



# PI-0395: How Do People Receive Information about Public Transit for trip planning and discovery of transit service?

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*Requested by*  
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## Executive Summary

### **Background**

California's public transit systems face challenges in effectively communicating accurate, timely information to riders and non-riders. Transit information is accessed through various channels—websites, apps, physical signage, or word-of-mouth—but these methods can be inconsistent, unreliable, or inaccessible for different groups. Riders may struggle with outdated or incomplete information, leading to confusion or missed trips, while non-riders may avoid using transit due to unclear or insufficient service details. Transit agencies may also be unsure about how riders best receive information causing them to make potentially inefficient investments in rider information platforms that don't meet the needs of riders and fail to motivate non-riders into becoming riders.

This PI will explore the literature on how people access public transit information and identify the most effective ways to communicate with different user groups. This includes literature on key transit information, informational context of transit information and the reliability of the transit information people receive among other topic areas.

### **Summary of Findings**

Public transportation has a messaging problem in that the information they provide often fails to be provided to the customer in a timely, accurate and convenient manner that is. This issue is compounded by the wide range of channels creating inconsistency and confusion in their messaging. To encourage increased utilization of public transportation it is imperative that these informational inconsistencies be resolved. To this end, this report will explore to what extent current research and practice have accomplished this and what gaps in the field need to be filled.

The primary way that customers obtain this information is through various internet channels, including proprietary apps like those produced by Amtrak and various social media platforms like X (formerly Twitter) or Facebook. A report produced by the Aristotle University of Thessaloniki, Greece discusses how upwards of 2/3rds of commuters rely on these platforms in order to both plan trips and obtain desirable, up to date and accurate information on travel conditions of their trip and status of services such as trains or busses. Matsumoto and Hidaka (2015) take a similar avenue in their analysis and find that consumers have a demand for accurate real time transit information for railway usage in an easy to access internet or phone application and that there is a correlation between ease of access of information and the propensity for commuters to utilize this official transportation information. Watkins, Ferris, Borning, Rutherford and Layton (2011) echo this sentiment that what riders of public transit want is accurate, real time and location information for their chosen mode of transit.

There is also an uptick in demand for real time traveler information during times of disruption as discussed in Li and Shalaby (2024). This study revealed the most desired information by travelers is related to shorter trips rather than more long haul journeys

and that there is higher demand for this content since disruptions create uncertainty and a desire to understand how various events might impact their trip.

The study from Manetti, Bellucci and Bagnoli (2016) provides some interesting findings from the organizational perspective of transit ridership information. They found that many public transportation agencies analyzed do interact regularly with consumers to provide information on social media services. However, the type and quality of that information varies widely by organization and locality. Similarly, Ghahramani and Brakewood (2016) explains how smartphones and how content delivered through the internet via apps is used by transit agencies to better understand consumer decision making and trip planning and this improved view of consumer preference allows for agencies to provide a better service.

What we can extrapolate from these findings is that consumers have a high demand for public transit information that is reliable, accurate and easily accessible through smartphone or other connected technology and that this demand is not fully met by the current market offerings. Moreover, there appears to be a strong relation between how easily someone can get the information from a website (either through a traditional computer or a modern smartphone device) and how likely that same individual is to actively pursue public transit as a viable means of transportation given other existing options such as private car ownership or ridesharing services.

A co-benefit of this trend is that it appears to create a self-contained positive feedback loop of customers searching for data and organizations improving their data availability and offerings. Improving the information, in turn, creates a larger incentive for customers to search this data and use transit and generates more data for an agency to improve their offerings.

Finally, while these informational services are clearly popular with riders, the inefficiencies arising from the non-standardization of information being provided present a large, and frustrating, hurdle. This friction then drives away many potential riders that might otherwise be interested in using the service. Resolving these asymmetries can encourage public utilization and collaborative interaction with transit agencies, resulting in easier rider access to highly desirable and relevant transportation information.

### **Gaps in Findings**

While there is existing research that evaluates various aspects of the transit rider's information discovery experience, there do not appear to be articles detailing a comprehensive and deep focus on what specific information customers want from transit agencies. There also is a space for research on a clear answer for what would constitute key, priority information for riders and what content is searched when the individual is already on transit and is looking for traveler information.

