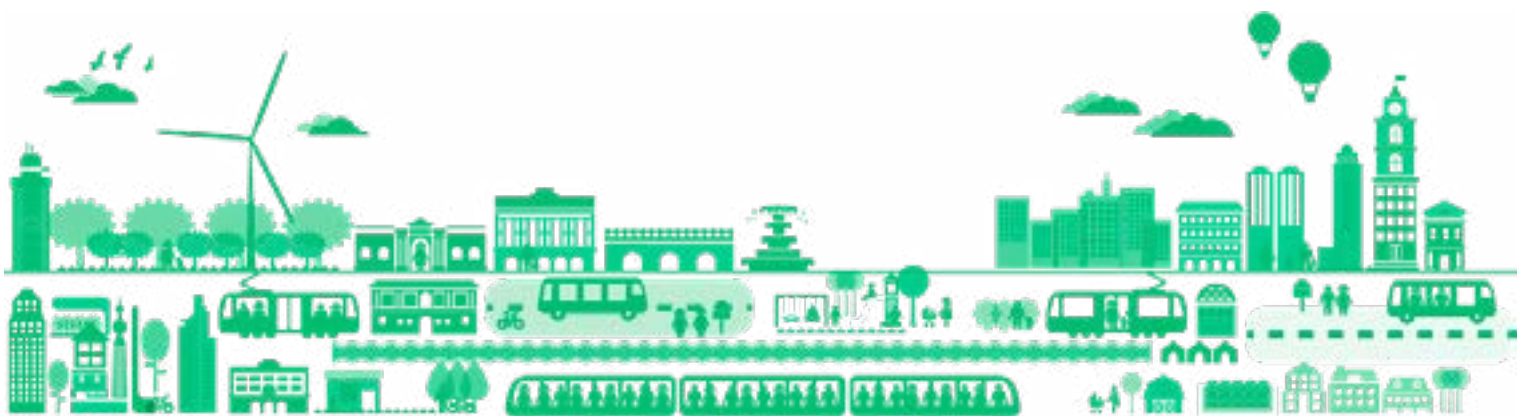


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Increasing satisfaction with public transport in the digital age

Perspectives from public transport providers and travelers in Sweden

Kimberly Nicholas, Chunli Zhao, Jonas Nilsson, and Johan Jansson



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Foreword

This report is part of the K2 project “Communicating public transport in the digital age: Impact of digitization on current and future traveler groups’ attitudes, satisfaction and travel behaviors.” Here we have summarized three years of research working with Swedish public transport providers and surveying the Swedish public. We hope our work can inform more successful and beneficial public transport in Sweden.

Thank you to K2 for a stimulating and enjoyable research environment, and to our reference group for important contributions throughout the project: Hilda Bengtsson who previously worked at Västtrafik, Hanna Ivarsson from Skånetrafiken, Anita Stenhardt from Svensk Kollektivtrafik, and Thomas Hansson who previously worked at SL.

Lund, March 2023

Kimberly Nicholas, Chunli Zhao, Jonas Nilsson, and Johan Jansson

Project Researchers

Summary (English)

We have examined how public transport providers in Sweden use digital communication tools, the challenges and motivations they face in doing so, and the attitudes, behaviors, and motivations of travelers in Sweden to use public transport. Our target group is practitioners and decision makers related to public transport, including providers and authorities, with the goal of supporting policy and practice to improve digital services for public transport.

From interviews with public transport providers from Sweden's three major metropolitan regions, we find that digital communication channels are viewed as valuable, but not transformative. Providers believe that **digital channels offer new ways of delivering existing services to meet traveler needs, rather than a qualitative change in service provision**. Digital communication offers benefits to providers, such as the ability to reach travelers quickly and easily at a given time, create dialogue with travelers, facilitate the use of public transport, and save costs. Digital communication also poses challenges for providers, such as implementation costs, the organizational and technical complexity of the transition to digital solutions, time pressure, public scrutiny, and meeting the needs of special groups such as the elderly and disabled.

There is a strong potential for **digital solutions to support the three quality dimensions of customer experience: *outcome quality* (of the service received), *interaction quality* (customer's perception of how the service is received), and *peer-to-peer quality* (based on interactions with other customers)**. For example, digital solutions can support outcome quality in helping to deliver a safe and reliable travel experience, with infotainment shortening the perceived travel time. Digital solutions can also support interaction quality by providing real-time, reliable, streamlined travel information. Finally, digital solutions can support peer-to-peer quality to enhance the traveler's feeling of control and safety, by using crowding information to plan a calmer journey.

Our survey of mobility habits and attitudes of over 5,000 Swedes found that they are moderately satisfied with public transport on average. Senior citizens are slightly more satisfied, and less stressed by the travel experience. However, **seniors are not primarily motivated by environmental concerns, and struggle with increasing digitalization in public transport**. Seniors report significantly lower awareness of, priority for, and enjoyment of using digital tools, compared with younger people. They struggle with the fast-developing digital service delivery options of public transport. They use apps less, and like using timetables on paper and physical signs more than younger riders.

Public transport authorities need to **guarantee senior citizens' access to public transport while developing digital services and tools, both by retaining some non-digital options and by providing clear guidance to help seniors adapt, so seniors are not left behind in the digital transition**. As digitalization poses challenges to senior citizens, it is important that public transport providers develop clear communication strategies to meet the needs this vulnerable, growing, and important group.

Our research includes a case study of how four different user groups (seniors, young people, car users, and regular public transport users) perceived the digital marketing of a seasonal offer (a summer ticket) across four digital channels: email, social media, website, and travel planner app. The findings show that all user groups have different perceptions and expectations of digital channels, but overall, **all users found the app the most useful channel for receiving information about the offer**. Across all channels, it is **important that the benefits and terms of the offer are clear**. The content should be explicit about the advantage of the summer ticket compared with other types of tickets, its price, and validity terms. To avoid risking mobility injustice towards senior citizens, public transport providers need to consider seniors' travel needs, including **providing both digital and analog solutions, such as senior tickets, postal letters, and retaining some physical ticket offices**. Young people rely much more heavily on social media and the travel planner app, where they expect appealing visuals and concise information. Car users are not well-informed about public transport offers and need clear explanations of the benefits of such offers.

