The Investigation and Enhancements of the Strætó and Klappið Systems

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Executive Summary

The Strætó bus system is the sole form of public transportation in the greater Reykjavík area. The company recently transitioned away from paper ticketing and to the Klappið system. Our project was designed to investigate this transition, analyze ridership and the ridership experience on the bus system, and provide suggestions for potential improvements. After conducting interviews, surveys, and observational studies we analyzed this data to find the largest roadblocks to Strætó's success. They include technology issues with the Klappið system, QR codes, barriers to entry for ridership, lack of awareness of the bus system, logistics, and confusion from riders. We then provided numerous suggestions to rectify these problems, including replacing QR codes with NFC and alternative payments, infographics, partnerships, increased frequency of buses, bus lanes, and renaming the KLAPP app. After providing these deliverables, our project made Strætó aware of the current problems and potential solutions for their bus system, and, if implemented will thereby increase ridership, increase accessibility, and improve the rider experience.

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Introduction

When it comes to transportation in Iceland, car ownership is far and away the predominant mode. While various public transportation options are widely used in many other European countries, including, but not limited to trains and subways, buses are the only form of public transportation in Iceland. Despite the lack of other options, buses are not used to their full potential.

Strætó is an Icelandic public bus company that operates primarily in Reykjavík and surrounding municipalities, with routes that run throughout the entire country. In November 2021, Strætó (the company) transitioned to a new system called Klappið. Previously they had been using the Strætó system, which included more paper ticketing payment methods. However, with the transition to the new more digitized KLAPP system, QR codes as a payment method became more prevalent. During this transition they encountered many issues, which they hope to avoid in the future.

For this project, we aimed to improve the bus system. We aimed to satisfy this goal by fulfilling our objectives, which are as follows:

1. Improve customer satisfaction with the Strætó bus system.
2. Increase the ridership of the Strætó bus system.
3. Increase the accessibility of the Strætó bus system.

After conducting interviews, surveys, and observational studies we analyzed this data to find the largest roadblocks to Strætó's success. They include technology issues with the Klappið system, QR codes, barriers to entry for ridership, lack of awareness of the bus system, logistics, and confusion from riders. We then provided numerous suggestions to rectify these problems, including replacing QR codes with NFC and alternative payments, infographics, partnerships, increased frequency of buses, bus lanes, and renaming the KLAPP app. By providing these deliverables, our project will make Strætó aware of the current problems and potential solutions for their bus system, and will thereby increase ridership, increase accessibility, and improve the rider experience.

Background

Transportation In Iceland

Cars are the predominant form of transportation in Iceland, for residents and tourists alike. However, the cost of owning or renting is prohibitively expensive for some. There are few other forms of transportation in Iceland. They include walking, biking, using a scooter, and taking a taxi or the bus. Other forms of transportation that are common in other parts of the world, such as taxis, rider sharing, or trains, are rare or non-existent on the island. Ride sharing and taxi use is infrequent, with just 0.6% and 0.2% of Icelanders having reported using these services respectively (Quintana, 2021).

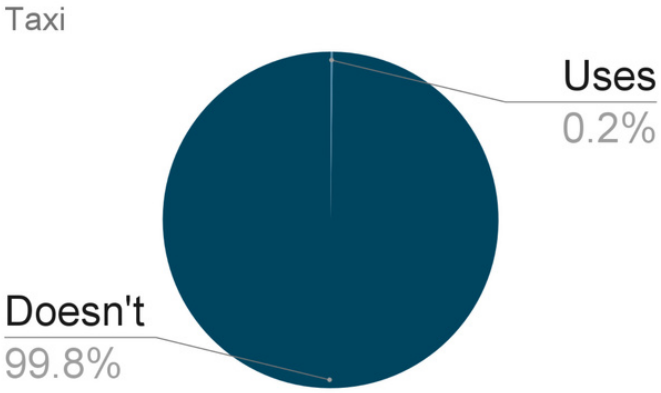


Figure 1. Taxi Usage in Iceland

Much of this infrequent use can be attributed to their high cost. Due to a widespread population and rough terrain, trains were never widely developed for the country (Collin-Lange, 2010). There have never been operational railways in Icealnd. Over the last few years, electric scooters have become increasingly popular in the capital. However, the island's persistently cold climate prevents their usage year-round and are not feasible to use over long distances. Bicycles face similar challenges, as while they can be used during the summer and winter alike, their usage is more common during the former (Bjarnason, 2005). For bikes, spread-out populations, rough terrain, and cold climate limit their usability. Walking is primarily utilized over short distances, and can be uncomfortable in fridgid weather. Buses are the only form of public transportation, are primarily used for longer-distance travel, and are relatively economical and usable year-round compared to other modes of transportation.

Cars are the Predominant, but not Exclusive Form of Transportation

Both within Reykjavík and Iceland as a whole, car usage is far and away the predominant mode of transportation. A survey in 2021 found that 98.5% of people in Iceland had access to a car (Quintana, 2021). Icelandic car ownership is among the highest in the world, with an average of 840 cars per 1000 people (CEIC, 2021). The infrastructure, especially in cities, is heavily geared towards automobiles, and most consider it extremely difficult to live without a car (Heinonen, 2021). Car ownership has only gone up over time. In the four decades between 1965 and 2003, the number of privately-owned cars increased by over five and a half fold. In Reykjavík specifically, almost three-quarters of trips are made by private vehicles (Quintana, 2021).

However, cars pose a number of challenges for Icelanders. Parking availability and time to park are often cited as issues with ownership (Bjarnason, 2005). It can also be costly, with average vehicle and gasoline prices ranking 26th and 3rd worldwide respectively (GlobalEconomy, 2017). Iceland also was home to 2.49 million tourists in 2018, (WorldData, 2018) and nearly 20% of them opted to not rent a car (IcelandMonitor, 2018). This puts pressure on roughly 500,000 tourists annually to use other forms of transportation noted above. This makes public transportation an economical source for tourists and natives, and an important option to consider and promote.

98.5%	**Of Icelanders Have Access to a car**
84%	**Of Icelanders Own a car**
2,490,000	**Tourists in 2018**
20%	**Of tourists did not rent a car**

Background

Public Transportation is Critical to those of Specific Demographics

Buses are the only form of public transportation in Iceland. However, just 17.8% of Icelanders use public transportation (Grapevine), which is a 45% decline since 1965. This decline was contributed to by a variety of factors, namely the high rate of car ownership (Quintana, 2021), lack of access outside of the greater Reykjavík area, or the bus system's poor reputation (Bjarnason, 2005). While the bus system is underutilized, it still has high ridership by certain demographics. As of 2015, of those in the bottom 10% of income for Iceland, 30.5% use public transportation, while each other income bracket ranges from 12-20% usage (Manning, 2015). The graph below details the slight correlation between income and public transportation usage rates.

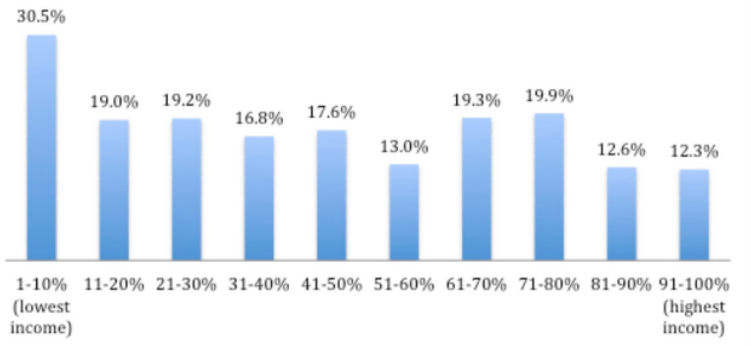


Figure 2. Income vs Public Transportation Usage Rate

When it came to age breakdown, those between 16-24 had highest usage rates, with 31.3% using public transport - at least 1.5 times higher than any other age bracket. There is also a correlation between age and public transportation usage as shown below.

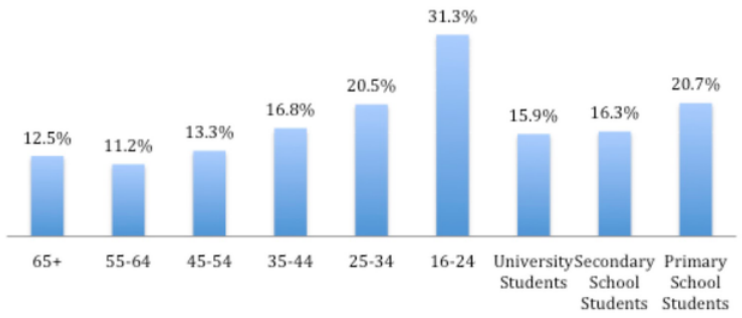


Figure 3. Demographic vs Public Transport Usage Rate

According to a report by Statista, over 15% of Icelanders are 14 years old or younger, resulting in a significant portion of the population being unable to drive themselves (O'Neill, 2022). This greatly contributes to the number of students utilizing public transportation, with 32.5% of students reporting they ride public transportation (Manning, 2015). On top of that, those who are unemployed came in at 30.8% while full time employed only stood at 14.4%. Both of those statistics are shown below.

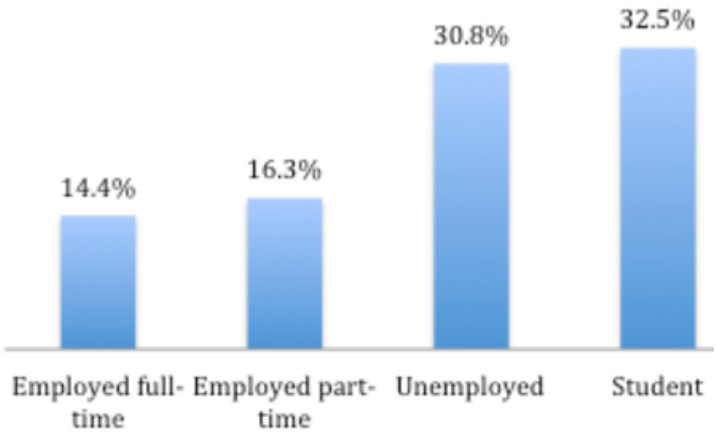


Figure 4. Employment vs Public Transport Usage

As with most countries, renting is cheaper (200,000 isk/month) than home ownership (40-50 million isk). People who are renting at a market rate have a 27.7% public transportation usage rate, while those who own a home with a mortgage at 15.3%. Single adults with children came in at 25.6% while 2 adults with no children at 14.9%. Those born abroad came in at 28.9% while those born in Iceland sit at 16.8%.

