

# The promise and challenges of integrating public transportation in Bogotá, Colombia

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**Abstract** Several cities in the developing world are transforming decentralized bus transit services into integrated transit systems. These programs aspire to improve service quality and mitigate negative impacts such as pollution and traffic injuries and fatalities. However, implementation processes in Santiago, Chile and elsewhere have proven difficult. One contributing factor has been a lack of integration of community concerns in the planning process. In this paper, we provide a framework for direct identification of user needs and apply it to an ongoing transit reform process in Bogotá, Colombia. Bogotá is integrating its bus rapid transit system with reorganized bus services throughout the city. Using expert interviews and a semi-structured community survey, we identify awareness, expectations and aspiration gaps between transit users and planners, as well as equity concerns. These gaps are part of a conflict we refer to as vision dissonance. We suggest specific actions to mitigate these problems in Bogotá and actions that may help reformers in other cities avoid encountering similar problems. A key lesson is that user consultation is valuable for identifying incompatibilities between users' self-identified needs and project goals. If such consultation is conducted early in a planning process, planners of future projects may be able to prevent rather than correct unanticipated incompatibilities. The methods developed for this research can help planners in other large-scale transit integration processes conduct effective user consultation.

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## 1 Introduction

An increasing number of cities in the developing world are attempting to transform decentralized, disorganized public transport sectors into well-coordinated integrated systems. However, implementation processes have proven difficult, partially due to lack of integration of community concerns in the planning process. User perception and education were the source of serious difficulties in previous integration projects (Hidalgo and Carrigan 2010). In São Paulo, improvements in mobility indicators after integration did not lead to improvements in user perception (Hidalgo 2009). In Santiago, poor user education was one contributing factor to the notoriously chaotic implementation (Muñoz et al. 2009). Although quality of service and users' perceptions of the Santiago system have since improved (Beltrán et al. 2013), the improvement in public opinion has lagged behind changes in technical performance indicators.

In this paper, we provide a framework for direct identification of user needs. We apply it to the ongoing integration process in Bogotá, Colombia, which is implementing a citywide Integrated Public Transportation System (SITP). According to planners working on the project, SITP is intended to improve order and efficiency, mitigate pollution, and reduce traffic injuries and fatalities. It also represents an opportunity for major improvements in the city's quality of life, particularly for low-income residents (TRANSMILENIO 2013).

This paper compares perspectives of local transportation professionals in Bogotá with those of public transport users. The data we present here depicts interviewees' thoughts in mid-2011, 5 months from the then-intended launch date for SITP.<sup>1</sup> SITP has not been operating long enough to evaluate its overall effects on the transport system. However, an understanding of the conditions during the crucial pre-implementation phase may help to explain the subsequent reactions of users during the ongoing transition to fully integrated service.

We examine potential risks in Bogotá related to user perception and education through interviews with experts and a user survey, comprised of semi-structured face-to-face interviews with 186 individuals in the area of influence of the expected changes. We combine open-ended questions with a structured coding system to allow for broad comparability of survey results and in-depth examination of the responses. The open format allows measurement of a wide range of concerns beyond those pre-identified by technical experts and policymakers (Schuman and Presser 1979; Kash 2013). By refraining from framing response options in advance, this flexible design also allowed for an examination of how transit users conceptualize transport issues in comparison to professionals (Marshall and Rossman 2011).

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<sup>1</sup> The launch was planned for December 2011, but actually occurred in September 2012.

Our analysis revealed the existence of major gaps in awareness, expectations, and goals between transit users and the SITP planning team. Most users did not know change was coming. When given details about SITP, their expectations did not match expert predictions. Finally, there were incompatibilities between transit users' understanding of the issues with public transport and the problems SITP has been designed to fix. This incompatibility between expert and lay evaluations of the situation is emblematic of a conflict we refer to as *vision dissonance*. Vision dissonance encompasses differences in values, information, experience, and norms about what constitutes acceptable evidence between stakeholders. These latent differences in stakeholders' processes for considering and evaluating policy issues are often associated with overt differences in the conclusions they draw about what the problems are and how they should be solved. Conflicting assessments of important and why can breed mistrust between the intended beneficiaries of a reform project and the reformers themselves (Corburn 2005).

Survey results also document a widespread practice of negotiating a discounted fare. This practice is ending with the change to smart farecards, and constitutes a "hidden" cost increase of as much as 40 % for some users.