To get more people to travel with public transport, it is important to focus on increasing traveler satisfaction. Most studies of overall satisfaction with public transport focus on utilitarian factors, such as commuting time, frequency, and accessibility. We found that **the quality of experience for public transport travelers, such as low stress and good feelings while travelling, was nearly as important to their overall satisfaction**. Those who value the environmental benefits of travelling with public transport were the most satisfied with their experience, and those with higher digital competence also perceive a higher quality of the service. Utilitarian quality, such as an easy-to-use app, was also important to overall satisfaction.

Overall, we see strong awareness from public transport providers of the potential for digitalization to increase service quality and ridership and to help meet the needs of all passenger groups. However, providers are also wrestling with challenges in making the digital transition. Digitalization might also make less sustainable transit options such as car sharing more appealing, thus competing for mode share with public transport, and limiting the success of public transport in reducing emissions.

Breaking norms and changing existing policies and infrastructure that give rise to unsustainable car use requires more than just improving the quality of public transport. In order for the public transport sector to seize the potential benefits offered by digitalization, it will need to **successfully involve all necessary stakeholders, work towards integrating information channels across regions and transit modes (e.g., regional and local buses and railways)**. Such integration is needed to deliver a seamless customer experience and to allow for sufficient long-term budgetary and time planning to develop, test, and implement digitalization.

The public transport sector cannot successfully implement sustainable mobility alone. The sector must be supported by public policy that explicitly favors low-carbon options systemwide, including through digitalization. These policies need to be efficient and inclusive, to be sure not to leave groups such as senior citizens behind.

Sammanfattning (Svenska)

Vi har undersökt hur kollektivtrafikleverantörer i Sverige använder digitala kommunikationsverktyg, vilka utmaningar de möter och vad som motiverar dem. Vi har även undersökt resenärers attityder och beteenden samt vad som motiverar dem att resa med kollektivtrafiken. Vår forskning riktar sig till praktiker och beslutsfattare inom kollektivtrafiken och har som mål att stödja utvecklingen av digitala kollektivtrafiktjänster och regelverk.

Från intervjuer med kollektivtrafikleverantörer från Sveriges tre storstadsregioner kan vi dra slutsatsen att digitala kommunikationskanaler är värdefulla för leverantörerna, men ses inte som transformativa. Kollektivtrafikföretagen anser att digitala kanaler erbjuder nya sätt att leverera befintliga tjänster för att möta resenärers behov, snarare än en kvalitativ förändring av tjänstebudet. Den digitala kommunikationen innebär många fördelar för operatörerna. Med digitala lösningar kan man snabbt och enkelt nå resenärer vid en viss tidpunkt, skapa dialog, göra det lättare för resenärer att använda kollektivtrafiken och samtidigt göra kostnadsbesparingar. Men digitaliseringen innebär också utmaningar för operatörerna. Dessa relaterar till kostnader för genomförandet, den organisatoriska och tekniska komplexiteten i övergången till digitala lösningar, tidspress och offentlig granskning. Operatörerna står även inför utmaningen att tillgodose behoven hos särskilda grupper som exempelvis äldre och funktionshindrade.

Det finns stor potential för digitala lösningar att stödja de tre dimensionerna som utgör kvaliteten på kundupplevelsen: *resultat* (av den mottagna tjänsten), *interaktion* (kundens uppfattning om hur tjänsten levereras), och *peer-to-peer* (interaktionen med andra kunder under servicen). Digitala lösningar kan stödja resultat kvaliteten genom att bidra till en säker och tillförlitlig reseupplevelse, med infotainment som förkortar den upplevda restiden. Digitala verktyg kan även bidra med interaktionskvalitet genom att tillhandahålla tillförlitlig reseinformation i realtid med hjälp av streaming. Slutligen kan digitala lösningar bidra med peer-to-peer-kvalitet för att öka resenärens känsla av kontroll och säkerhet, exempelvis genom att ge information om trängsel så att resenären kan planera en lugnare resa.

I vår undersökning om mobilitetsvanor och attityder bland över 5 000 svenskar framkom det att de i genomsnitt varken är särskilt nöjda eller missnöjda med kollektivtrafiken. Seniorer är något mer nöjda och mindre stressade av kollektivtrafiken. Seniorer är dock inte primärt motiverade av miljöhänsyn och kämpar med den ökande digitaliseringen inom kollektivtrafiken. Seniorer rapporterar betydligt lägre medvetenhet om och glädje av att använda digitala verktyg, jämfört med yngre personer. De använder appar i mindre utsträckning och föredrar tidtabeller på papper och fysiska skyltar.

Regionala kollektivtrafikmyndigheter måste garantera äldre medborgares tillgång till kollektivtrafiken samtidigt som de utvecklar digitala tjänster och verktyg. Detta genom att behålla vissa icke-digitala alternativ och genom att tillhandahålla tydlig vägledning för att hjälpa äldre att anpassa sig, så att de följer med i övergången till digitala verktyg. Eftersom digitaliseringen innebär utmaningar för seniorer är det viktigt att

kollektivtrafikleverantörer utvecklar tydliga kommunikationsstrategier för att tillgodose behoven hos denna sårbara, växande och viktiga grupp.

I en fallstudie studerade vi hur fyra olika kundgrupper (seniorer, ungdomar, bilanvändare och frekventa kollektivtrafikresenärer) uppfattade den digitala marknadsföringen av en sommarbiljett via fyra digitala kanaler: email, sociala medier, hemsida och reseplanerare. Resultatet visar att de olika grupperna har olika uppfattningar och förväntningar på digitala kanaler, men att samtliga användare ansåg att reseplaneraren var den mest användbara kanalen för att få information om erbjudandet. Oavsett kanal är det viktigt att fördelarna och villkoren för erbjudandet är tydliga i kommunikationen. För att inte riskera att det uppstår orättvisa måste operatörerna ta hänsyn till äldre resenärers behov. Detta genom att exempelvis erbjuda både digitala och analoga lösningar, såsom seniorbiljetter, brev och att behålla vissa fysiska biljettkontor. Ungdomar förlitar sig i mycket högre grad på sociala medier och reseplanerare, där de förväntar sig tilltalande bilder och kortfattad information. Bilanvändare är inte lika välinformerade om olika erbjudanden i kollektivtrafiken och behöver tydliga förklaringar om fördelarna med eventuella specialerbjudanden.