Some patterns emerged from this collection of data. Public transportation use is skewed towards particular demographics, especially those not as financially stable. It is predominantly used by several groups of people, including but not limited to: low income, students, younger, unemployed, renters, single adults with children, and those born abroad. Without the capital to use a car as their primary form of transportation, members of different socioeconomic backgrounds may choose public transportation as a matter of economic prudence.

Background

History of Strætó

Strætó was formed in a merger in 2001. The public bus system currently consists of 45 routes, with 27 in the city of Reykjavík and 18 in the surrounding country (Route System, 2022).

Figure 5. Strætó Route Map

After exclusively utilizing paper ticketing since its inception, Strætó released an app in 2012. It allowed for ticket purchasing, ticket accessing, as well as providing a live map and bus updates. At this time, cash, day-pass, bus-card, or the app were the only ways to purchase a ticket.

Figure 6. Strætó Paper Ticket

Figure 7. Strætó Bus Card

On September 3rd, 2021, Strætó introduced the new Klappið system in an article by the Reykjavík Grapevine (Huhta, 2021), to be implemented mid-November as the new and more digitized system. Along with the new app, card, and a ten fare paper ticket, plans were made to phase out old Strætó paper ticketing and were planned to no longer be accepted by March of the following year.

Figure 8. QR Code Scanner with Error Message

Due to technical difficulties, the deadline to transfer old tickets for new credit was extended from March 1, 2022 to March 16, 2022 (Harðardóttir, 2022) which was further extended to October 3, 2022. The Strætó app remains as a bus tracker, ticket purchaser and trip planner for potential bus riders until then, but the introduction of two applications and systems at once has begun to confuse customers. This confusion was not limited to just the transition, resulting in accessibility issues for certain individuals.

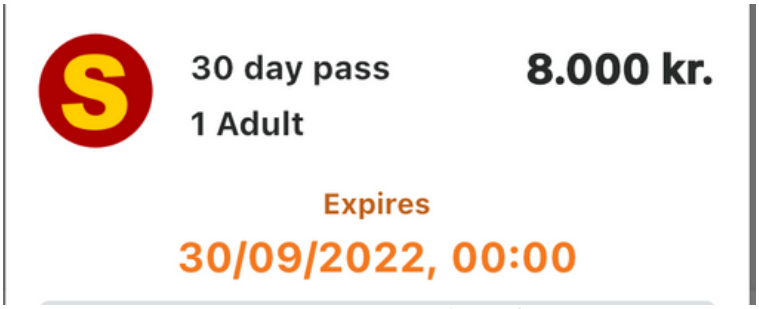


Figure 9. Strætó Monthly Ticket Information

Accessibility of Digital Ticketing

The switch from physical tickets to the Klappiðið system was a tremendous undertaking for Strætó. Aside from technical difficulties of the transition, accessibility and the user experience posed additional problems. Accessibility of technology-challenged users posed one such problem. As Iceland continues to adopt technology, the digital divide continues to grow, risking leaving those who struggle with technology behind. This is especially prevalent with the elderly, who are less likely to adapt new inventions and technologies (Gilly, 1985). These challenges include the internet and tech as "41% do not use the internet at all, 53% do not have broadband access at home, and 23% do not use cell phones." (Smith, 2014).

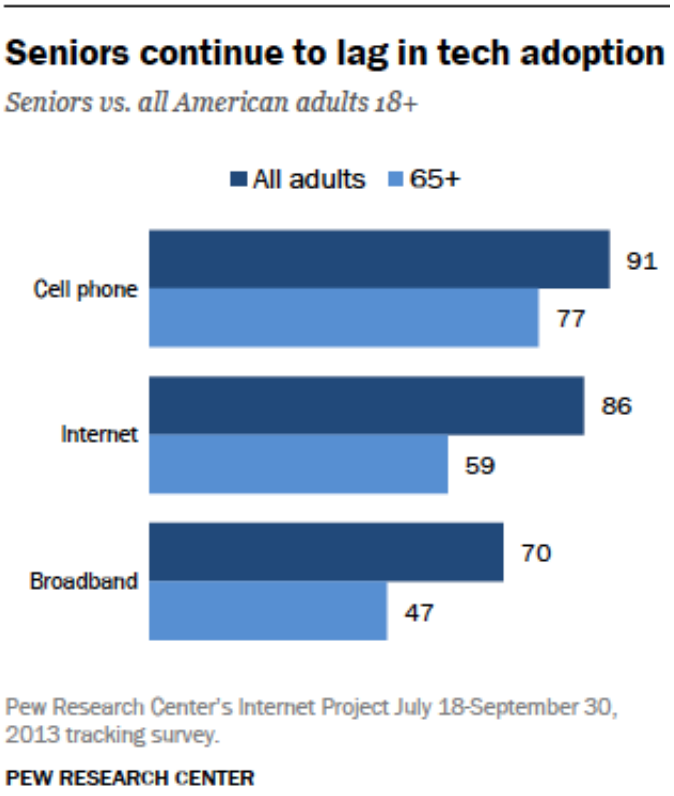


Figure 10. American Seniors Tech Adoption

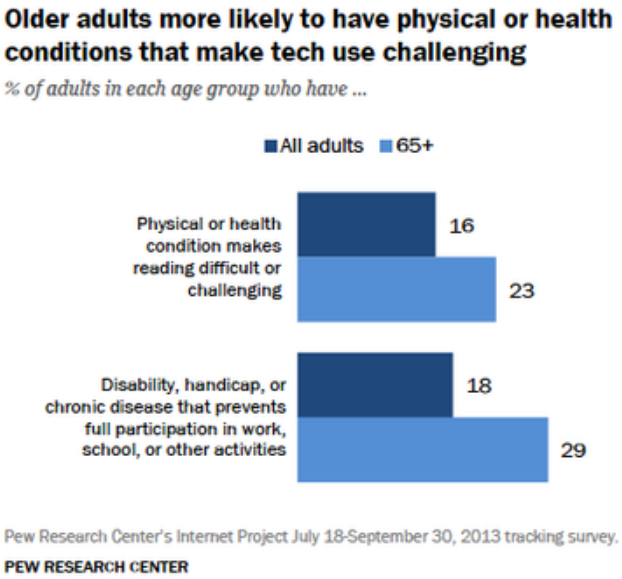


Figure 11. Elderly Difficulties with Technology

Even for seniors who own smartphones, there are still more challenges. "Only a small proportion of seniors—18%—express comfort with learning how to do so without assistance, while 77% indicate that they would need someone else to help them" (Smith, 2014). For this reason, simply giving seniors the tools without training is insufficient. With a digital system, an internet connection must be made, as a poor connection will severely impact functionality. That being said, "Iceland is ahead of the European averages for Standard broadband and HSPA, both Total and Rural, and up with the average for Total NGA" (Johnson, 2011).

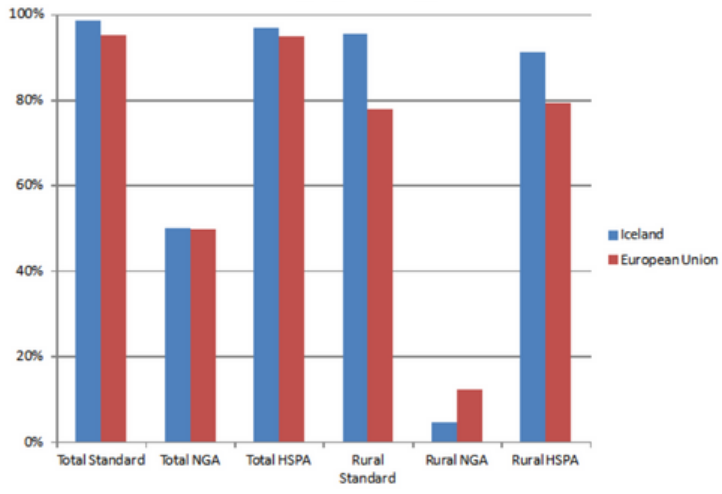


Figure 12. Iceland Broadband Coverage by Tech Combination

Background

While Iceland has suitable wifi, the same can not be said for mobile data, with only 4.4% rural coverage (Johnson, 2011).This will harm the usability of the app for Icelanders in rural areas, as they may not have adequate coverage to fully utilize it.

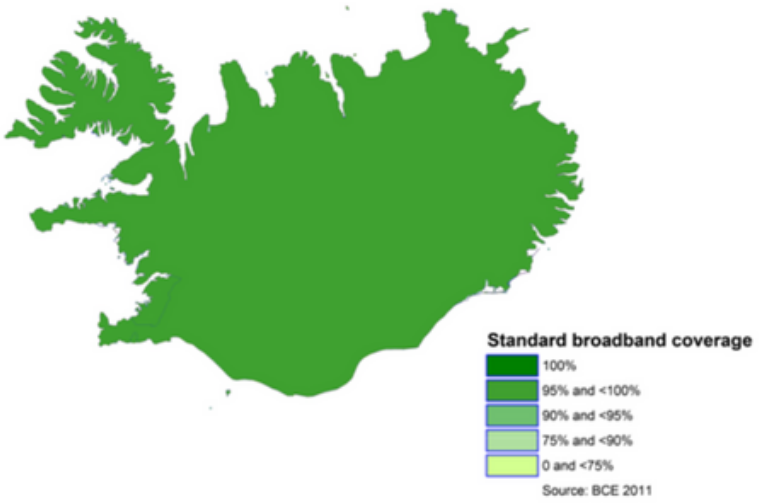


Figure 13. Iceland Broadband Coverage Map

Just as with technology, transportation has continued to innovate. Since the introduction of COVID-19 restrictions in early 2020, nearly all companies were forced to make changes to be compliant with pandemic-related laws. Much like many other retail businesses, Strætó, a transportation company, was largely affected due to a sharp reduction in travel. After introducing social distancing policies and contactless payment, accessibility for customers concerned about COVID-19 greatly increased.

