Citizen Perspectives on Trust in a Public Online Advanced Traveler Information System

Benjamin Schooley  Dolly A. Harold  Thomas A. Horan  Richard Burkhard
Claremont Graduate University  Claremont Graduate University  Claremont Graduate University  College of Business
benjamin.schooley@cgu.edu  dolly.harold@cgu.edu  tom.horan@cgu.edu  burkha_r@cob.sjsu.edu

Abstract

The role of government in providing services to the citizen has been dramatically transformed with the evolution of the Internet and information and communication technologies. Now, government electronic services must not only be effective in their delivery but must also invoke citizen engagement in order to realize its significant contribution. Previous e-Government research has shown that trust in government electronic services is a critical factor in invoking citizen engagement. This study uses a grounded methods approach to understanding factors that affect citizen attitudes toward an online advanced traveler information system (ATIS) in Minneapolis, MN as elicited from users. Focus group discussions were analyzed to identify patterns that signify trust in e-Government systems. The results of this qualitative study include the elements of trust that are important to citizens using e-Government systems, not only as it applies to the online information systems, but in relation to the physical service that the online service represents.

1. Introduction

The implementation of e-government worldwide has been categorized into three main sectors: Government-to-Government (G2G), Government-to-Business (G2B), and Government-to-Citizen (G2C). For G2C, a key role of e-government is to facilitate citizen’s interaction with government machineries [1]. For this purpose, government organizations are tasked to identify processes that are potential candidates for innovation using information technologies to facilitate improved citizen interaction with government.

The advancement of the Internet and information and communication technologies has provided citizen users with accessible and ubiquitous digital information. This in turn has sparked governments across the globe to continuously seek effective and efficient ways to deliver services to citizens. Information systems (IS) and information technology (IT) are applied to create these e-Government systems. Despite all the enthusiastic efforts to implement e-Government systems worldwide, West [2] found that these implementations still fall short of realizing their potential to improve service delivery and public trust.

Much research on e-government systems assumes that the effectiveness of e-government services is dependent upon citizen engagement with these e-government systems. As such, an important focus of e-government research should be on the citizen and the consumer-facing dimensions of government information systems. The literature has shown that trust is one of the fundamental factors for citizen’s adoption and engagement of online e-Government systems [4, 7, 11, 12].

Given the established importance of trust in e-Government contexts, the grounded research methods applied in this study begin with a focus on trust as the guiding typological assumption under which the study’s focus group data can be analyzed [30]. Although trust has been recognized as one of the dynamics that helps harness the engagement of citizens, as well as to heighten the adoption of e-Government systems by citizens [7] trust has diverse meanings, concepts, and applicability [24]. The breadth of meanings of trust underscores need to understand how trust is being perceived and experienced by citizens. The understanding that emerges from the grounded methods used in this study can give insights into how e-government systems can be improved to encourage engagement and adoption.

Some e-government systems can be considered a conduit for citizens to benefit from the actual services provided by government. One such system is the public, online Advanced Traveler Information Systems (ATIS) installed in Minneapolis, MN. ATIS was developed to accommodate travelers’ experiences with the physical transportation services provided by Metro Transit. ATIS supplies travelers with information on
bus and light rail schedules, and also provides additional features for personalized trip planning.

Many studies on trust in e-government systems use quantitative, survey-based measures. Grounded approaches take advantage of opportunities to understand the characteristics of a domain of study; in this case, the study examines trust themes that emerge from participant experiences in e-government systems. Multiple perspectives can be considered, including issues of distrust, trust antecedents and trust consequences. In this study, citizens are travelers using ATIS – an information system that facilitates interactions and experiences with a physical public service (i.e., public transportation). The objective of this study is to discover signifiers of trust from the perspectives of travelers using ATIS in planning their trips, and how the information system influences their trust in the actual travel experience when using the transport system.