För att få fler att resa med kollektivtrafiken är det viktigt att fokusera på att öka kundnöjdheten. Tidigare forskning om kundnöjdhet i kollektivtrafiken tenderar att fokusera på faktorer som pendlingstid, frekvens och tillgänglighet. Vi upptäckte att kvaliteten på resenärernas upplevelse, såsom låg stress och positiva känslor, var nästan lika viktig för deras totala tillfredsställelse. De som värdesätter miljöfördelarna med att resa kollektivt var mest nöjda med sin upplevelse, och de med högre digital kompetens uppfattar också en högre kvalitet på kollektivtrafiktjänsterna. Kvaliteten på kollektivtrafikens app var också viktig för kundnöjdheten.

Sammantaget ser vi att kollektivtrafikleverantörer är medvetna om digitaliseringens potential att bidra till en bättre kundupplevelse, ökat resande och att uppfylla behoven hos alla passagerargrupper. Men leverantörerna brottas också med utmaningar när det gäller övergången till det digitala. Det finns också en risk att digitaliseringen gör mindre hållbara transportalternativ, såsom bilpool, mer attraktiva. Detta kan i sin tur påverka kollektivtrafikens andel av antalet resor och begränsa kollektivtrafikens bidrag till att minska utsläppen.

För att bryta normer och förändra befintlig politik och infrastruktur som stödjer ohållbar bilanvändning krävs mer än att bara förbättra kvaliteten och digitaliseringen av kollektivtrafiken. För att kollektivtrafiken ska kunna utnyttja digitaliseringens potential måste sektorn involvera alla nödvändiga intressenter och arbeta för att integrera informationskanaler mellan regioner och transportsätt (exempelvis regionala och lokala bussar och järnvägar) för att ge en sömlös kundupplevelse. Det är även viktigt att möjliggöra tillräcklig långsiktig budget- och tidsplanering för att utveckla, testa och genomföra digitalisering. Kollektivtrafiken kan inte på egen hand utveckla hållbar mobilitet. Sektorn måste stödjas av en politik som uttryckligen gynnar alternativ med låga koldioxidutsläpp i hela systemet, bland annat genom digitalisering. Denna politik måste vara effektiv och inkluderande, för att se till att grupper som äldre personer inte lämnas utanför.

1. Introduction

In this report, we examine how public transport is communicated in the digital age, from the perspectives of both transit providers and travelers in Sweden. Here we summarize results from both existing research, and research conducted via our K2 project, to investigate the problems and opportunities that public transport agencies and different groups of travelers experience with digitalization in public transport.

Individual mobility decisions have a large, and growing, impact on greenhouse gas emissions, congestion, noise, and other environmental problems related to traffic in urban areas. Sweden will not meet its 2030 climate goal without substantially reducing private car use, including shifting mobility from private car use to public transport (Swedish Climate Policy Council, 2019).

In order to increase the share of travel taken by public transit in Sweden, a better understanding is needed of what influences traveler's attitudes, satisfaction, and behaviors in relation to digitalized public transport.

Communicating using suitable digital services has the potential to increase customer satisfaction, which will in turn increase travel by public transport, which can reduce greenhouse gases and air pollution and improve health (Figure 1). However, digitalization must be implemented with care to achieve these results in practice.

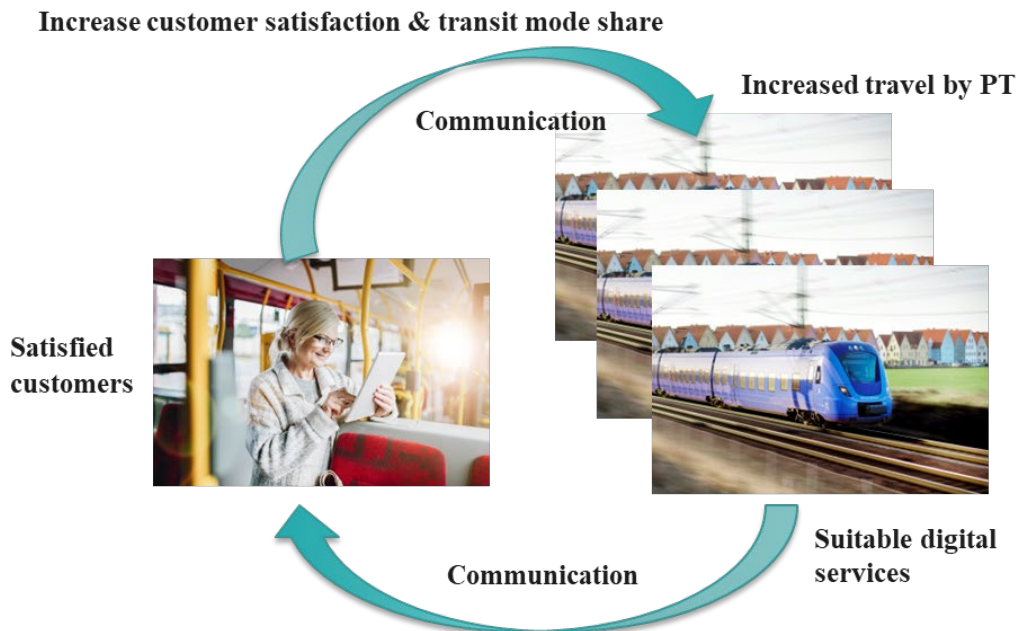


Figure 1. A conceptual framework for the overall project goal across the following chapters. Image Credits: [1], [2].

Since traveler's attitudes and satisfaction can vary greatly between groups, we have focused on different groups including seniors, youth, regular users, and car drivers, in order to derive relevant messages and recommendations for each group.