Twenty years after the introduction of paper ticketing in 2001, Strætó primarily moved to digital ticketing, removing the ability to buy individual paper tickets and only in groups of ten. Digital tickets can be purchased only using the Klappið smartphone app. Digital purchasing of tickets did not just increase pandemic-related accessibility. The ability to purchase tickets from home is quicker, easier, and has more information, offering knowledge regarding ticket status, bus routes and status, delays, and more. Despite a route planner that is provided within the app, Google Maps is overwhelmingly used for planning bus trips.

Online banking and electronic payments are becoming increasingly popular in Iceland. Just a few years ago, the European Payment Council's "online bank was [their] biggest distribution channel. Now, the mobile app has taken the lead, and we anticipate even more traffic through that channel in forthcoming years. All Icelandic banks offer customers a wide range of cards and payment methods via their banking apps" (Sveinbjorn, 2020). The Klappið app system aims to follow the trend of modernizing society through technology. This digitization in the bus system allows for an easier experience for customers, though the upgrade process can be difficult and will require iteration. It is important to make public transportation better, as it is one of few alternatives to cars available in Iceland. With these issues in mind, we have an opportunity to better understand the need, motivation, and opportunities available to the Strætó bus system.

Methodology

Methodology Introduction

Our project focused on providing potential improvements to the Klappið and Strætó bus systems in Reykjavík, Iceland, both at request of our project sponsor and due to negative public sentiment about Strætó and the Klappið system. In the pursuit of this goal, we researched the Strætó bus riding experience in the capital, both from before and after the transition to the Klappið system. In the seven week term between August 24th, 2022 and October 13th 2022, we conducted interviews informally and with subject matter experts, distributed surveys, and rode the buses.. This data aimed to provide suggestions to Strætó regarding the below objectives in order to improve their bus system. Our investigation was guided by our research questions and objectives, which are as follows:

Research Questions

- What is the importance of increasing ridership?
- What are the barriers and opportunities for increasing ridership?
- How might digital ticketing and increased ridership impact Strætó future goals?

Objectives

- Improve customer satisfaction with the Strætó bus system.
- Increase the ridership of the Strætó bus system.
- Increase the accessibility of the Strætó bus system.

In order to address these research questions and objectives, we conducted mixed-methods research to collect qualitative and quantitative data. We surveyed bus drivers, bus riders, and non-riders of the Strætó bus system and inquired about both perceptions and experiential data. We also interviewed subject matter experts among Strætó staff to better understand the technical and business operations of both the Klappið system and Strætó bus system. The following sections will elaborate our research process, methods, and ethical considerations.

Bus Driver Surveys

One way we hoped to further our understanding of the bus system was by surveying the drivers. Given that their job is to operate the buses and interact with customers throughout the day, we thought they would provide valuable insights into the current state of the Strætó bus system. Due to the limited availability of drivers, we chose to survey them. This also allowed for a much larger proportion of bus drivers to be questioned than if we interviewed a smaller number of them. With the help of our project sponsor, our questions were translated to Icelandic, and each bus driver was emailed a link to a survey on Qualtrics with a brief preamble about our project we had created with a language option. This allowed drivers to respond in a language they felt more comfortable in, hopefully increasing participation. Next, we asked how long they had been working as a driver for Strætó. We thought that it would be useful to be able to see if there was a correlation between answers and their experience with the bus system. We then asked the drivers several open response questions about the driver's experience with the Klappið system. While the questions collected data to fulfill all of our objectives, it primarily focused on our first objective, to increase customer satisfaction, since bus drivers frequently encounter confused riders during boarding. The next several questions focused on issues that customers encountered while using the buses. These questions were asked to give us insight into our first objective, in order to better understand the problems and challenges upon which improvements would be based. Lastly, we asked an open-ended question to allow drivers to share any other feedback or information that was not covered in the prior questions. This gave us the opportunity to garner feedback that we did not specifically ask about, and potentially give us additional ideas to investigate. Given the open-ended nature of the question, the information we gathered could connect with any of our objectives depending on their answer.

Methodology

QR Code Surveys

It was important to investigate the demographic of bus riders. We surveyed riders in order to have a robust sample size. There were multiple ways to access this survey. The first was via a QR code on a poster that we hung up at several bus stops and junctions throughout the city. We also posted our surveys at large junctions like Mjódd, which is "the biggest hub for the connection of provincial buses and city buses" (Strætó, 2022), which increased the chances of a prospective riders scanning it.

Figure 14. QR code survey on a bus stop at Hlemmur

The other way to access the survey was via QR codes that were put up by the project sponsor and randomly scattered onto the backs of seats throughout buses in the city.

Figure 15. QR Code Survey on Back of seat on bus

After choosing these locations, we expected to received primarily from Strætó riders. It is unlikely non-riders would have scanned a QR code at a bus stop, and they would not have been on the bus unless they were a rider. Someone who scanned a QR code was taken to a Qualtrics survey with a brief preamble about our project. Respondents were first asked for their language and basic demographic data. We inquired about age, gender, disability status, and if they lived in Iceland. We also asked how often respondents used the bus, and if they had experience with both the old Strætó system and the new Klappið system. These answers gave us insight into which groups of people were using the bus, and how their bus usage differed. From there, we analyzed how responses differed among different demographics, which aided our second objective (to increase ridership), and bus usage, which aided our first (to increase customer satisfaction). Later in the survey, we asked respondents open ended questions about how they felt about Strætó. Depending on their answer, this could have satisfied any of the three objectives, but in any case allowed us to better understand attitudes towards the current Strætó system.

Methodology

Given that these surveys were likely taken by bus riders, we felt that respondents would have been less likely to take longer surveys due to the large likelihood of interruption by having to get on or off the bus. Therefore, respondents were given one of four random surveys instead of one longer one. The first three primarily focused on one objective each, although given the nature of the objectives there was overlap between surveys and helping fulfill objectives. The last survey associated with all three objectives.

The first survey focused on objective one, increasing customer satisfaction. We asked respondents how they felt about the Klappið system, the old Strætó system, and why they felt that way. Based on those responses, we could provide feedback to Strætó on how customers felt, (and how to improve those feelings), fulfilling the first objective. Our second survey focused on our second objective, increasing ridership. We asked respondents on problems they had with the bus system, and for their feedback to improve upon those problems. This allowed us to see reasons why people may not ride the buses, and what could potentially make them change their mind, fulfilling our third objective. The third survey was focused on objective three, improving accessibility. This survey focused on payment methods, and asked respondents what payment methods they use to ride the bus, and what additional payment methods would be helpful to them. By doing so, we garnered feedback that helped Strætó focus on which payment methods customers find easier, fulfilling our second objective. The fourth survey asked respondents to rank how important certain features and improvements would be to them on a scale of one to five. This allowed us to rank their responses, and consequently report those findings to Strætó on which should be prioritized. We also asked respondents on their experiences with customer service. Depending on their answer, it could have aided any or all of our objectives.

Reddit Surveys

While the QR code survey described above gave us great insight into riders, the same could not be said for non-riders. Therefore, we wanted to have a survey for the wider public, which would be targeted at riders and non-riders alike. We made a post (see Figure 16) with a link to our Qualtrics survey on the social media site Reddit, in two subreddits (online communities) called r/Iceland and r/VistingIceland. This survey asked for the same language and demographic data as above. However, this survey primarily focused on what transportation people used. We hoped that by better understanding the transportation Icelanders used, we could better understand why they didn't use the bus. From there, we offered suggestions on how the bus system could be changed to be a better option for those people, fulfilling our second objective. We asked questions to this end, asking what they currently used for transportation and why. Afterwards, we asked for recommendations about the bus system specifically. We felt that asking them directly for feedback instead of just operating off of analysis for their transportation options would lead to more feedback overall.

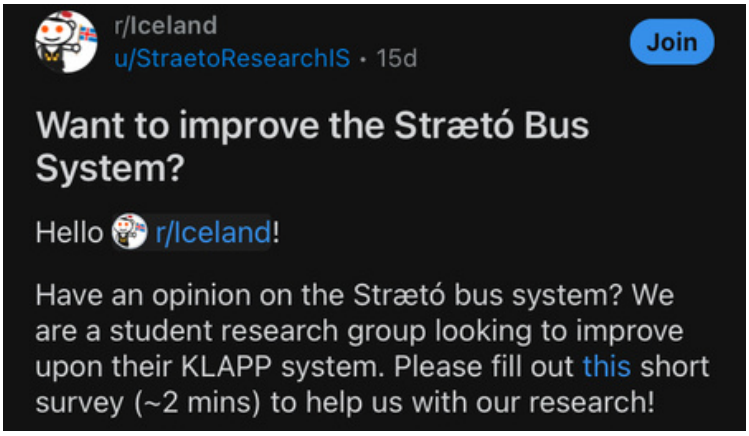


Figure 16. Reddit post with Link to Survey in r/Iceland

Methodology

Weekly Strætó meetings

Interviews with Strætó executives were instrumental to this project. Our sponsor was helpful logistically, allowing us to post QR codes in the buses, gave us access to survey bus drivers, provided translations, and gave us access to pivotal information. We had weekly meetings with Sigríður Harðardóttir, the director of HR and quality management, and Markús Vilhjálmsson, the head of marketing. At these meetings, we asked a large variety of questions, ranging from the operation of the buses to; the KLAPP transition to financial information about the system.