2. Background

For over a decade governments have capitalized on web technology to create presence in the digital realm. West [2] was optimistic that the development of digital government could transform service delivery and citizen’s attitudes despite evidences of shortfalls in the implementations of some e-Government systems to improve service delivery and increase public trust. Web-based solutions to familiar face-to-face interactions with government entities are now being improvised, creating system-level bureaucracies (information systems interactions) to expedite transactions with government, and improve service delivery [3]. For an efficient and effective government, transparency matters, and trust is a central enabler [4].

The implementation of e-Government has four main stages of development, ranging from information publishing to two-way communication, then to transaction, and finally to integration [5]. At the third and fourth stages (transaction and integration), it is crucial that citizens interact with government digital services in order to realize the potential of e-Government systems. According to Chan and Pan [6], user engagement is augmented by intermediaries in e-government systems implementation, leading to strategic convergence of interest in e-government systems implementation, support for e-government systems implementation, and sustained engagement of users in e-government systems implementation.

Although perceived usefulness and perceived ease of use are identified as key determinants for online transactions, Gefen, Benbasat, and Pavlou [7] posit that trust is central to the success of providing online services, particularly in the case of new users as suggested earlier by McKnight, Choudhury, and Kacmar [8]. Apart from that, trust is also a factor in helping consumers overcome perceptions of risk and insecurity, which increase the chances of using online systems [9]. Trust may also reflect users’ confidence that the system will perform its intended tasks as specified, and that it will not have adverse effects on the user [10]. Hence, trust is known to play a critical role in citizen decisions to interact with e-Government systems [11]. In other words, citizens will need to have some level of trust in order to interact with e-Government systems. For some government online services, the level of citizen trust is further augmented by the physical, “brick and mortar” services experienced by the citizens, as online systems or web presence are considered objects of trust that correspond to the general services being offered [12]. A study conducted by Teo, Srivastava, and Jiang [11] in 2009 also indicated that trust in government is significantly related to general trust in e-Government websites, and does not relate simply to trust in technology.

Wu and Chen pointed out that there are five types of trust antecedents on which trust can be built. Knowledge-based trust is built upon familiarity; cognition-based trust looks at first impression; calculative-based trust is based on rational assessment of costs and benefits; institution-based trust refers to an individual’s perception of an institutional context, and personality-based trust explains the propensity to believe or not to believe in others [29].

Navarrete [13] in a study on trust in transactional services has shown that trust is also augmented by government’s competence and benevolence, the handling of transactional data and trust in the electronic service delivery medium. Another study by Dashti, Benbasat, and Burton-Jones [14] revealed that felt trust by e-government is a significant factor in the nomological network describing government websites adoption, and that only when users perceive e-government to be trustworthy will they intend to use its website. Colesca [28] also proposes that trust in e-Government is enhanced by determinants of trust, which include the citizen’s perceptions of technological and organizational trustworthiness, the quality and usefulness of e-government services, and the Internet experience.

Most of the empirical research on trust has been conducted using quantitative approaches, drawing from past research frameworks based on trust models in e-commerce and related domains. While these models are important and valuable, this study explores the elements of trust that matter to citizens who are actually engaged in using a citizen facing e-government information system. The results of the focus groups in this study complement existing
literature on trust in e-government, thus providing a more comprehensive understanding on how trust or distrust plays a role in engaging citizens to adopt and use e-government systems.

3. Research setting

The research setting used to examine elements of trust in this study is the MetroTransit system serving the greater Minneapolis Minnesota area (USA). This transit system operates the Hiawatha light-rail line linked to a fleet of over 800 buses that covers over 100 bus routes [31].

MetroTransit’s call center handles approximately 1.1 million calls per year from its customers. The introduction of ATIS, the online trip planner by MetroTransit, has given an alternative to passengers of the transit system to check schedules for bus routes, light rail transits, and connections to light rail transit and buses. Apart from that, ATIS also provides opportunities for passengers to plan and personalize their trips. MetroTransit has recorded approximately four million trips planned using the online system in 2007 and usage continues to increase to over 500,000 trips planned as indicated by their self reported statistics in June 2008.