1.1. Digitalization and public transport

Public transport customer communication is currently transforming from non-digital to digital [3]–[5]. Public transport providers must respond to the needs of a changing society and find ways to integrate digital solutions into existing infrastructures, services, operations, and systems [6], [7]. Expanded digital passenger services such as travel planner apps, websites, and onboard screens have become the main channels for providing public transport service and communication, as well as to stimulate service innovation and potentially improve service quality [8]–[10].

Our focus on digitalization is on customer-facing digital services, including digital signs on buses, trains and platforms; websites; travel planner apps; booking services; and social media. All of these are relevant to the traveler experience and have impact on satisfaction, and thus ultimately influence ridership.

1.2. Does digitalization increase access to public transport?

Recent developments in digitalization can either increase or decrease climate-friendly travel. A recent review found that, on balance, digitalization of goods and services had strong potential to reduce emissions [11]. However, public policy is needed to steer digitalization to achieve low-carbon outcomes, as some digital innovations such as autonomous vehicles tend to increase emissions through induced demand or substitution with a higher-carbon option [11]. Replacing vehicle kilometers traveled by car with public transport is essential for the transport sector to achieve climate goals [12], [13].

Potential advantages of digitalization in public transport:

- Contribute to a more connected, intelligent, and sustainable public transport system, thus increasing the mode share of public transport [14], [15].
- Digitalized real-time traffic information has the potential to improve resource management for providers and provide more accurate information for passengers to plan their journey [16]–[18]
- Providers can benefit from saving costs by reducing labor resources after digitalization is implemented [19].
- Passengers can feel more independent when they can buy tickets on their phones instead of at a counter [20], [21].

While digital tools hold potential to better plan and deliver sustainable mobility, they can also enable unsustainable mobility. Examples of cases where digitalization can create challenges include:

- Rapid developments in ride-hailing services have increased car ownership and decreased the share of public transportation in high-income US cities, likely increasing carbon emissions from car traffic [22].
- Digitalization can make car driving, parking, and navigating easier and more accessible, thus reducing motivation to use public and active transport.
- The use of shared micro-mobility scooters has so far largely replaced walking, biking, and public transit trips, without decreasing use of cars, thus overall increasing emissions [23]–[25].
- Digitalization requires increased cooperation and coordination between organizations.
- High cost of infrastructure transformations [3], [16], [18], [26], [27].
- Challenging passengers' travel habits can result in reduced customer satisfaction and inequality for accessing services [28]–[30].
- Digitalization can cause mobility justice problems related to the accessibility of different user groups [31].

1.3. The Covid-19 pandemic and public transport in Sweden

We must also note that our study took place during the Covid-19 pandemic, which greatly affected travel behavior and presents an ongoing challenge to promoting public transport. In response to COVID-19, travel habits globally initially changed dramatically. But following large reductions in driving during the spring of 2020 [32], road use and the associated levels of climate pollution have since rebounded to near pre-pandemic levels [33]. Public health recommendations in Sweden advised avoiding public transport where possible for much of the first two years of the pandemic. Indeed, in Sweden, while public transport use declined by around 42% during the first year of the pandemic, car travel declined by only 7% in the same period, leading to an overall increase in the proportion of car use [34].

2. Public transport providers' perspectives on digitalization

Customer satisfaction is an important goal for public transport providers when developing digital services [35]. Our research examines how providers perceive the service quality of digital solutions, which is important to guide the best use of digital services to achieve sustainable and equitable public transport. We conducted semi-structured interviews with representatives from the relevant organizations, authorities, and operators involved in developing and providing digital services to passengers in Sweden, including four public transport authorities (SL, Västtrafik, Skånetrafiken, and the Swedish Transport Administration), and two bus operators (Nobina and Transdev). We analyzed how the providers perceive digital service quality and identified the motivations and challenges they face for delivering good service quality.

2.1. How does digitalization create customer experience quality?

Customer experience quality can drive behavioral intentions and actions, such as choosing to travel by public transport. Thus, ensuring high quality of customer experience can motivate use of public transport. We analyzed responses from public transport providers according to the definition of customer experience quality as consisting of **outcome quality** (how the customer perceives the service quality of the physical transit experience), **interaction quality** (the way the service is delivered, such as ease of use of digital services), and **peer-to-peer quality** (positive contact and lack of negative contact with other customers) [21].

Public transport providers reported using digital solutions to address all three elements of customer experience quality (Table 1). First, they improve outcome quality by aligning information, people, and physical objects on one digital platform, and shortening perceived trip distances by providing effective infotainment onboard. Interaction quality is supported by providing relevant, timely information across different digital channels and transit modes. Digital solutions support peer-to-peer quality by allowing passengers to control their space as much as possible on the bus or train, and providing information to allow passengers to avoid crowding, which was especially valued during Covid-19 restrictions.

Table 1. Public transport providers' perceived service quality according to customer experience quality model

Dimension of customer experience quality	Quality element	Digital solution to support delivering quality element
Outcome quality	Comfortable, frequent, reliable and safe travel experience	Design services based on user's input; Service adapts to demand based on big data; Detailed information about the full journey, including real-time information for station navigation, finding replacement bus stops, and where to stand on the platform
	Shorten perceived travel time	Using onboard screen to provide infotainment
Interaction quality	Unified, useful, timely information	Real-time traffic information from digital signs; Reliable screen information on the platform; Timely status updates and solutions to passengers on app, station broadcast
	Easier to use	Streamline all information in one digital platform, such as travel planner app
	Personalized travel information	App, website, social media; Adapt information according to the needs of the users in real-time location (planned); Audio messages for guiding disabled people (being developed)
	Dialogue with passengers	Social media Online customer service (app and website)
Peer-to-peer quality	Safety	Online communication channels for contacting police
	Feeling of control	Predict crowding level on bus or train

2.2. Motivations and Challenges in digitalizing public transport services

Public transport providers reported both motivations and challenges in digitalizing services, summarized in Table 2.