Figure 17. Weekly Strætó Meeting

Interviews with Strætó Employees

They also provided us with contact with other Strætó executives. These conversations were pivotal to fulfilling our objectives. They not only gave us valuable information about how things operated, but also Strætó's understanding of the customer experience, and what was possible to change for the future. This allowed us to make better recommendations, by understanding the difficulty of implementing them, and better tailoring them to make them more informative and actionable for our sponsor.

Ethical Considerations

Our project was generally low risk from an ethical perspective, and had no human subjects research implications that required review by the WPI Institutional Review Board; however, ethical considerations were reviewed and addressed. We asked for consent from any subject matter expert we interviewed before using their name in this report.

For surveys, users were anonymous; however, because we did ask for some personal information we sought to limit the privacy limitations of this when possible. Rather than asking for a specific age, we used age ranges, and rather than ask for where someone lives from we asked only if they were from Iceland or not. We asked respondents if they had a disability, but additional information about the disability was not requested. We also asked for respondents' genders, but since gender tends to be shared by large swaths of the population, this information is low risk. Additionally, all questions were optional to answer, allowing respondents to skip questions if they were uncomfortable or unwilling to answer them. Open response questions allowed respondents to submit potentially personally identifying information, but this did not occur in practice. Therefore, privacy concerns of the open response remain low.

Another potential ethical concern was bias due to sponsor pressure. However, given that both we and the sponsors shared an aligned vision of transparently finding potential issues with the bus system, this poses low ethical risk. Due to the aforementioned precautions, we think ethical concerns of our data collection were very low.

Data Analysis

In order to satisfy our project objectives, we collected both quantitative and qualitative data via a wide variety of sources - both surveys and interviews - with Strætó employees and both riders and non-riders. We also collected data from both tourists and Icelanders. By collecting the opinions of stakeholders, gathered a diverse set of opinions about the state of the bus system. Through these methods, we developed an understanding of both riders and non-riders. We gained a greater understanding to why riders rode the bus, and why non-riders didn't. We also better understood problems both groups had with the bus, and potential improvements that could be made to address those issues.

The data from the QR codes on the bus and bus station allowed passengers to input their opinions by answering Qualtrics surveys. The data was collected using Qualitics, which allowed for anonymous and secure surveys. We understood that the data from buses and bus stations was used to gather information from riders. To better understand all perspectives, data was collected from the Visiting Iceland and Iceland subreddits (online forums), where we expected a higher proportion of people who did not use the bus system frequently. We also wanted the perspective of the bus drivers, as they would experience the problems encountered by passengers for the working day. A third Qualtrics survey was created by our team and distributed by the Strætó administration via email to the bus drivers.

Data was downloaded in the CSV (comma separated values) format and exported into Google Sheets. We used the built-in translation function to translate from Icelandic to English. Since we did not require precise translations, we felt that potentially minor translation errors were not a major concern. Empty responses were removed, as well as personally identifiable information collected by Qualtrics, such as IP Addresses, longitude, and latitude.

We were able to easily tally quantitative responses using Google Sheets. The qualitative data, both natively in English and translated from Icelandic, required more time as we had to code the responses. Every qualitative question was coded using its unique corresponding section in the codebook. Utilizing the coded data, we tallied the data to understand response trends. Manually coding responses granted us a deeper understanding of responses. For the purposes of coding, assumptions were made. Responses that mentioned using the buses rarely were coded to less than one day a week. Responses that mentioned using the buses seasonally or occasionally were coded as using the bus one to two days a week. Responses that mentioned using the buses for the purposes of commuting the vast majority of the time were coded as using the bus five to six days a week.

We derived two groups of results from the final data; the opinions and preferences of the public, and issues users faced. Using our understanding of the data and the discovered issues, we derived recommendations for Strætó. The aggregated opinions of the respondents were of general dissatisfaction with the new Klappið App, and mixed opinions on the price and convenience of riding the bus. We asked bus riders for their satisfaction with the Klappið App, and the distribution in Figure 14 shows over 50% of the respondents were dissatisfied.

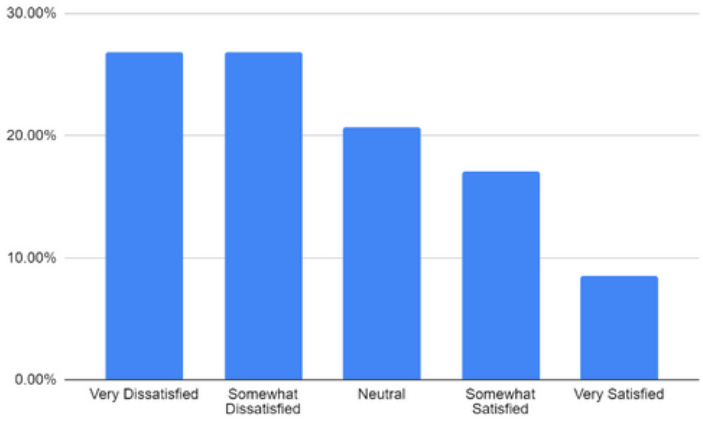


Figure 18. Satisfaction of Bus Survey Respondents with the Klappið App

Data Analysis

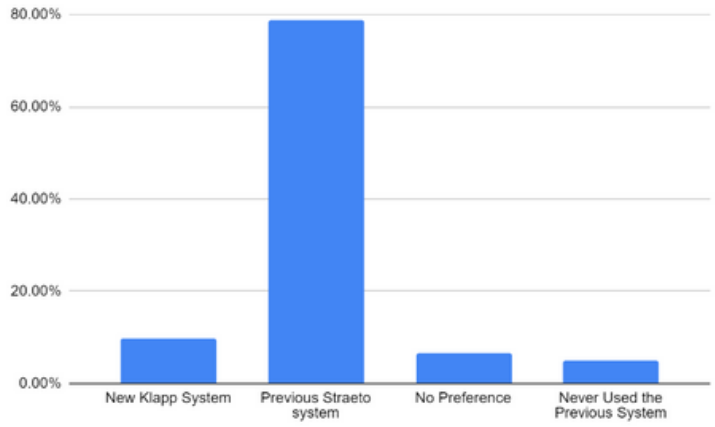


Figure 19. Preference Between the Strætó and Klappið Systems of Bus Survey Respondents

Figure 19 provides further evidence to this point, as an overwhelming majority preferred the previous Strætó app to the Klappið app. Respondents were dissatisfied enough that some still use the Strætó app to purchase their tickets despite Strætó's attempts to push the Klappið system into use (Figure 20). While we don't have data for the Strætó App, an astonishing 85% of respondents reported encountering problems using the Klappið app. One potential explanation for this is that due to the recent launch date of the Klappið app, many respondents may have encountered issues shortly after release that have since been fixed. Further research could be done to observe how the number of issues with the app changed over time.

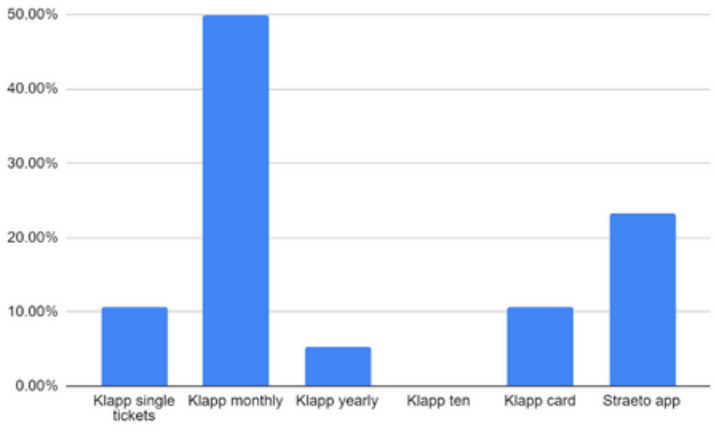


Figure 20. Primary Ticket Usage of Bus Survey Respondents

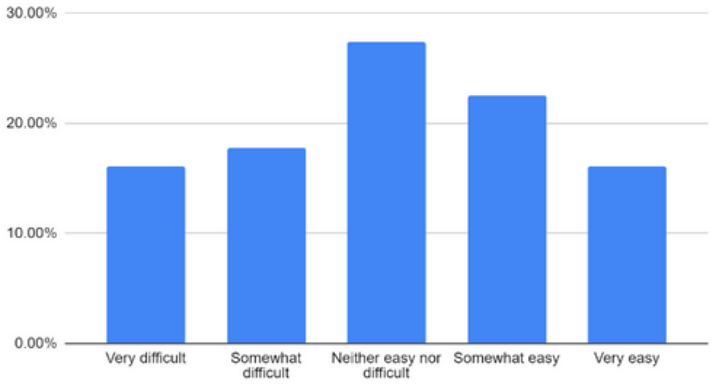


Figure 21. Ease of Use of the Klappið App for Bus Survey Respondents

Though the public does not like the app, the data shows that it was not difficult to use. The responses were a majority neutral about the ease of use of the app, but Figure 21 shows that more people said it was easy to use than difficult. Those that had experience using the Strætó app found the Klappið app difficult to use, while those that had only used the Klappið app found it somewhat easy to use (Figure 22). This may have been because the people who used the Strætó app had to unlearn how the older app worked while learning the new app.

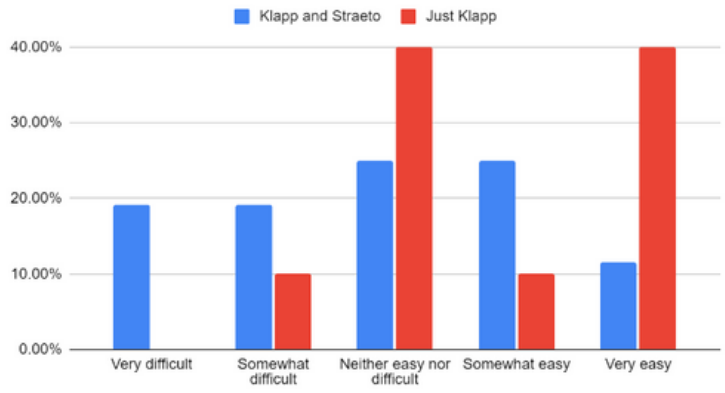


Figure 22. Ease of Use of the Klappið of Bus Survey Respondents, Divided by Familiarity with the Strætó System.