### **Next Steps**

Interested parties might find it prudent to examine how their transit organization provides information to customers and perform or commission for an empirical analysis of how effective their agency is in distributing their transit information and messaging.

## Detailed Findings

### **Key public transit information**

#### **SOCIAL MEDIA AND TRANSPORT CHOICES: HOW SOCIAL MEDIA CAN AFFECT TRIPMAKERS' CHOICES**

<https://www.witpress.com/elibrary/wit-transactions-on-ecology-and-the-environment/226/36326>

From the abstract: During the last years, the evolution of the World Wide Web from static websites to the Web 2.0, a platform where content and applications are continuously modified by all users, has created new online applications, known as “Social Media”, through which users interact with one another, share their experiences, opinions, knowledge, and sometimes their locations, an aspect quite useful for the transport sector. Many attempts have been made recently to implement social media analysis in the domain of transportation and extract useful information from social media. However, despite the efforts made so far, it has not been examined to a large extent what the characteristics of social media users are and how the existence of information on various topics in such platforms can affect the transport sector. In the framework of the present work, an attempt is made to investigate the likely influence of social networking services on the behavior and choices of commuters, through a questionnaire survey composed in the Greek language. This research aims to identify, at first, information on how often and in which way social media are being used and, secondly, to examine whether the existence of real-time information on traffic conditions from social networks or through interaction with other users of such networks can affect the way users travel and make their choices. The preliminary results indicate that almost 64% of the survey’s participants receive information from social media about their trip, especially when they use public transport. They also reveal that this information may alter, in a substantial percentage, their route or the period they travel. Understanding the influence of social media on the behavior and choices of commuters can be a valuable tool for mobility managers to alter the trip characteristics for various activities such as work, but mainly trips for entertainment, shopping, etc.

#### **Assessing Means of Transit Information Delivery for Advanced Public Transportation Systems**

<https://journals.sagepub.com/doi/abs/10.3141/1666-11>

From the abstract: “One of the important functions of advanced public transportation systems (APTS) is to provide timely information to transit users. Information delivery systems thus become an essential part of APTS. Described and categorized are means of information dissemination systems and their roles in advanced traveler information systems. An evaluation framework is developed to assess different media on the basis of seven criteria: accessibility, versatility and interactivity, information carrying capacity, user friendliness, costs to install, costs to use, and ease of implementation. The evaluation shows that the Internet and kiosks have the highest overall ranking. These are capable of delivering a variety of information, can provide interactivity to users, and if designed properly can have a user-friendly interface. Variable message signs and closed-circuit televisions are ranked as good for their modest costs and the variety of information they can deliver. They are appropriate to both wayside and in-terminal information displays. Other emerging technologies, such as automated voice annunciators and personal communication devices, are promising for the future but are not ready for implementation.”

#### **Evaluation of Real-Time Transit Information Systems: An information demand and supply approach**

<https://www.sciencedirect.com/science/article/pii/S2046043017300126>

From the abstract: This study assesses current needs in the implementation of Real-Time Transit Information Systems. Web surveys are used to better understand information supply and demand, defined as the attitudes and experiences with real-time information of transit passengers and agencies, respectively. The most valued types of information demanded were found to be related to vehicle location while the least valued information relates to vehicle characteristics, like seating availability.

Smartphone applications were found to be the preferred medium for receiving information followed by Internet/websites and dynamic message signs. The surveys also revealed that demographic and socioeconomic status influence preferences for real-time information. The information supply survey found that approximately 70 percent of surveyed agencies currently offer real-time information. The largest constraint to providing or improving Real-Time Transit Information Systems (RTTISs) was found to be funding, followed by staffing needs. A comparison between the survey results found that the information currently being provided by transit agencies is mostly in line with the information most valued by transit passengers. The few differences that exist are generally because agencies do not provide information on the media preferred most by passengers. To address these differences, several suggestions are made to improve the implementation of real-time information. This information can be used to better develop and prioritize investment in real-time information systems.