We suggest mitigation measures for these concerns in Bogotá. Consultation with users in Bogotá was minimal. We contend that soliciting user opinions during the design stage could reduce the likelihood and magnitude of incompatibility between user needs and citywide goals in planning and implementing future large scale transit reforms. We propose a relatively low cost methodology to collect needs and expectations from users based on mixed-methods data collection and analysis techniques.

## 2 Background

### 2.1 Bogotá, Colombia's divided public transportation

In 2010, Bogotá's population was 7.5 million inhabitants with a growth rate of 1.4 % (DANE 2011), a poverty rate of 22 % (DANE-DNP 2010) and a very high population density of 19,177 persons per km<sup>2</sup> in the urban area in 2010 (Suzuki et al. 2013). The lowest income population is concentrated at the periphery of the city; employment is concentrated towards the city centre. In 2008, 53 % of the city's 12.2 million daily trips used public transportation (Universidad de los Andes (UniAndes) and Cámara de Comercio de Bogotá (CCB) 2008).

Public transportation in Bogotá is provided through two separate bus systems: TransMilenio Bus Rapid Transit (BRT) and what is known locally as Collective Public Transit (CPT). In June 2011, TransMilenio was comprised of 1,783 buses (TRANSMILENIO 2011, Estadísticas Generales) and accounted for 26 % of public transport trips in Bogotá; the collective system was comprised of 17,500 vehicles, operating in mixed traffic, and accounted for the remaining 74 % of trips (Hernández, J., personal communication). The fare for the TransMilenio was 0.94 USD; the average fare for the collective buses was 0.77 USD.

Prior to the launch of TransMilenio in December 2000, CPT was the only form of public transport in the city. TransMilenio has achieved positive socio-economic impacts and international recognition as a sustainable transport best practice (Hidalgo and Carrigan 2010; EMBARQ 2009; Suzuki et al. 2013). Nevertheless, expansion has been unable to keep pace with demand as intended (UniAndes and CCB 2008; Ardila-Gómez 2007). Recent independent surveys rate the system as low quality, largely because of extreme crowding (Bogotá ¿Cómo Vamos?-BCV 2010).

Prior to the implementation of SITP, collective buses operated through 66 private companies.<sup>2</sup> Most collective buses are independently operated economic units, affiliated to these companies. This results in intense competition between drivers for every passenger, a conflict known as “the war of the penny.” CPT bus routes were assigned through permits that do not reflect supply and demand studies. The permit structure perversely incentivizes the companies that receive the permits to maximize their profits by “affiliating” as many drivers as possible and therefore collecting more payments (Ardila-Gómez 2007). As the drivers face over competition from each other, they increase operating hours, drive aggressively, and underinvest in maintenance. This results in slow travel, high pollution, and problems with road safety. In 2011 alone, 68 people died in collisions involving CPT vehicles, representing 12.5 % of total deaths from traffic incidents (FPV 2013). All public transport vehicles were only 1 % of the total vehicles registered in the city (Secretaria de Movilidad 2012). The CPT bus fleet is considered obsolete; many buses are as much as 20 years old. Their productivity is low, with less than 1.6 average passenger boarding’s per vehicle-kilometer (UniAndes and CCB 2008).

Various attempts have been made to regulate CPT, but the well-organized affiliation companies have consistently been able to block or circumvent reforms. At the time of study, CPT continued to compete with TransMilenio for customers, impacting the latter’s capacity to evolve into a system that can meet the needs of all *bogotanos* (Ardila-Gómez 2007). SITP was intended to address the declining conditions in both CPT and TransMilenio.

## 2.2 Components and goals of SITP

Conceived as part of Bogotá’s 2006 Master Plan for Mobility (Bogotá 2006), SITP is expected to change the provision of public transportation in the whole city. The following paragraphs describe the principal aspects of SITP according to personal communications with and public presentations by staff of TRANS-MILENIO S.A. (TM), the city-owned company in charge of the process. Following local conventions, we differentiate between the city company and the BRT system they administer by referring to them as TM and TransMilenio respectively.

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<sup>2</sup> The number of companies in operation will reduce during SITP’s gradual implementation process. The basic conditions we describe here, however, continue to apply to the remaining CPT service.