This research setting provided a platform to understand elements of trust in the public, online ATIS, where users of the benefit from the physical services provided to them. Citizens have a choice of either using the ATIS system to organize their trips or making phone calls to the call center for information and help on issues such as scheduling. In the case of ATIS, the customers of Metro Transit use the traveler system to look up transit routes and schedules, and also plan their trips prior to using the buses or light rail system. Figures 1, 2, and 3 provide an overview and illustration of the MetroTransit ATIS used in this study (www.metrotransit.org). Elements of trust for ATIS are determined by how the system accommodates the actual experiences of the travelers when using the bus and light rail services.
Users receive an output from the trip planner including three itinerary choices; distance to walk to and from transit locations and starting and ending points; cost of trip; options to map the route; environmental impact of trip; ability to add route to a personalized planner; and ability to quickly change or find another route.

4. Methodology

4.1 Research approach

We used a grounded-methods, qualitative research approach to explore trust in depth. The focus groups in this study offer special flexibility to uncover elements of trust from the perspective of the traveler who has the lived experiences of using the public online advanced traveler information system (ATIS), and relating that online experience to the actual physical services [15]. The guided discussion form of inquiry provides the researchers the ability to capture subtle attitudes and behaviors of participants when they relate their experiences [16]. Grounded theory is appropriate for uncovering emerging themes from data collected inductively from actual practitioners [26, 27].

Data collection included a series of group interviews. This method was most fitting to generate a discussion of participants’ experiences by not imposing any constraints on the topic being discussed. Group interviews have the advantage of encouraging the free flow of ideas among participants based on a guided discussion, and this method allows participants to query, support and explain each others’ experiences [17].

Two series of group interviews were conducted at the premises of Metro Transit with a total of 24 participants. Research participants were Metro Transit passengers who have used ATIS to organize their bus and light rail trips by looking up the routes, schedules, as well as planning trips. This study requires input from real users of the Metro Transit who can relate their actual experiences when using ATIS and also the physical transit system. Hence, non-users were not the target of this study. Participants were randomly selected from a pool of ATIS users that volunteered to participate in the study through the Metro Transit website. The research participants included both experienced and new users to ATIS, comprising a total of 54% male participants, and 46% female participants. Research participants were mostly working adults with diverse occupations, including a musician, a system analyst, a social worker, and an editor. There were 3 students, and 4 disabled participants who depend on the transit system for their primary source of transportation.

Open ended questions were posed to the participants during the 90 minute interview sessions to elicit their experiences, and perceptions related to trust (or distrust) in using the online systems to accommodate their actual physical experiences. The types of questions posed to elicit responses included how confident the participants felt in the ATIS in terms of its functionality; the technical benefits and challenges of using the ATIS and the related transit service; how well the transit service performs; and how both the transit service and the ATIS could be improved to suit the needs of citizens.

4.2 Data analysis

Following a grounded methods approach, the data collected were analyzed to identify emerging themes in terms of related issues, challenges, and representations which became the basis for understanding elements of trust or distrust in this study. Codes were generated by categorizing segments of data with a keyword that signifies each category of data. The initial codes were analyzed again to construct more concrete and reflective codes so as to embody the emerging themes from the data which were used to develop analytic interpretations [18].

The findings from the study were compared and analyzed with existing literature to situate the elements of trust in e-Government within the research context domain.

5. Findings

The findings from the focus group sessions generated five emerging themes. These themes reflect the collective participants’ lived experiences, and also perceptions related to trust in the public online traveler information system.

5.1 Theme 1 - usefulness

ATIS was recognized by all research participants as a useful tool to assist travelers to manage and organize their bus and light rail trips. Usefulness of the system is reflected in how ATIS helps the travelers in their process of decision making about whether to ride the transit service or another form of transportation.

“I use it because sometimes, I have to decide if I want to drive or if I want to take the bus and which feels like it’s gonna be the easiest.”

“I use it for my daughter, who goes to school in St. Paul. And if she has to go to an alternative place, I’ll
Other aspects of usefulness include finding directions and getting to places both familiar and unfamiliar, estimating walking and arrival time, what to expect at the destination, and making connections to other buses and light rail cars.