Data Analysis

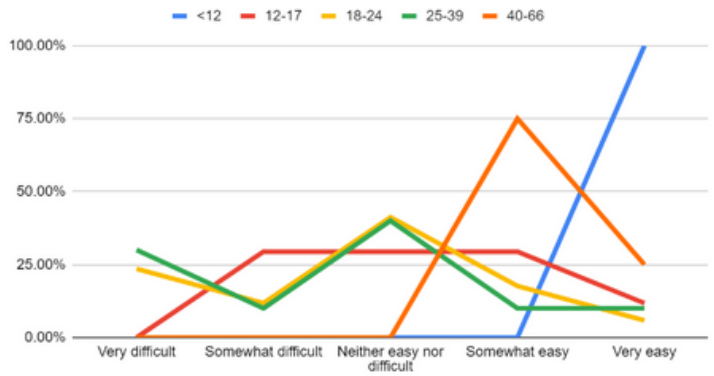


Figure 23. Ease of Use of the Klappið of Bus Survey Respondents, Divided by Age.

Interestingly, the youngest and oldest people seemed to find the Klappið easier to use. Figure 23 shows that those under 12 and between the ages of 40-66 found the app easy to use, while those between the ages of 12 to 17 were more evenly divided, and those between 18 to 39 found it more difficult to use. We expected that younger people would find the app easier to use, however we thought that there would be a technological barrier to the older passengers. Therefore, it was surprising that those between 18 and 39 had the most difficulty with the app.

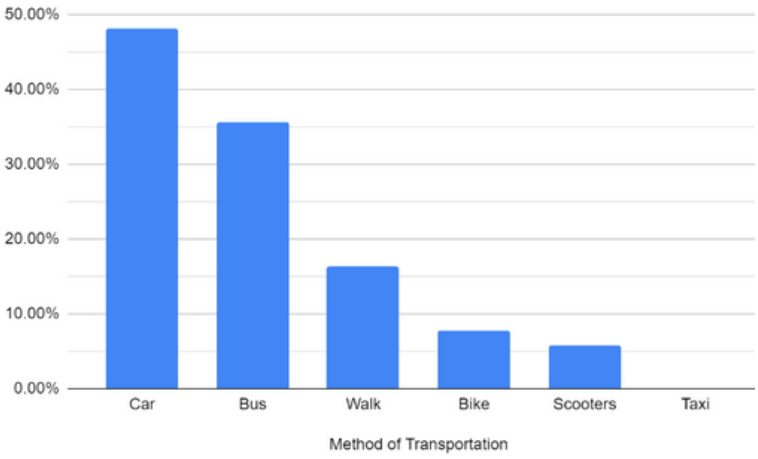


Figure 24. Preferred Method of Transportation of Reddit Survey Respondents

There was limited data from the Reddit Survey, as we asked much fewer questions relative to the survey put on the buses. A majority of responses stated they used cars, with the bus as a close second, reported as 15% less (Figure 24).

This divide was well represented, as shown in Figure 20, with a bimodal distribution peaking at less than once a week and more than seven times a week. We also asked them to explain why they do or don't ride the buses, and the price and convenience were the most common reasons given, both for and against riding the bus, as shown in Figure 26.

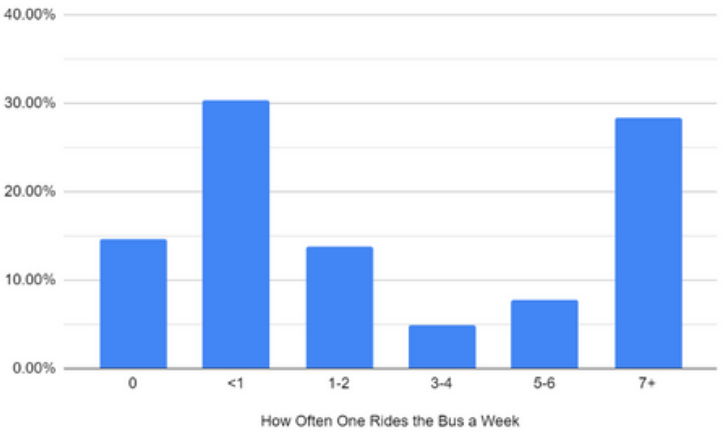


Figure 25. Weekly Ridership Frequency of Reddit Survey Respondents

"Car" was cited as the third most common reason, though mostly neutral, as many stated they rode the bus because they didn't have a car, or didn't ride the bus because they had a car. We believed that those statements were neutral because they said nothing of importance about the buses, as opposed to explicitly comparing the convenience of a car against that of the bus. Overall, a significant proportion of those surveyed rarely or never ride the bus, and viewed it as a system with significant room for improvement.

	In Favor	Neutral	In Opposition
Price	10	1	17
Convenience	10	4	14
Car	0	27	0

Figure 26. Three Most Common Reasons for Bus Patronage from Reddit Survey Respondents

Recommendations

Introduction

From our data collection and our own experience we composed recommendations that would help improve the bus system. We organized our thoughts with a main problem statement and our recommendation. We also gave a star rating next to each out recommendations detailing there importance, with 5 as the most important, and 1 as the least. Following extensive data analysis, we consolidated trends we discovered into high level recommendations that, if implemented, fulfill our objectives. This includes modifying or eliminating the QR code system, making logistical changes, increasing clarity, and increasing awareness.

Problem: New KLAPP Technology / Accessible

The KLAPP application and its associated QR codes were the most noteworthy topics on our survey. It had the most respondents report dissatisfaction and propose potential improvements. QR code scanning creates numerous issues, among them software bugs, a slow onboarding process, and dependence on an internet connection to properly function.

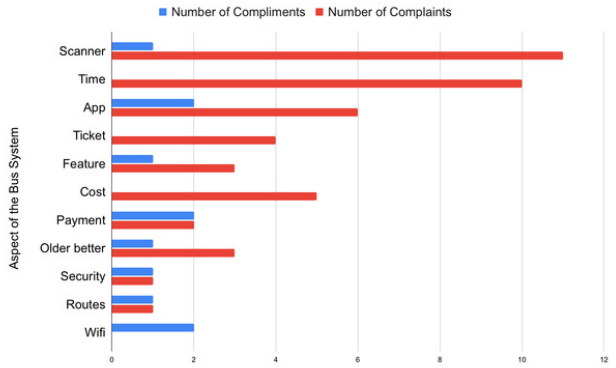


Figure 27. Satisfaction with Aspects of the Bus System

Recommendation: Modify or eliminate the QR code system

Alternate Payment Methods ⭐⭐⭐⭐⭐

Alternate payment methods provide a compelling alternative to QR codes. We believe the adoption of Apple Pay, Google pay, and credit card tap to pay on scanners on the bus would resolve most major issues reported by respondents. They are more reliable, quicker, and do not require an internet connection. Additionally, newly introduced tourists to the system will be able to pay and onboard a bus without the requirement of downloading and learning an app, allowing for an overall more satisfactory and accessible bus riding experience. When 70 bus riders were asked "would alternate payment methods make the bus riding experience easier", 54.3% of them strongly agreed, while 18.5% somewhat agreed, and only 1.4% strongly disagreed (1 person) and 4.3% somewhat disagreed (Reference graph). When those same individuals got the question "what alternate payment methods would make the bus riding experience easier", 91.4% of them selected at least one of the options, (Apple Pay, Google Pay, Credit Card, other) while only 8.6% selected "none". On the importance survey, 62 bus riders were asked the question "how important are alternate payment methods", and the responses are shown in figure #. It received an average importance rating (AIR) of 3.68

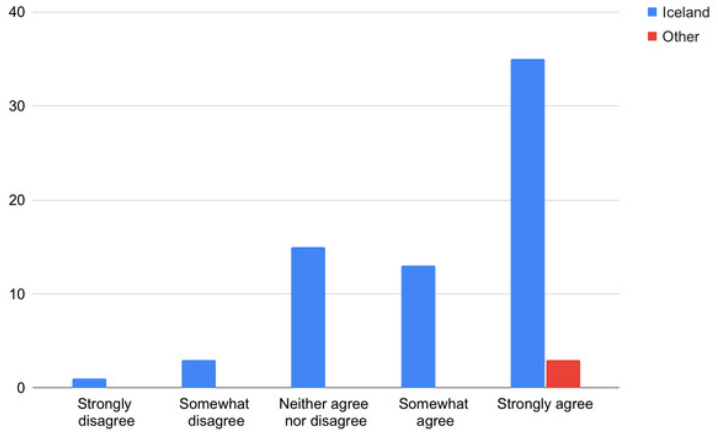


Figure 28. Rider agreement with the addition of alternate payment methods making bus riding easier

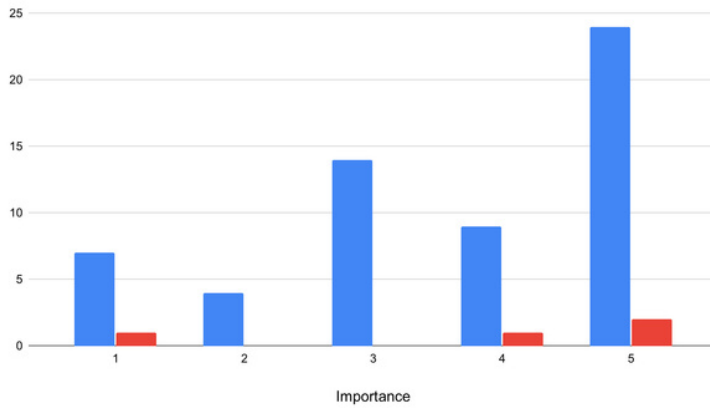


Figure 29. Rider Importance of Adding Alternate Payment Methods

Recommendations

NFC Scanning ⭐⭐⭐⭐⭐

Similar to alternate payment methods, near-field communication (NFC) allows scanning without an internet connection. This includes the concept of Strætó wearable devices, such as bracelets or rings, which could have funds loaded onto them. Riders would be able to easily wear their NFC device, ensuring that they could scan without an internet connection. This would decrease wait times to board the bus, as well as increase accessibility. On the importance survey, the AIR of NFC scanning received a high 4.38 (tied with bus frequency as second most important).