Table 2. Motivations and challenges for digitalizing public transport service

Motivations	Challenges
<ul style="list-style-type: none"> 1 Flexibility and immediacy of digital solutions 2 Meet passenger expectations 3 Save costs and increase resource use efficiency 	<ul style="list-style-type: none"> 1 High cost for transitioning from non-digital to digital channels 2 Technical and organizational complexity during digital transition 3 Time pressure across the short, medium, and long term Societal pressure on the public sector 4 Meeting needs of special groups

2.3. Summary and recommendations based on providers' perspectives

- Digital channels are valuable, but not transformative. Public transport providers believe that digital channels offer new ways of delivering existing services to meet customer needs, rather than a qualitative change in service provision.
- Providers feel a pull to communicate digitally with travelers and use different channels for different purposes. Travel planner apps and websites are mainly used for customer service and ticketing. For real-time traffic information, announcements through loudspeakers and messages on station platforms are more common. For brand communication, social media and digital on-board signs are used.
- Digitalization can help fulfil the three dimensions of good customer experience quality: outcome, interaction, and peer-to-peer quality.
- Digital communication offers benefits to providers, such as the ability to reach travelers quickly and easily at a given time, create dialogue with travelers, facilitate the use of public transport, and save costs.
- Digital communication poses challenges for providers, such as implementation costs, the organizational and technical complexity of the transition to digital solutions, time pressure, public scrutiny, and meeting the needs of special groups.
- Policy should facilitate effective cooperation and coordination between public organizations, regions, and cities, thus developing an integrated transport system that enables a seamless journey for passengers. One example of this could be an integrated national ticket system that allows passengers to buy all tickets on one digital platform, as being investigated by the Infrastructure Department [36].
- Long-term public transport planning needs to allow sufficient time to develop, test, and implement digital solutions, while allowing an agile approach, supported by long-term budgetary planning.
- Providers report providing digital services to all groups is one of the biggest challenges they are facing. Until the digital transition is completed, to avoid mobility inequality, it is important to provide solutions for special groups who either do not have access to digital platforms, e.g., the elderly, or those who have special needs, e.g., disabled people.

3. Senior citizens' perspectives on digitalization in public transport

3.1. Demographics of Swedish mobility

To understand traveler demographics, attitudes, norms, and travel behavior, especially regarding public transport, we surveyed 5,041 people in the three largest metropolitan areas in Sweden, 1,006 of whom were senior citizens (age 65+). We found high car use is the norm, with two-thirds traveling at least 2 days per week by car, but the largest share (40%) identified themselves as primarily public transit users, with nearly a third using public transit 5 or more days per week. Self-identification as an active transport user was about three times lower (approximately 15% for cyclists and 12% for pedestrians), with 40% reporting they never cycle. Understanding traveler identity is important for public transport to not only maintain its market share of current users, but to attract car users to switch from car to public transport, which is necessary to meet sustainability goals.

3.2. Why focus on senior citizens and mobility?

Seniors may differ in their mobility decision-making compared to younger groups. It is important to understand their perspectives to design truly sustainable transport. In many industrialized countries, the share of senior citizens in society is increasing [37], and they are often more active and able to travel and be mobile in everyday life than a few decades ago (e.g. [38]–[40]), making their mobility decisions an important part of achieving sustainability goals.

However, seniors may struggle with sustainable mobility decisions. They are experiencing a rapidly changing environment compared to previous generations [41]. These changes include expectations to keep up with rapid digitalization, or risk being left out and perceiving society as less accessible if they struggle with challenges in using new technology (e.g. [42]–[44]). Seniors also may struggle to adjust to the stronger emphasis on environmental issues in individual decision-making, as compared to different social norms that were previously dominant in their formative years.

3.3. Seniors and digital tool use

Our findings indicate that digital services are widely used by people who travel by public transport, even more so than drivers. A large majority of travelers relied regularly and extensively on a travel planner app to navigate public transport. This implies that

continued investment in improvements to digital communication are an effective means to improve customer satisfaction in public transport.

However, we also find that senior citizens are less digitally literate and less attracted to digital tools. When travelling, seniors use smartphone apps and other digital tools less often than younger people across all modes of transport (car, public transport, bicycle, walking). When traveling with public transport, seniors do not use digital tools to search for information or for paying as often as their younger peers. Given that public transport is becoming heavily digitalized, and the possibilities to use cash are becoming limited [45] this may represent a challenge in the upcoming years.

Overall, across all travelers, satisfaction with public transport apps is moderately high. Utility was reported as the most important contributing factor to satisfaction, followed by aesthetics, then enjoyment. This implies that available digital services are meeting traveler's expectations, given their purpose and use context. Assuming that the services meet minimum expectations across all three dimensions, further increases in satisfaction could be targeted either to improve utility (the most important dimension of satisfaction in our survey), or to increase enjoyment (the lowest-rated attribute).

3.4. Environmental attitudes, norms, and travel choices

Our findings show that travelers care a lot about nature protection, and recognize the pollution problems caused by car use, including climate change from burning fossil fuels. Respondents strongly agreed that reducing car use and increasing public transport use offered social and environmental benefits. However, travelers do not seem to take personal responsibility to travel sustainably, including transit use.

Seniors are equally aware as younger people that public transport decreases environmental problems. However, they are less aware of cars and fossil fuels as environmental problems (Figure 2). While seniors agree it is important to protect and respect the natural environment, even more so compared to younger people, they take less personal responsibility to reduce their *own* environmental impact, particularly regarding climate change and fossil fuels.

Age is not related to environmental norms but to how cars and public transport is seen

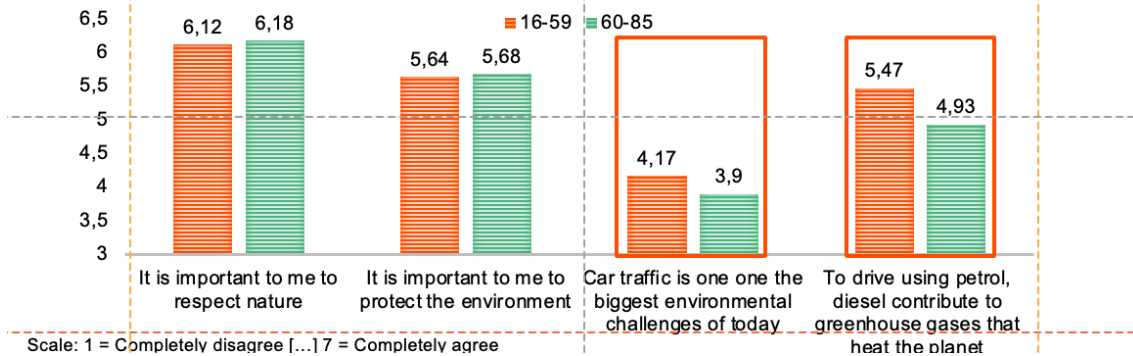


Figure 2. Survey results from over 5,000 Swedish respondents, highlighting shared values for nature protection across age groups, but higher awareness of the problems of cars and climate change among younger adults.