One participant also commented that the online system would cease to be useful if it does not perform the task that it is expected to perform.

5.2 Theme 2 – dependability

Participants described how they have become dependent upon ATIS for their trips. They would fully rely on ATIS to give suggestions for their trips in terms of the appropriateness of transportations and routes to be taken, and to also give alternatives for the time duration of the trip.

“It's really good. But, the--I don't know what the relationship is with the suburban routes. But, some of them, it just goes totally haywire. There was--I was trying to get somewhere north of St. Paul, one of the suburbs, Arden Hills. And the people that I was going to meet said, you know, "There's a bus that comes here. I'm looking right out the window at it." And I kept putting things into the trip planner and putting things and putting things and putting things. And it would not give me directions for how to get there.”

5.3 Theme 3 – compatibility

One of the themes which have been brought up during the discussion by participants is the issue of compatibility. Participants are of the opinion that ATIS is compatible with some applications but not with others.

“Any trip to St. Paul, I do on public transit [using ATIS]. I don't attempt it on my own.”

“And I go to people's homes and work sites in order to perform that job. And so, I'm using the Trip Planner all the time because I mostly rely on the bus to get to where I need to go, including getting here today.”

“And I pretty much use all of the features. You know, I plan the trip. I'm able to look at the options. And I do all of this with a piece of software called the Screen Reader because I can't see the screen. And it works quite well.”

“And also, I use a device called a Sidekick. I've tested it out on there, searching on the internet, and unfortunately, the website doesn't work on my device whereas other sites do….. Yes, on my computer, the system seems to work just fine. But unfortunately, when I'm mobile, I can't access it with my Sidekick.”

5.4 Theme 4 – reliability

Participants commented on the usefulness of ATIS in assisting them to manage and organize their trips but they also related that the bus schedule information provided by ATIS is not fully accurate, and that they need to fine tune their specification of time in order to get a more accurate response. Reliability is an issue to most participants.

“So usually, it's just changing the times will give you more options, because sometimes, you know that bus is really not gonna be on time. So, you can factor in an extra seven minutes.”

“Like, if I go downtown and want to take the 94 to St. Paul, I know that there's like maybe a four minute wait for the 94, but it always says it's a half hour later.”

“I mean, I think if you look at us as customers, it seems most of the things people are voicing are about
timeliness. It doesn't come at the right time, and that's on occasion.

And the trip planner doesn't really solve that. I mean, it sort of informs you, but it's like a best guess.”

Apart from not providing accurate information, participants also stressed upon the importance of the provision of the physical services. The participants said that although ATIS states the time schedule for the buses, at times, that time schedule is not actually supported by the actual physical services. The buses do not come on the specified time, and there is a range of time differences, from five minutes to half an hour. Some participants also implied that bus drivers are at times not accommodative to the needs of the travelers. In sum, the timeliness represented in the online system does not always align with the physical services provided for because drivers can be unreliable and not accommodating. In the case above, the information system indicates a traveling schedule which is not supported by the actual transit service, and this actually creates an impression on the participants that the overall transit system and the information systems are both not reliable.

“But, then the drivers are not that cooperative in terms of trying to catch that bus. All they have to do is honk. If, you know, you’re coming to an intersection and the bus is over here, and your bus is going this way and you want to catch this one, they don't stop most of the time. And some of the drivers are just terrible.”

“As far as it being a well run organization, I think overall it is. But, I think the drivers, some of the disgruntled drivers or drivers that have been around a long time.”

5.5 Theme 5 – timeliness of information

Timeliness of information about incidents that might impact a transit schedule or route is an important issue to some of the passengers of Metro Transit. According to the participants, being able to know if there are any incidents or delays with a specific bus, route, or portion of a route could actually allow a traveler the ability to make certain decisions pertaining to his/her travel plans. Such information empowers the transit user and may influence the level of trust he/she has in the system. Some comments included:

“Or, accessibility. I would love it [ATIS] to be able to text something on my phone, just quickly ask a question and get it. "Oh, your bus is--it broke down. Start walking," that kind of thing.”