### 2.2.1 Business structure

The city of Bogotá was divided into zones and awarded 13 public transport concessions through a competitive bidding process. Contracts started in February 2011. During the contract period of 24 years, the concessionaires receive the exclusive right to offer public bus services within their zones. Interzonal transport will be shared between different operators, based on routes' end zones. The contractual structure is largely similar to the concession system employed successfully for TransMilenio. Compensation is based on a formula that includes bus fleet vehicle-km programmed and served and, unlike TransMilenio, passengers. There are also penalties based on technical performance indicators, including a user satisfaction index. A 14th contractor received a concession to provide the technology for fare collection and control (SIRCI).

TM has made a concerted effort to incorporate current operators into SITP; 52 of the 66 companies currently offering collective bus service in Bogotá will continue to operate as part of newly formed companies. TM expects a substantial portion of buses from the remaining companies to be acquired by the SITP concessionaires and most bus drivers in the existing system to be retained by them. This has served to reduce, though not eliminate, opposition from affiliation companies and drivers.

### 2.2.2 Operational aspects

SITP provides a structure for centralized oversight of public buses operations, following performance and quality indicators. The project requires large investments in technology (GPS, communications and dispatch software) and physical infrastructure (bus stops, terminals, improved roads). However, the most striking changes are institutional. In CTP, management of operations is carried out at the level of individual drivers.<sup>3</sup> Under SITP, concessionaires will be primarily responsible for coordinating local service, while TM will coordinate citywide service out of the same operations center that oversees TransMilenio.

Fares will be integrated by smart farecards,<sup>4</sup> which will be valid on collective buses and TransMilenio. A discount for transfers will be introduced. The fare scheme is designed not to increase the officially regulated tariffs and to decrease costs for users currently paying transfers.

SITP routes outside TransMilenio will continue to operate in mixed traffic. Routes will be reorganized under a hierarchical system based on trunks and feeders. According to official estimates, transfers are expected to rise from 8 to 15 % of trips. In interviews, TM attributed this rise to increased demand resulting from lower price; some outside observers have expressed concern about a possible increase in obligatory transfers. TM aimed to make route changes as minimal as

<sup>3</sup> The existing informal regulation of buses is comprised of people who earn their living by standing at bus stops and marking at what time buses pass on a clipboard. They share this information with drivers in exchange for tips. Buses are not centrally regulated by the companies or any municipal authority.

<sup>4</sup> Contractual issues prevented the implementation of a single ticketing system during the first months of SITP's operation. As of writing, the system was still operating with two different fare collection systems, which have not yet been fully integrated.

possible to avoid the sort of user confusion that occurred in the transition to Transantiago (Muñoz et al. 2009). TM also worked with the Secretary of Mobility in soliciting feedback on route design from local resident committees, a practice they used in planning TransMilenio (Ardila-Gómez 2004).

To mitigate what officials at TM and experts regard as oversupply of obsolete buses, SITP's implementation is intended to include scrapping 8,000 aging vehicles and purchase 2,867 new vehicles in the first year of operation, resulting in a net reduction of 30 % for the total fleet. The reduction in passenger capacity will be somewhat less, because small "busetas" will be replaced with larger buses.<sup>5</sup> A more modern fleet is being phased in gradually, reducing average vehicle age from 10 to 5 years. The maximum useful life of buses is being decreased from 20 to 12 years.

Bus drivers in CPT system currently work 14–16 h shifts in order to maximize their earnings. As part of the formalization of employment resulting from SITP, their shifts will be reduced to 8 h. As a result, the number of drivers per bus was projected to increase from 1.2 to 2.4, generating 6,800 additional jobs. SITP buses will only stop at designated places approximately 500 m apart, replacing the current system of hailing a bus in any place.

When our interviews were conducted, the projected start of operations was December 2011. The first routes actually began operating 9 months later in September, 2012. The system is being implemented gradually over a period of 16–24 months, with SITP routes and vehicles slowly replacing routes operated by CPT drivers. This is designed to avoid the confusion that greeted Transantiago's "Big Bang" start and allow for adjustments. However, the low demand resulting from this gradual implementation is expensive for the city. In April 2013, the weekly subsidy was estimated at USD 2.7 million (Redacción Bogotá 2013a). Implementation is ongoing at a slower pace than initially intended. Full system operation is expected in April 2014 (Gómez-Carvajal 2013).