3.5. Satisfaction with public transport

All travelers reported relatively solid satisfaction with public transport, with two-thirds stating they were strongly to extremely satisfied overall with the public transit agency they used most.

One of the more interesting findings is that, despite the ongoing digitalization, senior citizens are considerably more satisfied with public transport, compared to younger travelers. Seniors are also significantly more likely to recommend the local public transportation company to others.

3.6. Summary and recommendations for supporting senior users

- Seniors (65+ years) are less likely than younger people to use digital services for public transport. Seniors experience significantly lower levels of awareness, priority for, and enjoyment of using digital tools compared to younger people. Seniors mostly disagree that digital tools have made it easier to use public transport. They struggle with the fast-developing digital service delivery options of public transport. They use apps less, and like using timetables on paper and signs at bus stops more than younger riders.
- Public transport authorities need to guarantee senior citizens' access to public transport while developing digital services and tools, since seniors are at risk of being left behind since they are less willing to use digital tools. Retaining some non-digital options and providing clear guidance on digital updates through information channels, workshops, campaigns, and co-creation activities, are likely to help seniors adapt to the changes, as well as overcome some of their digital anxieties.

- Swedes of all ages value nature highly, but do not feel much responsibility for climate change. Citizens of all ages agree that public transport reduces environmental impact and that respect for nature is important. Nevertheless, they do not feel much personal responsibility for global warming. People below the age of 65 feel slightly more responsible than seniors and are more concerned about the environmental problems caused by car use. Public transport is more environmentally friendly and sustainable than travel by private cars, but environmental motivations do not seem to attract many more people to travel by public transport.
- Swedes are moderately satisfied with public transport. Compared to younger travelers, seniors are slightly more satisfied with the travel experience and experience less stress from public transport, indicating that many seniors like using public transport, despite lacking environmental motivations to do so, and struggling with increasing digitalization.
- While also working to expand public transport ridership to new groups, it is important to maintain current users. Therefore, it is a smart strategy for providers to attract and retain senior citizens, since they are the group most satisfied with public transport service. Attracting new and maintaining the current senior users will contribute to increasing number of users and reduce the negative social impacts of digitalization on senior citizens, which supports achieving a more environmentally and socially sustainable society.
- Since previous research has shown that norms have more explanatory value than attitudes in predicting behavior (value-belief norm theory, [46]), we believe that an important and under-used strategy to increase public transit use is to simultaneously promote the norm of travel by transit, while discouraging travel by car (push- and pull-effect, [47]). We suggest transit authorities, together with other measures, broaden and increase their communication to promote a transit norm, including through increased perceived consumer effectiveness, while collaborating with campaigns to discourage car use.

4. Effectively reaching user groups digitally

Digital marketing, using channels such as social media, websites, and email, has become an essential strategy to inform and maintain relationships with existing customers and to attract new customers [48], [49]. To be effective, digital marketing needs to use the right channels for appropriate content and user groups. Here we present a case study to support public transport providers in using digital marketing to effectively reach different user groups, and thereby maintaining regular users while also attracting new ones.

4.1. Case study: The digital marketing of a summer ticket

We investigated how four different user groups (seniors, young people, car users, and regular public transport users) perceived marketing for a digital public transport service across four digital channels: email, social media, website, and public transport travel planner app. The digital service was a summer ticket offered by Västtrafik for travel for 30 days between June 15 and August 31, 2022. It allows one to travel freely in three zones for the price of one throughout Västra Götaland County and Kungsbacka municipality. The ticket could be used on all Västtrafik's vehicles except certain SJ regional trains. One can only purchase the ticket through the app Västtrafik To Go.

We conducted focus group interviews with the different user groups the week before the ticket became available, to capture customer *perceptions* of digital marketing messages, rather than customers' experience using the service.

4.2. Reaching senior citizens – through the app and website

Seniors reported the travel planning app as their most preferred channel for checking traffic information, although less so for buying tickets. They did not see email, website, or social media as an effective channel to be informed about the summer ticket. They reported checking email daily, but often deleting emails without reading them. The website was valued by seniors with poor vision, so they could read on a big screen, but they find the content on the website redundant. Seniors reported choosing not to use social media due to preferring in-person interactions, privacy concerns, and low trust in information from social media, although they consider Västtrafik a trustworthy organization.

Even though they personally may have other options to travel without using the summer ticket, several seniors raised concerns about inclusion, noting the digital transition left those without a smartphone behind, and they perceived the pace of digitalization as too fast. One senior citizen stated,

“People who don’t have a smartphone have no chance to log into any apps. And that’s totally crazy. So I think digitalization has happened entirely too fast.”

Another senior criticized the exclusionary impacts of digitalization, saying:

“You can almost see it as a discrimination towards the elderly, the disabled. I think it is striking that many of us are excluded from travelling.”

Even seniors who use the internet and smartphone in their daily life were concerned about exclusion:

“But I feel like I want to stand up for all the people who do not have the ability to use phones and computers. Personally, I use them but I think it is so incredibly important that we don’t forget maybe 10-20% of the population.”

4.3. Reaching young people – through the app and social media

Young people expressed that the travel planner app was the best channel to buy tickets, obtain useful information, and the most effective channel to inform them about the summer ticket. They appreciate the convenience of digitalization. They also appreciated the accessibility of Instagram, where it is easy to share information with others and link to the website for more information, though they noted they would like more summer-related images in the marketing content. Young people felt email and website were old-fashioned and not innovative channels. However, they appreciate the detailed information provided in those two channels, though they wished for more beautiful and relevant images on the website. They found email and the website easy to use, although not easy to share information with their friends or family and thus, less effective for marketing.