### **Trends in Mobile Transit Information Utilization: An Exploratory Analysis of Transit App in New York City**

<https://www.sciencedirect.com/science/article/pii/S1077291X22001126>

From the abstract: Smartphone applications that provide transit information are now very popular. However, there is limited research that examines when and where passengers use mobile transit information. The objective of this research was to perform an exploratory analysis of the use of a smartphone application known as Transit App, which provides real-time transit information and trip planning (schedule) functionality. Backend data from Transit App were examined by time of day and day of week in the New York City metropolitan area. The results show that the pattern of both the trip planning feature and overall real-time information usage follow the typical pattern of transit ridership, which has morning and evening peaks. Additionally, self-reported household locations of Transit App users in the New York City area were compared with household socioeconomic characteristics (specifically, income, ethnicity, and age) from census data using GIS visualizations and the Pearson correlation coefficient, but they do not appear to be correlated. This implies that passengers use Transit App regardless of household income, race, or age trends in their neighborhood. This exploratory study examined a rich new data source—backend data from a transit information smartphone application—that could be used in many future analyses to help transit agencies better understand how transit riders use information and plan their trips.

### **Evaluation the effect of mobile information services for public transportation through the empirical research on commuter trains**

<https://www.sciencedirect.com/science/article/abs/pii/S0160791X15000706>

From the abstract: Railways play an important role in the way people move around their communities. The purpose of this study is to identify the factors which improve overall satisfaction with railway services in order to increase railway usage. This literature especially focuses on mobile information services on commuter trains. In this study we verified what kind of mobile information services passengers need while using railways, especially while on board, through two empirical surveys on commercial commuting trains. We provided not only rail information but also marketing-related information such as news, shop information, advertising and coupons for smartphones. Content server access logs were then obtained and analyzed, and several questionnaires were conducted in order to evaluate these information services during the test period. We used customer satisfaction (CS) portfolio analysis in order to clarify the relationship between satisfaction with each type of content and overall intent to use the mobile information services. Both times it was indicated that almost 90% of passengers who answered questionnaires would use these mobile information services if the services were actually introduced, and that satisfaction with railway information content was higher than that with marketing contents. From access logs to installed content servers on board, it was found that railway information is frequently accessed as well. In-station shops information and coupons were accessed as frequently as railway information. This result indicated that there were latent needs for these contents. This result was also drawn from CS portfolio analysis. These contents can be divided into the following

types according to different points of view, location-based contents and non-location-based contents. We also found that the satisfaction with location-based information content affected overall intent of using these mobile information services. We also found that content that changes according to time received higher evaluation than other content. For the second surveys we built a system that can provide information on board connected with the internet. We found that over 60% of passengers who connected to the on-board network used the internet not only for on-board information services but also to browse other websites, using SNS and sending or receiving emails. Moreover, we investigated the relationship between the internet usage in this on-board mobile information service and overall intent to use this service. From this result, it was quantitatively found that offering an internet connection affected overall intent in using the on-board mobile information services.

### **Stakeholder Engagement and Public Information Through Social Media: A Study of Canadian and American Public Transportation Agencies**

<https://journals.sagepub.com/doi/abs/10.1177/0275074016649260>

From the abstract: This study uses theories on dialogic accounting to assess whether online interaction through social media is used as a mechanism of public information and stakeholder engagement by Canadian and American public transportation agencies. We embraced a quantitative methodology in which content analysis was performed on the Facebook and Twitter accounts of 35 transit operators in Canada and the United States. We categorized the contents of 1,222 Facebook posts and 2,615 tweets, assessed which level and what type of interaction was effectively reached for every category, tracked whether and how agencies reply to comments on their posts, and assessed the general tenor of the discussion. Our results show that public transportation agencies often take advantage of their presence on social media to provide the public with information on their services and to perform activities associated with stakeholder engagement. However, we have found some significant differences in the utilization of social media by public transportation agencies, all of which are discussed in the “Conclusion” section of this article. Twitter is most often used for public information messages, while Facebook appears to be used more to publish content in a dialogic perspective that creates two-way, collaborative conversations with users. In terms of practical implications, our study suggests that a broader and more continuous commitment to interaction between users and stakeholders on social media would create new opportunities for improving transparency and, indirectly, the services of public agencies.