“I mean, because I think that solves a lot of people's problems. Like if you said, "Well, is the bus running early?" Then, you pick up your cell phone and you go, "Okay, this bus will be here in two minutes.”

6. Discussion

The five emerging themes from the focus group discussions gave a reflection of the lived experiences of the participants when using both the public online traveler information system and the actual physical services. Responses revealed the interrelated and interconnected nature of ATIS with the physical transit services. These reflections, listed in the emerging themes as shown in Table 1 signify how trust may be augmented through use of the ATIS.

<table>
<thead>
<tr>
<th>Elements of trust</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usefulness</td>
<td>Increases trust when online systems are deemed to fulfill the needs of users.</td>
</tr>
<tr>
<td>Dependability</td>
<td>Increases trust when online systems are representative of the physical service they are supporting, and when there are no other options for the accomplishment of a specific task.</td>
</tr>
<tr>
<td>Compatibility</td>
<td>Increases trust when online systems are able to function/integrate with other applications and devices to satisfy the needs of the user to accomplish specific tasks.</td>
</tr>
<tr>
<td>Reliability</td>
<td>Increases trust when online systems are able to be relied upon to perform the intended task, and successfully complete a transaction for the user.</td>
</tr>
<tr>
<td>Timeliness of information</td>
<td>Increases trust when online systems are able to generate up-to-date information for timely decision making.</td>
</tr>
</tbody>
</table>

It became apparent in the focus group discussions that participants felt ATIS to be a very useful tool to assist travelers with their travel plans. This first theme of usefulness gave participants the initial impetus, as well as the confidence to trust the system, which subsequently led to the interaction with the system. Usefulness of the systems such as the ATIS as a trust factor is supported by Papadopoulou, Nikolaidou, and Martakos [19] in their proposed trust types and dimensions for trust in a service. Usefulness as described by Papadopoulou et al. is “the provision of
services which are useful to the citizen for the intended purpose to facilitate their tasks.” This theme, usefulness, indicated the importance of how a system has to fulfill the need of the citizens for a specific task in order to initiate trust to interact with the systems.

Dependability is a distinctive theme which emerged from the data. This theme is a factor for participants to have the disposition to have trust not only in the information system, but also the public service that the information system supports. Dependability as described by the participants is the need to rely on a particular electronic system to aide interacting with a physical world system and the accomplishment of a task. For the participants, ATIS is considered to be a means to reach an intended destination with confidence and assurance, and without any negative incidents such as getting lost, or wasting time unnecessarily. Sommerville et al. [10] in their discussion of dependability and trust in organizational and domestic computer systems states that trust is created when services almost always meet the expectation of their external users, hence creating dependability in the system. To capture the trust of citizens to engage and adopt e-government systems, the virtual system must align and adequately represent the physical system that it supports. It must be made dependable to the citizen so that it becomes a necessity, and no longer becomes an option, for them to use the system to accomplish the intended task. This becomes particularly challenging when the physical world system is less dependable due to complexities outside the control of the service (e.g., unexpected traffic incidents).

In this digitally connected world, there rarely exists a single system that functions on its own. Systems are developed to function with other systems to ensure the completeness of the intended task. In the case of ATIS, some participants who are more IT savvy, and those participants who are in need of special applications are testing ATIS with other complementing functionality. The success and failure of connecting ATIS to other applications may influence the level of trust in ATIS and transit more generally. It seems the level of trust that participants have in ATIS may be affected by its ability to work with other critical applications and devices used by some participants. Hence, compatibility as one of the emerging themes for trust in the system can be considered a factor that is more inclined to sustain the trust of the participant when interacting with the system. For e-Government environments, compatibility is a known challenge. The move towards integrating data, establishing policies to facilitate cross-agency access of information, and establishing applications [2, 20], not only among government machineries but also between the public and private sectors is an ongoing pursuit. Carter and Belanger’s [21] (2005) study on utilization of e-Government services indicates that citizens are willing to use online services if these services are congruent with the way they like to interact with others.