"Pay as you go" ⭐⭐⭐

The KLAPP card currently is one of the most challenging payment methods to use. Just 8.6% of respondents to the bus rider survey reported using the card as their primary payment option. The ability to use the KLAPP card as a "pay as you go" card that auto-charges a connected credit card would be useful for riders trying to avoid potential internet connectivity difficulties. This functionality would also be useful for children, as parents may want to allow unlimited rides on the bus without the ability to spend money elsewhere. The limited spend option on these cards could also be utilized to prevent abuse. When bus riders were given the question "how important is the addition of 'Pay As You Go'", the majority of respondents gave a 3 out of 5, which we believe is because they would find the functionaility useful, but they don't use the KLAPP card currently. "Pay as you go" functionality may bring in new customers who wish to exploit these use cases. AIR of 3.58

Increased Wifi Reliability ⭐⭐

If the prior three recommendations are not implemented, increased wifi reliability becomes a five star recommendation. While the above recommendations would reduce the severity of internet connectivity issues, currently scanning is extremely difficult with unreliable wifi, and it is a high priority to allow easier payments without an internet connection. If an internet connection continues to be essential for customers to easily access the bus, the onboard wifi needs to be extremely reliable AIR of 3.61.

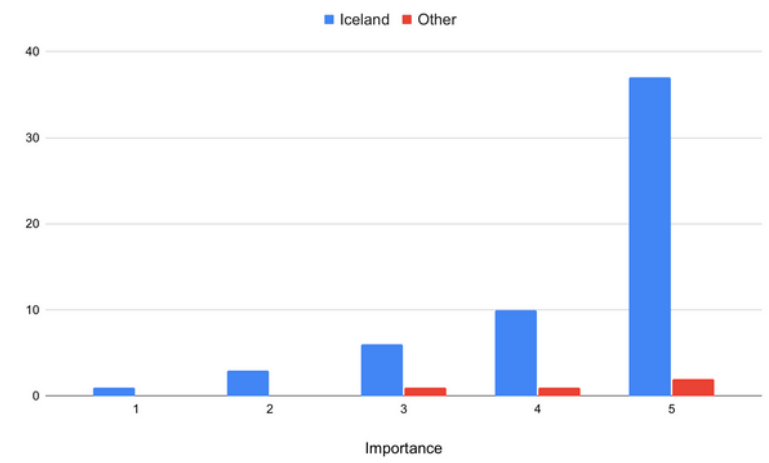


Figure 30. Rider Importance of Adding NFC Scanning

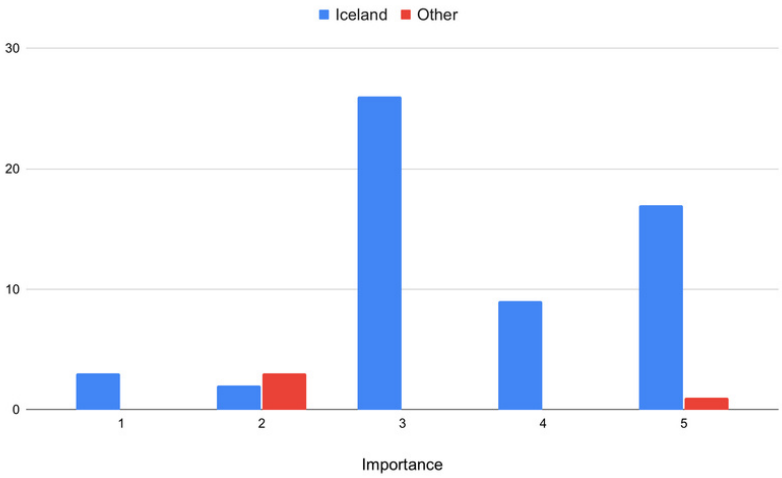


Figure 31. Rider importance of Pay as You Go

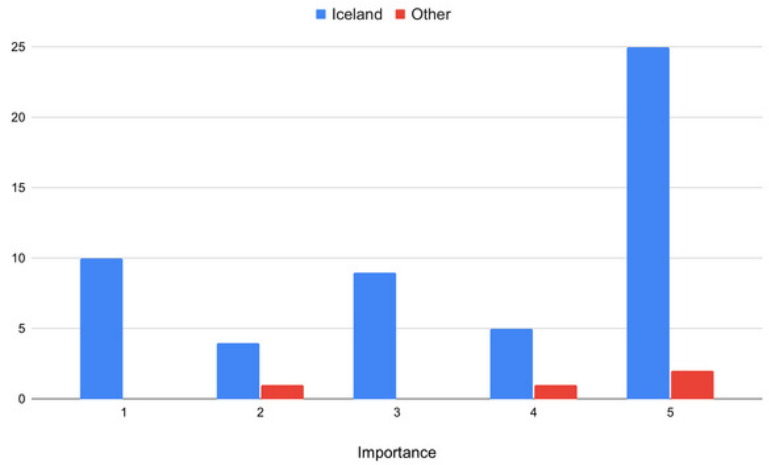


Figure 32. Rider Importance of Wifi Reliability

Recommendations

Problem: Logistics

During our data collection, infrastructure changes including bus frequency, stops, routes, and lanes were very often mentioned as complaints or places for improvement. With many logistics changes within the system, Strætó should see an increase in ridership and satisfaction among ridders.

Recommendation: Improve Bus Routing and Infrastructure

Increased Bus Frequency ⭐⭐⭐⭐

Due to the lower frequency of buses after the introduction of coronavirus restrictions, ridership has slightly dropped. Many Icelanders believe waiting 30 minutes to an hour per bus is too long, and because many bus stops aren't fully covered, riders are stuck outside in a harsh climate for excessive amounts of time. According to our Reddit survey of 104 respondents, the most suggested area of improvement was frequency of buses (at 29.8%). For non-riders (or those who rarely ride), the most suggested area of improvement was still "frequency of buses" (tied with ticket pricing). Both of these graphs are shown on the right. In the bus rider surveys, frequency was also one of the most requested and important improvements to the bus system logistics. It received an AIR of a high 4.38 (tied with NFC as second most important).

Larger Expanded Route System ⭐⭐

While Strætó does a good job of servicing the greater Reykjavík area, many still believe a larger expanded route system is very important for the company, as evidenced by an AIR of 4.02. We believe this may be because riders wanted access to areas further out in the country. Despite the high rating, this recommendation receives just two stars. While this recommendation is highly requested, it has several logistical issues. Expanding to elsewhere in the country would be a major infrastructure challenge. These higher costs would be absorbed by the riders, decreasing their affordability, and would be especially costly to low-income riders who stay within the greater Reykjavík area.

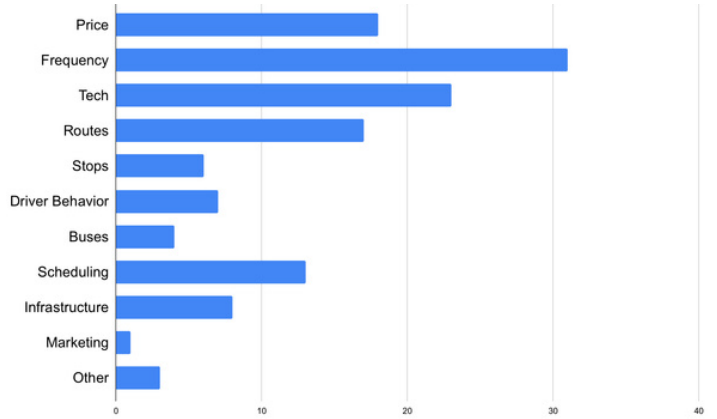


Figure 33. Suggestions for Improvement from Reddit

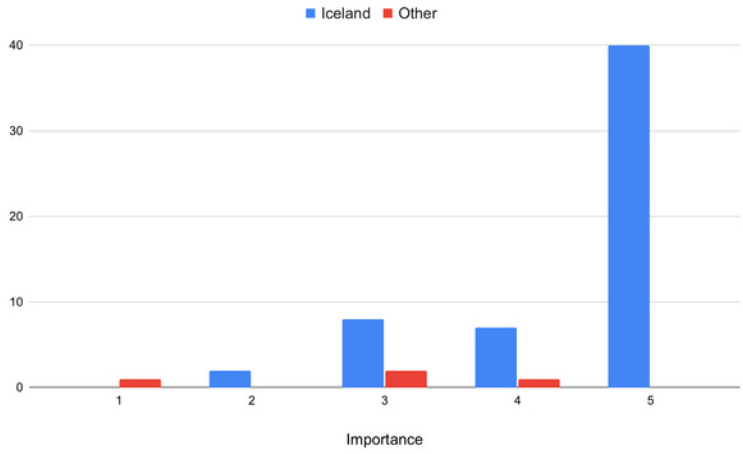


Figure 34. Rider Importance of Increased Bus Frequency

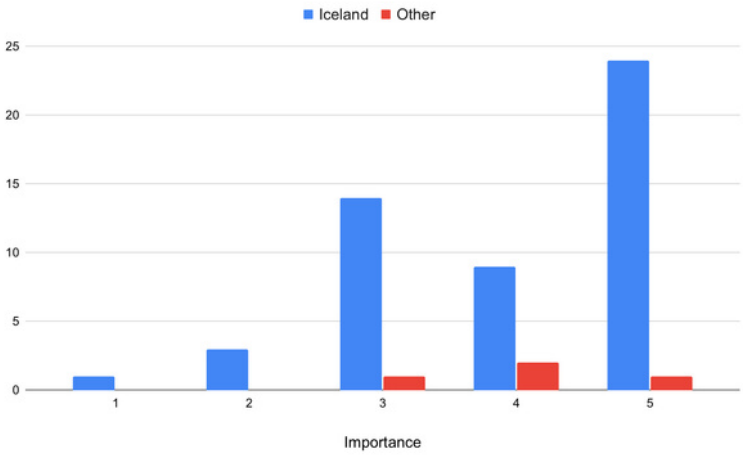


Figure 35. Rider Importance of a Larger Expanded Route System

Recommendations

Increased Bus Stops ⭐⭐

For most riders, the bus stops are fairly convenient. However, many respondents wanted closer bus stops, evidenced by its AIR of 3.69. Much of this sentiment can be attributed to the distance had to walk to their stop, which many respondents felt was too far.