### 2.2.3 Predicted effects of SITP

The primary intended user benefit for SITP is a more organized transportation system. The reduction in fleet size and retirement of old buses is projected to reduce air pollution (SUR-CAI-BID 2012). The projected peak hour occupancy of vehicles will increase to 6 pax/m<sup>2</sup>, identical to the target density for TransMilenio vehicles (though actual peak hour occupancy of the TransMilenio can reach 7–8 pax/m<sup>2</sup>). Increased occupancy of buses is designed to improve efficiency with the goal of keeping operation costs low. The reduction in bus kilometers, improved training and shorter working hours for bus drivers and the end of competition between them is expected to reduce traffic injuries and fatalities.

Through more efficient routing, buses making fewer stops per km, and a reduction in bus congestion, overall travel time may be reduced by up to 10 % (SUR-CAI-BID 2012). However, because of the uncertainty of operating in mixed traffic, such gains are not guaranteed for trips outside the new BRT corridors being

<sup>5</sup> It is not possible to know the exact passenger capacity reduction as it depends on the size of the vehicles to be scrapped and may change if TM adjusts the vehicle occupancy standards for SITP.

opened as part of SITP (TransMilenio Phase III). Initial reductions in congestion may be offset by an increase in private vehicle fleet (3.9 % a year) (UniAndes and CCB 2008) and the “rebound effect” generated by the increased availability of road space for them (Downs 2004; Littman 2011). High-demand corridors where BRT infrastructure is not planned may actually experience congestion and vehicle queuing at bus stops, as happened initially in Transantiago before the implementation of off-board validation in critical interchanges (Muñoz et al. 2009).

### 3 Design and methods

This project employed a mixed method design, including both quantitative and qualitative analysis and two distinct series of interviews. The first consisted of in-depth expert interviews [Number of respondents (N) = 16] with professionals involved in the process (city agency staff, bus operators) and knowledgeable external observers (consultants, NGO staff, academics; see complete list in Acknowledgment section). The second portion of the investigation was a survey of collective public bus passengers (N = 186). All data collection took place between May and July, 2011.

In an integrated transportation system, many modes together move the city far more efficiently than any single mode could. Mixing research methods confers a similar benefit. Collecting information through multiple channels allows opportunities to confirm findings through triangulation (Small 2011). More fundamentally however, it allows the two methods to compensate for each other’s limitations and synergistically reinforce each other’s strengths (Small 2011; Axinn and Pearce 2006).

For this investigation, qualitative analysis of interviews provided rich information about the emic (internal) perspectives of both transportation experts and transit users. Quantitative analysis of survey data allowed us to understand which of the opinions we encountered were particular to the individual being interviewed and which were widespread across the population, as well as to identify demographic opinion trends.

#### 3.1 Survey sampling strategy and sample characteristics

The user survey consisted of 4–6 min semi-structured interviews and was conducted in collaboration with TM staff. The interviews were conducted at transit stops in the city, and the principal investigator was present to conduct interviews and supervise. As Axinn and Pearce (2006) explain, this strategy improved the quality of data in two ways: it allowed the principal investigator to observe and correct potential sources of measurement error in real time rather than uncovering problems after the completion of data collection and it provided a method of triangulation to confirm respondent statements about the bus system through observation.

We employed a nested sampling strategy. We used purposeful cluster sampling to identify clusters of users (Teddlie and Yu 2007)—five high-usage transit stops selected to represent a socioeconomic and geographic diversity reflective of Bogotá

itself.<sup>6</sup> Two sites were primarily residential and two were employment centers; the fifth was mixed use. Neighborhoods without current TransMilenio service will experience the most dramatic changes as a result of SITP. Therefore, we chose sites that lack direct access to TransMilenio, though two had indirect access through feeder routes.

At each site, we approached passengers as they exited or waited for the collective public buses.<sup>7</sup> Interviewers reported that the majority of potential subjects approached agreed to be interviewed. Our sample is 51 % female, with a median age of 32. As expected, subjects belong to the lower socioeconomic strata of the population (divided from one to six, with one being the poorest strata; see Fig. 1). According to TM staff, 87 % of the users of collective buses are from strata one, two and three, a slightly higher proportion than on TransMilenio. Eighteen percent of respondents had completed a primary school education or less; slightly more (22 %) had completed a university degree.