One pressing issue brought up during the group interviews is the issue of reliability. Industry [22] has specified reliability as an important approach to achieving trustworthy computing. This is accomplished by ensuring the quality of the technologies and products, and that processes perform as intended and as expected by customers. Likewise, for the research participants in this study, reliability means that the system provides reliable information to travelers for them to use the buses and trains. As voiced by the participants, the real, actual time the bus arrives at the bus stop does not always correspond with the time given in the ATIS schedule – which causes frustration and distrust for those who use the system. These incidents discussed by the participants can be an outcome of unforeseen occurrences, or due to human ineffectiveness in delivering the service. In order to acquire trust in information, the said information must be valid and complete [19]. Too many occurrences of misinformation can lead to a decrease in the level of trust, and for the case of ATIS, this happens when the physical service does not match the information being provided. Literature has shown the importance of government websites having accurate and reliable information, which reflects the high quality of those websites [12]. Reliability (or unreliability) is one factor that can influence citizen’s trust in the system, and encourage interaction with the system.

Another emerging theme which may influence the level of citizen trust in ATIS is the degree to which information is updated in a timely (i.e., real time) manner. The evolution of Internet technology has facilitated real time availability of the transit system [23]. This capability has prompted some participants who are more technologically savvy to expect real time information to keep them informed of what is happening around them, and also to assist them to make timely decisions. Many users are continuously looking for better ways to obtain services, and they may expect service providers to continually improve their services in tandem with current technologies. In the case of ATIS, participants want to know if the bus or train is going to arrive on time, or whether there is a delay in the services by means of their mobile devices. Information pushes to mobile devices can be seen as one of the many ways in which travelers can be kept informed, as mobile devices and services have become more available and ubiquitous. To capture trust in e-government systems, other than just giving reliable and
accurate information, government machineries, as service providers, may consider providing real time information to assist citizens to make timely decisions. Real time information may not only augment the level of trust in the system but in a related sense also increase the level of trust in government. User engagement means continuous improvement, particularly in improving the systems [7]. Trust can be sustained by means of showing continuous improvement to the system.

The five themes that emerged from this study: usefulness, dependability, reliability, compatibility, and timeliness of information illustrate user perceptions about elements of trust in an information system that supports a government provisioned physical service. For e-government systems, these themes are valuable [19] in illustrating how citizens’ trust in government is broken down into more specific issues about the instrument being used to deliver the services, and the propensity to trust the system [29]. When examining the elements of trust, each of these themes should be taken in unison and studied in terms of how they can lead to a better, more comprehensible and satisfactory e-government service delivery.

7. Conclusion

This qualitative study on examining elements of trust in a consumer facing e-Government system uncovered several potential factors that may influence how citizen trust levels may be affected by the implementation and use of an online system and its associated physical services. This in turn may influence the intention, degree, and manner in which the traveler interacts with the system. These propositions should be examined, tested and validated in future research.

Most academic research on trust in e-Government environments has been conducted using quantitative methods using models originating from prior research in business sector information systems (i.e., e-commerce). Examining trust using qualitative methods provides a “ground up” approach to identify trust issues as seen from the eyes and experience of citizens engaging real world e-Government systems. As technology evolves, and the demand for an effective and efficient government becomes more apparent among citizens, the need to provide secure and trustworthy online systems is fundamental for its’ realization. Understanding how to engage citizens in the evaluation and design of these systems becomes increasingly paramount, and qualitative approaches can help elucidate and/or validate models specific to e-Government.

Hence, in order to ensure citizens’ trust is acquired and maintained for continuous interaction with e-Government systems, it is therefore valuable to consider these themes: usefulness, dependability, reliability, compatibility, and timeliness of information in the development of e-Government systems. The authenticity of these themes as factors for trust in information systems can be explored further by means of conducting future research using quantitative methods. Future research can also include the development of a theoretical framework based on the elements of trust found in this study.

8. References