Regarding the app, one young person said, “*It feels like the best place to purchase a ticket. It also feels like the information was the best on the app*” and “*There’s almost more information on the app, which I think is good because that’s where you buy the [ticket] and keep the[ticket], and you can always have it on your phone.*”

4.4. Reaching car users with clear explanations of the benefits

Overall, car users expressed that, across all digital channels, the offer of the summer ticket was not enticing enough to trigger their interest to travel with public transport. Because they are not familiar with the standard ticket costs and benefits, the advantages that the summer ticket offered were not sufficiently clear to them. One car user said,

“So it feels like they’re [Västtrafik] trying to attract new people but ...it doesn’t feel like it’s enough value for me as somebody who is not a regular user to buy this [ticket].”

Comparing the four digital channels, car users found the travel planner app the easiest to use and access, but they did not use it often. They tended to delete or refuse emails containing advertisements, although they did click on links more often in emails than in social media, and some car users reported saving the email from Västtrafik if they planned to travel with their children during the summer. Car users appreciate that the website provides complete information, organized in bullet points that make it easy to read, but they wanted more explicit details, for example regarding the discount for young people. Finally, they reported social media as largely irrelevant to their interest, and not conveying enough clear and useful information.

4.5. Reaching regular public transport users

Overall, regular public transport users expressed that the summer ticket nudged them to continue travelling with public transport during the summer instead of using the car, and they are less critical and more positive about the offer of the summer ticket. Public transport users have good knowledge about the prices and attributes of different tickets, hence they expect more detailed and specific information than other groups, such as price and valid zones and trains.

Public transport users already use the travel planner app to buy tickets and search for traffic information as early as possible, and like having all the information and ticket on their phones, so they found the app the most useful and efficient channel to reach them with new offers like the summer ticket:

“I feel like [the app] gives enough information and would be simple enough to act and buy the ticket right away. And I would get reminders too every time I log in to buy a ticket or renew a ticket.”

However, they expressed doubt if the app was an effective way to reach new users. They found the email effective, appreciated the image and the clarity of the dates of availability, but they thought the information came too late. Some of them had already bought other types of tickets, which were a worse deal for them than the summer ticket, and expressed frustration they did not know about the summer ticket in time to buy it. Public transport

users appreciated the level of detail on the website, such as the frequently asked questions which they found very helpful, and found Instagram good for catching attention since they spend a lot of time using the platform.

4.6. Summary and recommendations for digital marketing of public transport

- Overall, the travel planner app was the most useful digital marketing channel to reach customers across user groups with a new service.
- Across all channels, it is important that the benefits and terms of the digital marketing offer are clear. The content should be more explicit about the advantage of the summer ticket compared with other types of tickets, its price and validity (e.g., geographical zones, number of passengers covered).
- Making information available on multiple channels may increase users' access to the information, and perhaps help attract new customers. Users expect the content on different channels to be presented at different levels of detail. For example, users prefer the travel planner app to contain only the most relevant, concise information, while they are more tolerant of reading longer texts and more detailed information on the website.
- Each channel should enable users to search for more information if they wish, for instance, by providing links to buy the ticket or to frequently asked questions. Different user groups have different needs and knowledge about the ticket, as well as expectations regarding the channels and content that are relevant for them.
- It would be useful to compare the qualitative impressions reported from our focus groups with quantitative data from the marketing campaign regarding which channels produced the most ticket sales. (For example, users report finding email ineffective, but previous marketing research suggests email is much more effective than social media for generating purchases.)
- Effective marketing targeting car users requires strategies and content that state clear benefits for them and that acknowledges they are not very familiar with current public transport offers. Targeting car users more explicitly to effectively shift mobility from car to public transport is important to meet policy goals for a low-carbon society.
- To avoid risking mobility injustice towards senior citizens, public transport providers need to consider seniors' travel needs, including providing both digital and analog solutions, such as a senior ticket, postal letters, and retaining some physical ticket offices.

5. Traveler satisfaction in public transport

5.1. Utilitarian and experience quality

Naturally, traveler satisfaction is an important factor influencing ridership. However, past public transport research has focused almost exclusively on understanding overall satisfaction as a function of practical, utilitarian quality elements like reliability, frequency, travel time, and price [50], [51]). But research in other domains, including sports and tourism [52], [53], has shown that customer experiences are holistic, consisting of sensory, emotional, cognitive, physical, and social elements, and that understanding this “experience quality” is important to understand consumer reactions [54]–[56].

Here we conducted a large survey of over 5,000 people in the three largest metro areas in Sweden to examine the drivers of traveler satisfaction with public transport. We explored the role of both utilitarian and experience quality in driving overall satisfaction with public transport.

We found that both utilitarian, and to a slightly lesser degree, experience quality were important for overall satisfaction with public transport. Travelers in Sweden reported that it was important to them to have utilitarian features such as availability and knowing how to use public transport for most trips, easy travel, and a public transport schedule that suits their needs. Travelers also highlighted the importance of a nice atmosphere and environment while traveling by public transport, and to experience pleasant feelings and low levels of stress.

The average experience quality reported by Swedish public transport users is much lower than the averages of utilitarian quality, showing strong room for improvement in experience quality.

5.2. The role of environmental norms in perceived quality

We found that the norms people hold regarding the environment are important as they drive travelers to (correctly) perceive the environmental benefits of public transport. This is important as people who perceive environmental benefits also tend to think that the public transport service is of higher quality. Thus, nature lovers care about traveling green, correctly perceive public transport as green, and since public transport meets a function they care about (low emissions), they get high utilitarian quality from using these services. However, feeling personally responsible for climate change is not very important to driving perceived greenness of public transport.

Somewhat surprisingly, caring about nature also made users perceive their experience of traveling with public transport as more positive. If you like nature, you will find public transport not just more reliable and comfortable, but also more pleasant and good for your well-being.