As shown in Table 1, the interview sample is mainly composed of heavy users of CPT. Even those riders with access to TransMilenio via the feeder service typically used it infrequently; 75.3 % of respondents from sites with feeder service used TransMilenio less than once a week (as opposed to 77.1 % for riders with no TransMilenio access). Private vehicle usage, while still low, was higher than TransMilenio usage. Most respondents who used private transport did so infrequently, and only 13.4 % of respondents owned a vehicle. The mean reported trip duration was 57 min, with 11 % of trips requiring transfers.

### 3.2 User survey design

The survey was piloted before final application; responses from the pilot were not included in the analysis. Enumerators were trained and supervised directly by one of the authors.<sup>8</sup> Respondents were first asked about their current transportation habits and opinions of the existing collective bus system. Second, interviewers assessed awareness of the SITP by asking subjects if and what they had heard about it (using both the full name and acronym). The interviewer then described several basic aspects of SITP to the participant: central coordination of public buses; integrated fare card; discount for transfers; scrapping of old buses; and enforcement of official bus stops. After this explanation, participants were asked about their predictions of the positive and negative effects of these changes.

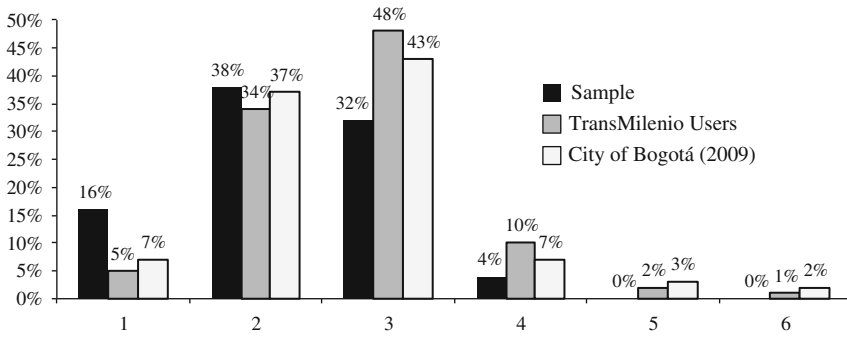
The SITP knowledge assessment and opinion questions were asked in open-ended formats. Interviewers asked for opinions without specifying specific issues,

<sup>6</sup> The five sites were in Normandía (in the locality of Engativá), San Cristobal Norte (Usaquén), Las Lomas (Rafael Uribe Uribe), Kennedy Central (Kennedy), and Fontibón Centro (Fontibón). The number of complete interviews at each site ranged from 32 (Normandía) to 46 (Kennedy).

<sup>7</sup> 93 % of respondents were either waiting for or exiting the bus; the remaining respondents were on the street for another purpose.

<sup>8</sup> TM provided two staff members, with knowledge of the SITP, to assist with survey data collection. They were trained by one of the authors, who also joined them in the field for supervision, additional data collection, and proactive quality control (Axinn and Pearce 2006).





City of Bogotá data from Encuesta DANE 2009; TransMilenio Users from TM (2011)

**Fig. 1** Socioeconomic strata of sample, TransMilenio riders, and City of Bogotá

**Table 1** Mode usage for respondents to user survey

Mode	Percent of sample using less than once per week (%)	Percent of sample using 1–2 days per week (%)	Percent of sample using 3–4 days per week (%)	Percent of sample using 5+ days per week (%)
Collective public transport	0.0	9.7	8.1	82.7
TransMilenio	76.8	15.7	2.7	4.9
Private transport	61.3	31.5	5.0	2.2

then followed up with non-directive probing to encourage subjects to clarify and elaborate on their responses.

The adaptive nature of mixed-methods investigation allowed us to incorporate early qualitative findings into subsequent quantitative measurement (Axinn and Pearce 2006). Accordingly, two questions were added to the survey in response to early interview results. First, interviewers began specifically soliciting a range for the typical duration of the subject’s most frequent trip as opposed to asking for a single number. Only responses that contain a range of values for trip length were included in analysis of travel time variation (n = 62).

Second, several early interview participants spontaneously mentioned the practice of informal fare discounts for passengers, which are offered at the discretion of operators. These discounts are absent from official records of transportation in Bogotá but widely known by users and bus operators. We took advantage of this early finding to document the prevalence of the phenomenon by adding a follow-up question about the discount to our survey.