### **Utilizing Social Media in Transport Planning and Public Transit Quality: Survey of Literature**

<https://ascelibrary.org/doi/full/10.1061/JTEPBS.0000128>

From the abstract: The purpose of the present study is to examine whether mining and analyzing social media data can be a powerful tool in the transportation domain. A survey of the literature based on the existing uses of social media in transportation is conducted; opportunities and barriers are also presented for the subject. Analysis of social media can provide valuable information regarding incident detection, mobility, and activity patterns as well as users’ opinions about different transport modes. The issues that need to be addressed are not few, with most important ones being the advanced mining and linguistic techniques required for the extraction of information, the reliability of the data collected, and the sample bias. The study concludes with recommendations in relation to the existing gaps in the literature, such as the need to create a transport-oriented lexicon to facilitate the process of collecting transport-related information from social media, use of social media during transport planning and operation, and finally, potential use of qualitative indicators on public transportation issues regarding the perceived level of service.

### **Modeling Riders’ Behavioral Responses to Real-Time Information at Light Rail Transit Stations**

<https://journals.sagepub.com/doi/abs/10.3141/2412-10>

From the abstract: “An advanced passenger information system (APIS) can play a significant role in improving the satisfaction of transit riders in the short term and increasing ridership in the long term. This research focuses on investigating riders’ behavioral responses to en route real-time information on

light rail transit (LRT). A survey was designed and conducted to collect LRT riders' behavioral responses by presenting hypothetical scenarios in Calgary, Alberta, Canada. Two scenarios were examined: an estimated arrival time of 10 min for the next LRT and an LRT service interruption attributable to an incident or weather with no information on expected recovery time. The survey collected 505 responses. Four multinomial logit models were developed and calibrated to explore the factors affecting trip decision making for the described scenarios for commuter and noncommuter trips. The results led to the conclusion that various socioeconomic attributes (e.g., age, gender, and number of autos per household), experience with an APIS (familiarity with APIS and perceived accuracy of APIS), and experience with transit and the LRT system (use of transit as the primary mode of transportation, frequency of LRT use, and familiarity with LRT) had strong influences on travelers' behavioral responses in the context of real-time LRT information. Analysis of the data also determined that travelers' actions varied by trip purposes, travel time, and weather conditions."

**Data-driven customer segmentation and personalized information provision in public transit**  
<https://dspace.mit.edu/handle/1721.1/119331>

From the abstract: "To ensure customer satisfaction, a transit agency must strive to understand and cater to its users' needs. The goal of this research is to develop a framework that could help the transit agency to better understand its users and their behaviors. Segmentation of the market for transit users is the first step, since it allows for the understanding of heterogeneity in their characteristics and their varying requirements, at a granular level as opposed to an aggregate one. In this study, we create a framework, which uses smart card data, to identify customer segments. The framework developed in this study includes a segmentation scheme that creates segments based on the spatial and temporal characteristics of the travel behavior of customers. Data from Hong Kong's MTR system were used to demonstrate the practical application of the developed segmentation methodology. In doing so, a thorough analysis was conducted to interpret the specifics of the identified segments. The segmentation scheme created in this study is capable of catering to meaningful applications that could serve both the agency and the users of the transit system. A few applications explored in the context of this study include the use of the customer segmentation framework for the provision of personalized information. It was demonstrated how targeted information could be provided to users who may likely be affected by a particular service disruption event. In addition, the segmentation framework was used to understand the impact of changes in the network, through a before-and-after analysis where the impact on customer travel patterns due to the provision of service on the newly opened South Island Line is adopted as a case study. Lastly, a predictive transit smart card attrition model was developed by using the features created for the purpose of segmentation. The framework for segmentation developed in this study was found to be useful for multiple applications. Furthermore, the framework is flexible and, therefore, could be generalized for use to address other applications and across other agencies."