Bus Driver Improvements ⭐⭐

Another highly requested recommendation, with an AIR of 3.85, was related to the Bus Drivers. Respondents complaints had two main categories: driving and customer interactions. There were reports of driving that was aggressive enough to frighten riders. Others reported of rude bus drivers. We feel a feedback form on the app would make it easier for riders to voice these concerns to Strætó.

Bus Lanes ⭐⭐

Customers desire faster service. One way to accomplish this is via bus lanes. While these already exist, creating more would allow the buses to avoid traffic and not have to interact with other vehicles on the road as often.

Cheaper Ticket Prices ⭐⭐⭐

While cheaper ticket prices obviously mean more ridership, our expectation was that the pricing wouldn't be as important as reported. According to the bus survey, cheaper ticket prices reported to be the most important change in the logistics regarding the bus system, with a whopping AIR of 4.54. Below you can see the responses more specifically. Due to Strætó's main company goal being providing a service to Icelanders, cheaper tickets would only benefit this goal.

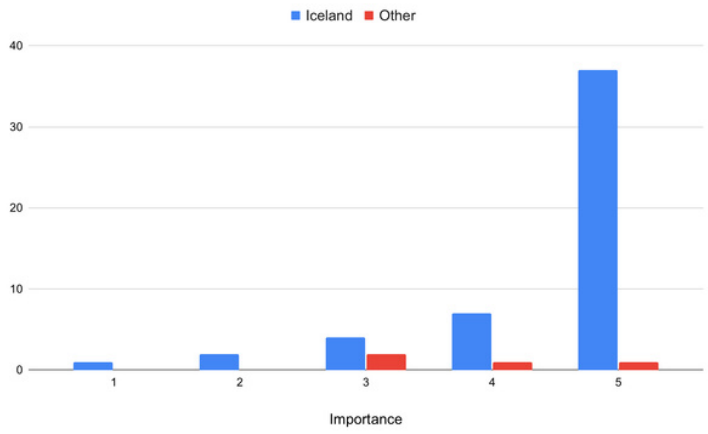


Figure 36. Rider Improtance of Cheaper Ticket Pricing

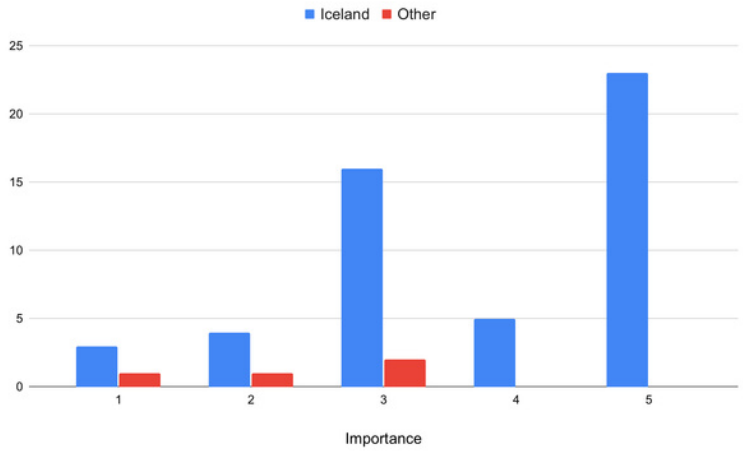


Figure 37. Rider Importance of Increased Bus Stops

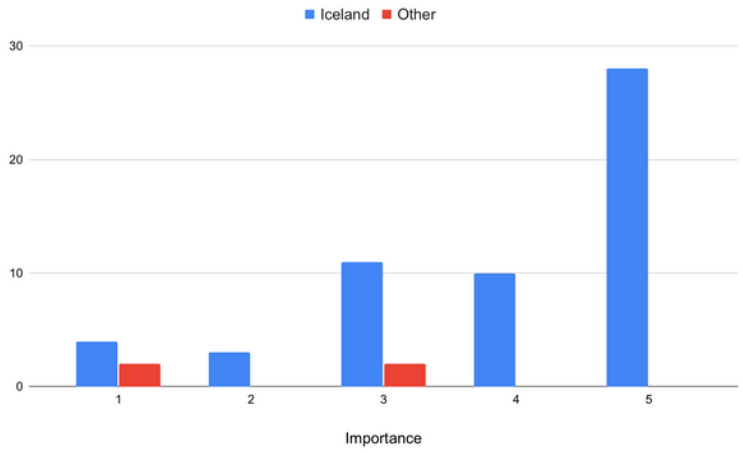


Figure 38. Rider Importance of Bus Driver Improvements

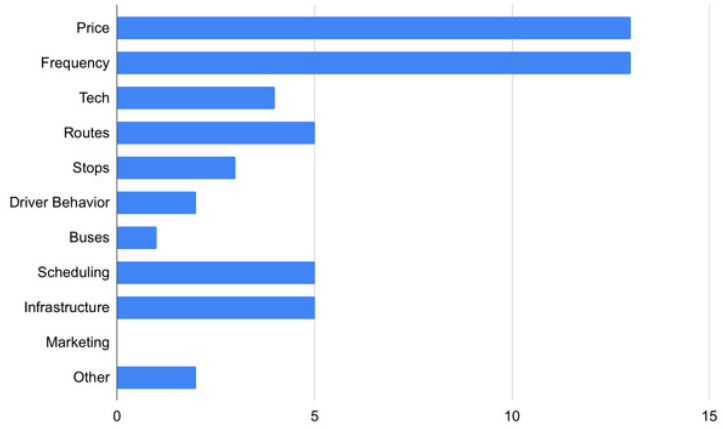


Figure 39. Reddit Non - Riders and their Suggestions for Improvements

Recommendations

Problem: Barriers to Entry

The barrier of entry into public transportation is the most challenging aspect of acquiring customers. While barrier to entry issues affect Icelanders, it is especially problematic for tourists due to a lack of prior knowledge of the Strætó and Klappið systems. Riders may need additional information or incentives to try the bus system for the first time. Currently, the system is challenging for many, and especially for tourists, as those not accustomed to it are most likely to have difficulties.

Recommendation: Increase knowledge of the system and incentives to loyal customers

Infographics ⭐⭐⭐⭐

We recommend adding infographics to bus stops and outside buses. This is one of the easiest and cost-efficient strategies to inform potential bus riders. Adding infographics would aid Icelanders and tourists download the app, explain the payment methods, and how to use the new system. Adding infographics to bus stops, outside of buses, and about the existence of the KLAPP app would be helpful to customers.

Bundles with Companies and Hotels ⭐⭐

The first ride is the biggest barrier to entry. Prospective riders do not want to spend money on a system when they are unsure about. For tourists, this issue is further compounded, as they also lack awareness of the system. Bundling with hotels and other companies by offering free tickets with their stay, for example, would incentivize people to use the bus without an upfront cost. This will increase first time ridership, which will increase additional ridership. This option is also relatively economical for Strætó when compared to physical and digital advertising.

More Advertisements ⭐⭐

Additional advertisements would help tourists as well as Icelanders better understand the Strætó and Klappið system. For tourists, more advertisments should be in English, which limits their reach to those who do not speak Icelandic. Ads should also talk about both Strætó and the KLAPP app, since people may be confused if they are mentioned separately.

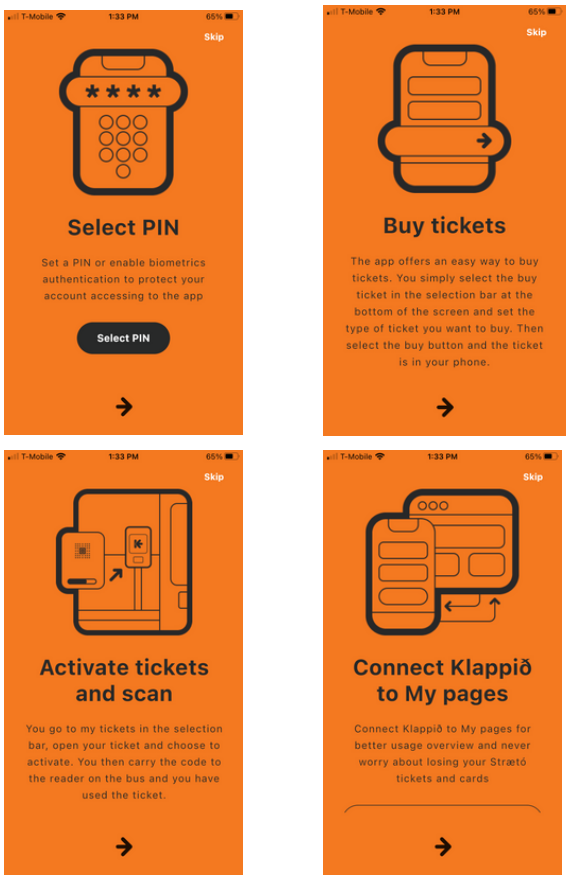


Figure 40. Initial KLAPP app instructions

Figure 41. Ad that appeared on Instagram in Icelandic

Recommendations

Partner with influencers and Travel guides ⭐⭐

Many tourists watch influencers on sites like YouTube, TikTok or other social media sources. Partnering or sponsoring these creators would increase awareness of Strætó in demographics that would otherwise be less likely to have heard of it. Rewards and deals could also be added to incentivize first time ridership. This would increase knowledge upon the bus system especially if they've never heard of Strætó before.