If a subject reported they generally pay the official fare of 1,400 COP (0.77 USD), a follow up question was added: “Are there ever times when you say ‘will you take me for 1,000 COP (0.55 USD)?’” This is the phrase riders generally use to request a discount. Our analysis of what percentage of riders report sometimes paying a discount fare is based on riders surveyed after the addition of this follow-up question (n = 84). Our report of the number of riders who always request the discount is based on the entire sample.

### 3.3 Expert interview sampling and design

The expert interviews, which were conducted by the authors, were intended to solicit the views of key actors in the planning and implementation process of SITP. We therefore utilized a combination of stratified purposeful and snowball sampling strategies (Teddlie and Yu 2007) among four categories: city representatives, bus operators, academics and consultants, and NGOs. Within these categories, we identified key organizations and interviewed high-ranking staff members and/or individuals mentioned as significant by earlier participants. We interviewed representatives of the two public organizations with direct responsibility for implementing SITP (the Secretariat of Mobility and TM), three out of nine companies awarded SITP operation concessions, and a variety of consultants, academics, and NGO staff who participated in the discussions and planning for SITP. A full list of those interviewees who did not wish to remain anonymous can be found in Acknowledgment section.

To allow flexibility to examine respondents' individual areas of expertise in greater detail, an unstructured interview format was used (Weiss 1995). The interviews covered participants' formulations of the costs and benefits of SITP and the factors impeding and facilitating the implementation process.

### 3.4 Methods for analysis

This investigation is mixed methods both in terms of data collection and data analysis (Small 2011). For the user survey, after the interview was completed, enumerators applied a coding system to categorize responses to open-ended items. Codes were primarily deductive. In other words, they were pre-defined based on issues raised by expert interviewees, pilot survey interviews, and review of the relevant literature. Additional inductive categories were added to reflect unforeseen but common responses; this flexibility is one of the most important advantages of open-format survey questions (Schuman and Presser 1979). The design allowed for statistical examination of responses while also providing nuanced data about respondents' underlying concerns and reasoning (Tourangeau et al. 2000; Kash 2013).

Expert interviews were analyzed using the same coding scheme that was applied to the community survey while incorporating other inductive codes to reflect themes not mentioned by transit riders. We then selected five expert interviews from the participants with the most direct influence on the design and implementation of SITP for detailed quasi-statistical analysis and comparison with community viewpoints. The interviews included the Secretary of Mobility, who is responsible for the political aspects of SITP, the General Manager of TM, the head of SITP, and two other department heads within TM. We opted not to include outside observers in this analysis because they have less of an influence over official policy. We also excluded operators because they tended to focus on micro-level logistical and technical issues, which are outside of the area of concern for the average transit user.

Throughout the analysis, we make extensive use of direct quotes from both transit users and transport professionals. The inclusion of such narratives is important because even relatively straightforward categories such as “safety” and “organization” can have sharply different meanings for different survey and interview respondents, the investigators, and the reader (Tourangeau et al. 2000). For example, in a similar study in Arequipa, Peru, qualitative analysis of survey responses revealed that to transit users, “traffic accidents” typically referred to daily occurrences such as passengers tripping trying to exit or enter a moving transit vehicle. For planners in the city, accidents referred to the more severe but less frequent collisions that often result in serious injuries and in deaths (Kash 2013); a parallel distinction was documented in Bogotá. To borrow a concept from the qualitative tradition of Grounded Theory, “providing ample verbatim material ‘grounds’ ... abstract analysis and lays a foundation for making claims about it,” ensuring that the concrete meanings in broader categories are not lost (Charmaz 2006). This reduces the potential for ambiguities of the type described above.

A final reason for including such narratives is because they reflect the manner in which transit users articulate and understand their own viewpoints more faithfully than aggregate statistics in isolation. Local knowledge possessed by groups such as transit users often incorporates narrative as an important type of evidence in its own right (Corburn 2005). The process of incorporating local knowledge into empirical analysis has the potential to produce “socially robust knowledge” that improves the fit between quantitative assessments and local conditions (Gibbons 1999; Corburn 2005).

The method of analysis used here, selecting representative quotes to elaborate on quantitative trends in public opinion, is one method of translating local knowledge into a format that can be more easily included in technical analysis. This project supports the finding from other disciplines that qualitative research methods can provide a useful supplement to quantitative modes of analysis (Axinn and Pearce 2006; Small 2011).