5.3. The role of digital tools in perceived quality

We found that a positive evaluation of the travel planner app that public transport operators use is important to both perceived utilitarian and experience quality. People perceive the app as an important part of being able to use the function of the service, such as to catch the bus on time in the right place.

5.4. Summary and recommendations to increase customer satisfaction

- The quality of experiences (based in the ‘senses’), such as low stress and good feelings while taking public transport, are important to satisfaction with public transport, but have been under-studied. It is not ‘just’ the utilitarian factors (commuting time, frequency, accessibility) that matter to overall satisfaction with public transport.
- Personal characteristics of travelers matter for how public transport quality is perceived. For influences behind experience quality, the most important was personal norms valuing the environmental benefit of traveling with public transport. Those who most perceived public transport as green were most satisfied with their experience. People with higher digital competence also perceive a higher quality of public transport service, which is likely due to being better able to deal with information through digital channels. These results support the importance of enhancing the experience dimension to increase overall satisfaction with public transport.
- For influences behind utilitarian quality, the most important was satisfaction with the travel planner app, so continued investments to deliver a well-working app are essential to overall satisfaction.
- An important avenue for public transport providers in Sweden to increase overall traveler satisfaction is to prioritize experience quality, for example by focusing on cleanliness, pleasant aesthetics such as perhaps incorporating plants and natural materials to trigger nature norms, taking steps to reduce traveler stress levels and use cues that suggest calm, and encouraging positive interactions among travelers that foster pleasant feelings.
- Norms for protecting nature were more important than norms for taking personal action. It is thus likely more effective to focus on messages emphasizing that “traveling by public transport is good for nature” rather than “you’re doing your part” by traveling with public transport.
- Travelers with higher environmental norms are likely to be more satisfied with public transport services. Public transport providers could use this information in a number of ways to increase ridership. One way is to focus on the “low-hanging fruit” by marketing to already eco-conscious travelers, for example through nature protection or outdoor organizations, and emphasizing the climate and environmental benefits of public transport. Providers could also

focus on “increasing the amount of low-hanging fruit” by supporting eco-awareness in society through education and training. Finally, providers can use non-environmental attributes to reach those who are not inherently motivated by environmental norms, for example by focusing on improving experience quality.

6. Overall conclusions and recommendations

In this project we have examined how public transport providers in Sweden use digital communication tools, the challenges and motivations they face in doing so, and the attitudes, behaviors, and motivations of travelers in Sweden to use public transport. We have interviewed public transport providers, conducted a questionnaire survey among travelers, and held focus group interviews with senior citizens, young travelers, habitual car drivers, and frequent travelers with public transport.

Concerning digital channels, from a public transport provider perspective, we conclude that providers believe that digital channels offer new ways of delivering existing services to meet customer needs, rather than a qualitative change in service provision. Digital communication offers benefits to providers, such as the ability to reach travelers quickly and easily at a given time, create dialogue with travelers, facilitate the use of public transport, and save costs.

Digital communication also poses challenges for providers, such as implementation costs, the organizational and technical complexity of the transition to digital solutions, time pressure, public scrutiny, and meeting the needs of special groups such as the elderly and disabled. Based on this we find that digital solutions can support outcome quality in helping to deliver a safe and reliable travel experience, with infotainment shortening the perceived travel time. Digital solutions can also support interaction quality by providing real-time, reliable, streamlined travel information. Finally, digital solutions can support peer-to-peer quality to enhance the traveler's feeling of control and safety, by using crowding information to plan a calmer journey.

Our survey of mobility habits and attitudes of over 5,000 Swedes found that they are moderately satisfied with public transport on average. Senior citizens are slightly more satisfied, and less stressed by the travel experience. However, seniors are not primarily motivated by environmental concerns, and struggle with increasing digitalization in public transport. Seniors report significantly lower awareness of, priority for, and enjoyment of using digital tools, compared with younger people. They struggle with the fast-developing digital service delivery options of public transport. They use apps less, and like using timetables on paper and physical signs more than younger riders.

Based on these results, we recommend that public transport authorities guarantee senior citizens' access to public transport while developing digital services and tools. This can be accomplished both by retaining some non-digital options, and by providing clear guidance to help seniors adapt to digital offerings, so seniors are not left behind in the digital transition. As digitalization poses challenges to senior citizens, it is important that

public transport providers develop clear communication strategies to retain this vulnerable, growing, and important group.

Based on the focus group study, we find that, while user groups (senior citizens, young travelers, habitual car drivers and regular public transport travelers) have different perceptions and expectations of digital channels, overall all users found the travel planner app the most useful channel for receiving information about the offer of a summer ticket. Based on this we recommend that across all channels, it is important that the benefits and terms of the offer are clear. The content should be explicit about the advantage of the summer ticket compared with other types of tickets, its price, and validity terms. To avoid risking mobility injustice towards senior citizens, public transport providers need to consider seniors' travel needs, including providing both digital and analog solutions, such as senior tickets, postal letters, and retaining some physical ticket offices. Young people rely much more heavily on social media and the travel planner app, where they expect appealing visuals and concise information. Car users are not well-informed about public transport offers; they need clear explanations of the benefits of such offers.

Overall, we see strong awareness from public transport providers of the potential for digitalization to increase service quality and ridership and to help meet the needs of all passenger groups. However, providers are also wrestling with challenges in making the digital transition. Digitalization might also make less sustainable transit options such as car sharing more appealing, thus competing for mode share with public transport, and limiting the success of public transport in reducing emissions.

Breaking norms and changing existing policies and infrastructure that give rise to unsustainable car use requires more than just improving the quality of public transport. For the public transport sector to seize the potential benefits offered by digitalization, it will need to successfully involve all necessary stakeholders, work towards integrating information channels across regions and transit modes (e.g., regional and local buses and railways). Such integration is needed to deliver a seamless customer experience and to allow for sufficient long-term budgetary and time planning to develop, test, and implement digitalization.

The public transport sector cannot successfully implement sustainable mobility alone. The sector must be supported by public policy that explicitly favors low-carbon options systemwide, including through digitalization. These policies need to be efficient and inclusive, to be sure not to leave groups such as senior citizens behind.

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