Team up with Flybus and other airport shuttles ⭐

Most tourist after arriving on Keflavik International Airport head onto Flybus or other airport shuttles to head to Reykjavík. Companies like Flybus provide one way to potentially convert tourists into customers. A partnership would allow for possible incentives and knowledge into the Strætó bus system while the tourists are in Reykjavík.

Different ticketing length options or bundles ⭐⭐⭐

KLAPP single tickets were one of the least common purchased ticket types, while monthly tickets were easily the most popular among Icelanders. This leads us to believe Icelandic riders enjoy the deals and high usage rates of an unlimited pass. Because of this, we recommend the addition of a 3-day pass and weekly pass due to the ease of implementation, and their expected future use by tourists and Icelanders alike. This be used by tourists because usually they stay in the country from 3-7 days, and these ticket lengths may entice them to get the special 7-day deal instead of multiple single tickets. The cheaper cost would encourage ridership due to a longer commitment to bus riding and provide a cheaper alternative to other transportation methods. We also believe there should also be bundled purchases. One idea is a five for one deal where a rider would buy five tickets to get one free.

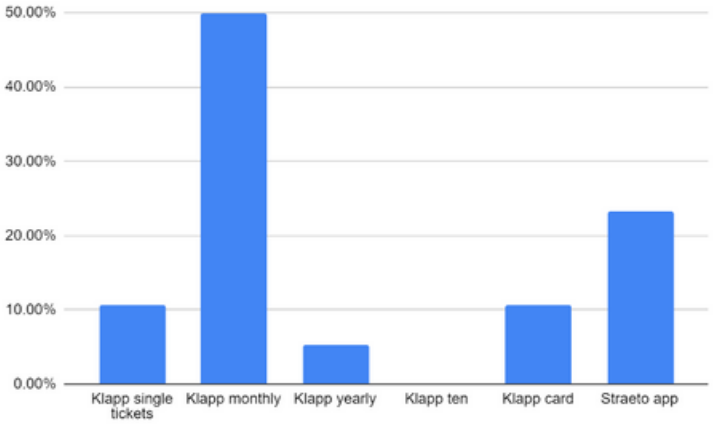
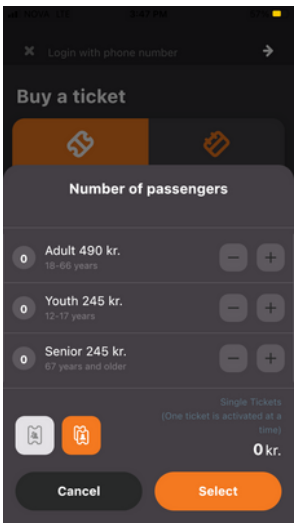


Figure 42. Graph that shows what type of ticket used for Bus



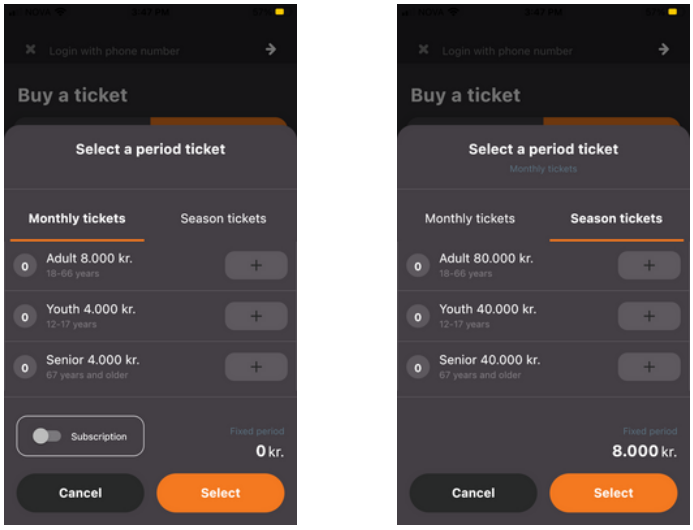


Figure 43. Current selection of tickets with the exception of Klapp-10 which is physical

Recommendations

Sign up Bonus and Referral Bonuses ⭐⭐

One idea was to give riders a free ticket for signing up for KLAPP to incentivize first time use. This greatly lowers the barrier to entry, as after someone has used the bus already they are more likely to keep using it. Currently, prospective riders may dismiss the bus as an option because they are worried about wasting money on a service they are unsure about. Referring a friend to the KLAPP app would also encourage ridership. If referring a friend would give both parties a free ticket, current riders would be encouraged to help expand ridership, and new riders would get a free ride. This would increase downloads of the app, and public exposure to Strætó's services in general.

Strætó rewards / Merchandise ⭐

Merchandise is helpful for a company, both to increase public awareness and revenue. In a hypothetical future rewards system, riders would be able to earn merchandise after a large amount of rides, or by directly purchasing it on the Strætó website. Print on demand online stores could be used to make these products, and could be a potential revenue source for the company. Another possibility is a points system. Each ride or ticket bought would provide a set amount of points, which could be redeemed for free rides or Strætó merchandise.

Figure 44. A happy rider with a hypothetical Strætó Merchandise Hat

Recommendations

Problem: Increase Clarity and Understanding for Riders

While the Strætó system is functional, there are aspects of it that confuse and frustrate riders. Some are minor and mostly inconsequential, but others are major enough to discourage ridership. Increasing the clarity and understanding for riders and simplifying processes will increase customer satisfaction and increase ridership.

Recommendation: Reduce Confusion and Simpifily design

Rebrand KLAPP Name ⭑⭑⭑⭑

We feel that the KLAPP app and Strætó app names are overly confusing without widespread external knowledge of their differences. We have seen many people download the Strætó app and be bewildered getting on the bus, since they are not aware of the KLAPP app. This could be due to a lack of marketing. The previous app, Strætó, being active, as well as having the exact same name of the company in itself is confusing. The KLAPP app does not get enough advertising space to let riders know it should be used instead. There is nothing on the buses or bus stops. Either change the name of the Strætó app, delete it entirely, or make the KLAPP app more distinct and visuals for less confusion.

Better and Simpler Sign Up Process ⭑⭑⭑

According to a customer support representative of Strætó, between 30 and 100 people daily reach out to Strætó in need of help regarding the sign up processes. These issues could be minimized in several ways. One way is an infographic to make this more understandable. Another is simplifying the sign up process. As of now, the only simple sign in process is with a phone number, which can make it challenging to use for those without one. Even with a phone number, tourists often have difficulties getting verification codes due to security measures against DDOS attacks. Email based authentication is one solution to this issue, and would improve usability of and satisfaction with the KLAPP app. Given that this is a major barrier to entry, we believe it is key to increasing ridership and delivering a positive impression of Strætó to new customers.

Fix Graffiti ⭑⭑

Graffiti occasionally obstructs information about the bus system and its routes. While this is a minor issue, this information being inaccessible may confuse riders.

Figure 44. Graffiti Covering Information at Bus Stops

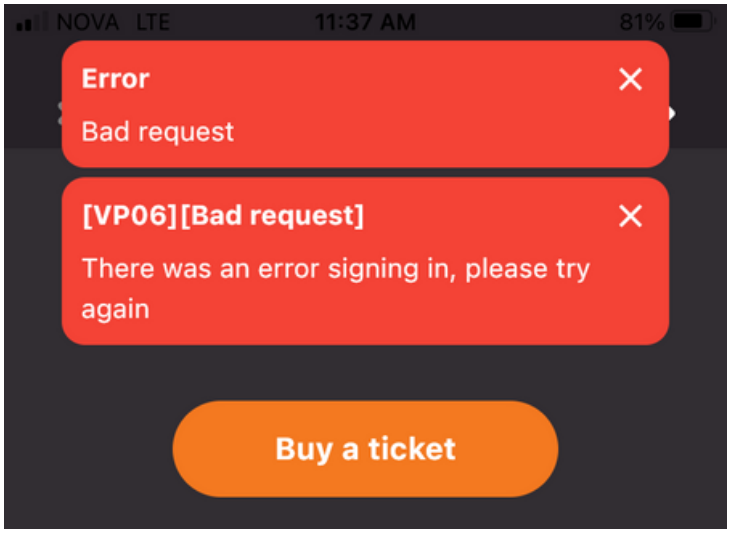


Figure 45. Error Message when Signing in

Conclusion

Strætó's mission is to provide bus transportation for the greater Reykjavik area. While it already serves millions of riders annually, it can be further improved. We investigated the Strætó and Klappið systems, and collected data via surveys and interviews. From this data, we provided recommendations to enhance the ridership and ridership experience. For these reasons, we believe our project was successful, and we hope it will serve as a valuable resource for Strætó, future IQP projects, and any related investigation.

Despite our progress, there is still further research to be conducted. While we feel that many of our personal recommendations may prove useful, they were unsupported by our limited data. Further investigation into these will provide insight into the practicality and suitability of these suggestions. Marketing is another area that warrants additional inquiry, as it is pivotal to customer acquisition, especially among tourists. Millions of tourists a year travel through the greater Reykjavik area, and provide an opportunity for dramatically increasing ridership. For this reason, additional exploration of barriers to tourist ridership is warranted. While we made many recommendations, we hope our highest priority ones, namely adding both alternative payment methods and NFC scanning and renaming the app, will drastically improve the rider experience. We hope that Strætó implements our changes, resulting in additional riders on an accessible bus with a superior rider experience.

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