## 4 User survey results

### 4.1 Informal transit discounts

A substantial portion of respondents reported receiving a discounted fare, generally 1,000 COP (0.55 USD) rather than the official fare of 1,400 COP (0.77 USD). 8.7 % of respondents reported always receiving a discounted fare ( $n = 132$ ) and 32.1 % reported sometimes receiving a discount ( $n = 84$ ). Due to the socially sensitive nature of this topic, the true rate is likely to be even higher than reported (Tourangeau et al. 2000). Interviews with bus drivers and operators confirmed the prevalence of this phenomenon, and also the widespread practice of allowing children and students board the bus for free, despite regulations to the contrary.

Chi square analysis did not reveal statistically significant differences in the percentage of people who receive a discounted fare across gender or strata. However, given that 16.7 % of respondents of strata 1 reported always receiving a

discount (as opposed to 6.1 % of respondents of strata 3), this perceived lack of significance might be due to sample size. Further study would be needed to resolve the issue.

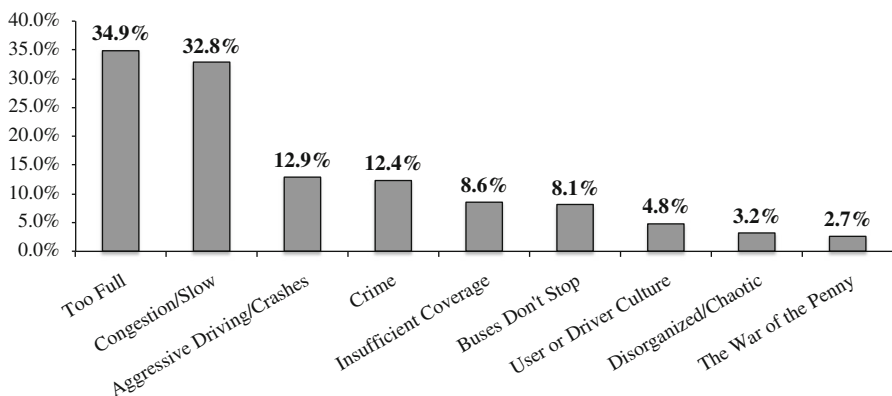
This informal transit discount will end with the implementation of SITP's integrated fare card. SITP has been designed to avoid cost increases for users. However, according to TM staff, these informal discounts have not been included in the economic model used to generate the new fare structure. The discontinuation of the discount will create a cost increase of up to 40 % for transit riders of low and moderate income who currently receive it, and perhaps more for riders, primarily women (Lecompte Plata 2011), who travel with children. This raises a question of adverse economic impacts on sensitive groups from the formalization of the transport payment system under SITP. Freddie (age 46 strata 1), said that SITP will be "a complete failure, because the poor are used to saying 'can I ride for 1,000 COP?' They're going to negatively affect poor people."

#### 4.2 Complaints about existing collective bus service

As depicted in Fig. 2, the number one complaint about existing bus service is that the buses are too full. People cited four primary reasons for disliking this situation. First, crowding increases the perceived risk of petty theft. Second, full buses will not stop to pick up passengers.

Third, extreme crowding, combined with unsafe driving practices, can be dangerous for riders. Respondents pointed to buses with passengers hanging out both doors to illustrate their point. Alina (strata 2) said "sometimes I have to go in the doorway, and it makes me very afraid. I'm 65 years old!"

Concerns about congestion, the second most common complaint, were often related to variability in travel time; 42 % of respondents reported that a traffic jam could increase trip duration by a factor of two or more ( $n = 62$ ). Other respondents complained about permanent congestion. Several respondents reported their travel time as, for example, "90 min when there's a traffic jam." When asked "And when



**Fig. 2** Most common complaints about existing bus service

there's not a traffic jam?" the response was "but there's always a traffic jam!" Travel time variability increases the amount of time users devote to transportation. Users who reported a wide range of travel times typically allotted more than the average length of their journey for the trip; many allotted the maximum length.