**Navigating the transit network: Understanding riders' information seeking behavior using trip planning data**  
<https://www.sciencedirect.com/science/article/pii/S0965856424001447>

From the abstract: Relevant and timely provision of transit information advises travelers of the route options available to them, allows riders to plan the timing of their trips, and helps mitigate the adverse impacts of unexpected disruptions. This in turn can improve the experience and retention of current riders and help attract new ones. While previous studies have relied primarily on data collected from surveys to understand people's use of transit information services, this paper uses backend data from Transit, a multimodal trip planner smartphone application (app), to analyze usage patterns in Calgary over the span of six months. A clustering analysis was initially performed to gain an understanding of trip search characteristics. The results show that most searches were made for short distanced trips. Additionally, panel data models were estimated to investigate the relationship between search frequency

and transit service characteristics, temporal factors, built environment, weather and sociodemographic attributes. The model results reveal that people seek out transit information the most during times of uncertainty, as poor reliability and service disruptions were shown to increase itinerary searches markedly. Furthermore, there was found to be a significant increase in searches after the network was restructured and three bus rapid transit (BRT) lines were introduced. These findings can help agencies determine the best way to deliver information to people and gain insights into travel behavior.

### **Informational context of transit information**

<https://ieeexplore.ieee.org/abstract/document/6338887>

From the abstract: “The accelerated urbanization rates have brought along an ever-increasing number of vehicles, which, in their turn, causes serious delays in people's daily travels. Users of public transportation, in particular bus passengers, have suffered the most, due to the lack of information about transportation means and traffic conditions. This creates anxiety and uncertainty about the travel, especially on metropolitan regions in developing countries. In this light, User Information Systems (UIS) aim to provide precise information, taking into account the context of the passenger and of the traffic. Hence, it is possible to better support users decisions and increase users' trust on the transportation means reliability. This work presents a systematic literature review, which aims to identify how (if at all) contextual information is used by Public Transportation User Information Systems.”

### **Information impact on quality of multimodal travel choices: conceptualizations and empirical analyses**

<https://link.springer.com/article/10.1007/s11116-007-9120-1>

From the abstract: “This paper investigates the impact of a variety of travel information types on the quality of travel choices. Choice quality is measured by comparing observed choices made under conditions of incomplete knowledge with predicted choice probabilities under complete knowledge. Furthermore, the potential impact of travel information is considered along multiple attribute-dimensions of alternatives, rather than in terms of travel time reductions only. Data is obtained from a choice experiment in a multimodal travel simulator in combination with a web-based mode-choice experiment. A Structural Equation Model is estimated to test a series of hypothesized direct and indirect relations between a traveler's knowledge levels, information acquisition behavior and the resulting travel-choice quality. The estimation results support the hypothesized relations, which provides evidence of validity and applicability of the developed measure of travel-choice quality. Furthermore, found relations in general provide some careful support for the often expected impact of information on the quality of travel choices. The effects are largest for information services that generate previously unknown alternatives, and lowest for services that provide warnings in case of high travel times only.”

### **Personal and Contextual Factors Supporting the Switch to Transit Use: Evaluating a Natural Transit Intervention**

<https://spssi.onlinelibrary.wiley.com/doi/abs/10.1111/j.1530-2415.2003.00019.x>

From the abstract: “U.S. communities are becoming increasingly automobile dependent, with car use embedded in U.S. policies, practices, and preferences. To encourage transit use, transit systems too will require supporting policies, practices, and preferences. Light rail is currently enjoying some supportive policies, but research is just beginning to explore how psychological experiences might help support a switch to rail use.

We propose a transactional approach to behavior change in which societal, physical environmental, and inter- and intrapersonal factors combine to support a new behavior. We illustrate this perspective at a university host site for the 2002 Olympics, where temporary parking shortages, the opening of a new light-rail transit line, and an outreach program enhanced the attractiveness of transit. Transit use was maintained by psychological satisfactions such as enjoyment of productive and pleasant activities during the ride, positive evaluations of the service qualities of light rail, and the view that light rail enhanced city livability. Results support the transactional approach and suggest directions for actions in transit promotion, environmentalism, and urban design.”

**Use and Deployment of Mobile Device Technology for Real-Time Transit Information: A synthesis of transit practice**

<https://books.google.com/books?hl=en&lr=&id=7FL7PY9is3YC&oi=fnd&pg=PP1&dq=informational+context+of+transit+information+&ots=NdkbQPfKkE&sig=rxb-A9YOvjbkPU0qDqPMML6Ra-M#v=onepage&q&f=false>

From the abstract: “This synthesis examines and documents the state of the practice in the use and deployment of real-time transit information on mobile devices.”