Aggressive driving in CPT was also a common concern. Most respondents who discussed this issue framed it in terms of aggressive driving (9.7 %) rather than traffic injuries and fatalities (4.8 %), though some mentioned it in combination with concerns about traffic safety. It was more often described as one aspect of poor driver behavior. Lucía (age 22 strata 3) lamented "the imprudence of the drivers—they don't respect signals!" Just as commonly, respondents complained about a lack of courtesy or honesty, complaining about drivers and passengers who smoke, push or are simply "rude."

Differences in common responses to opinion questions were examined across gender and strata using Chi square analysis. Women were more likely than men to report concern about unsafe driving (20 vs 5.5 %,  $p = .003$ ) and crime (19.0 vs 5.5 %,  $p = .005$ ). Responses were not significantly different across strata.

### 4.3 Awareness of SITP

Awareness of SITP was extremely low. Only 37.6 % of people had heard the name. Only 25.8 % of people could name at least one concrete aspect of SITP; 8.0 % could name two aspects. Only one person could list three components of SITP. The three most widely-known facets of SITP were the fact that the collective buses would be integrated with TransMilenio (12 % of respondents), that there will be a fare card on the collective buses (9 %), and that there will be official bus stops (4 %).

A comparison of respondents who can name at least one aspect of SITP to those who cannot, either because they haven't heard of it or have only heard the name, revealed significant differences across both gender and strata. Logistic regression was employed to disentangle the effects of one from the other Table 2. The model was controlled for neighborhood. According to this analysis, women were only 41 % as likely to be aware of SITP as men. People of strata 3 were nearly 6 times as likely to be aware of SITP as people of strata 1. The difference was even more dramatic for respondents of strata 4, but it should be noted that people of strata 4 represented only 4 % of the sample as a whole.

At the time of data collection, the primary avenue of public information about the SITP had been newspaper articles related to the contract solicitation process. These stark differences in awareness are an indicator that different mediums of information are necessary in order to reach women and people of lower strata. This is especially important since low-income people make up the majority of users of collective public transport.

### 4.4 Expectations for SITP

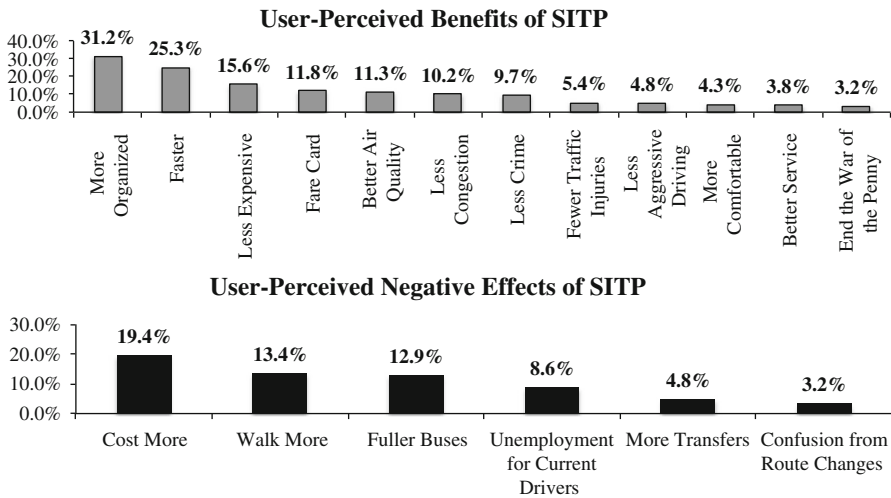
After listening to a brief explanation of the operational components of SITP as described in Sect. 3.2, seventy-five percent of respondents believed that SITP would positively affect their lives. As shown in Fig. 3, the most often cited benefit was

**Table 2** Relationship between awareness of SITP, gender and strata

	Female (vs Male)	Strata 2 (vs strata 1)	Strata 3 (vs strata 1)	Strata 4 (vs strata 1)
Odds ratio	0.410	2.057	5.905	9.638
Standard error	0.376	0.637	0.679	1.089
<i>p</i> value	0.018 <sup>a</sup>	0.258	0.009 <sup>b</sup>	0.038 <sup>a</sup>

<sup>a</sup> Denotes significance for  $\alpha = .05$

<sup>b</sup> Denotes significance for  $\alpha = .01$

**Fig. 3** Respondent expectations of SITP

improved organization resulting from official bus stops, reorganized routes, and driver training. Andrés (age 29 strata 3) commented, “This is what the city has been waiting for: something more organized.” Nearly ten times as many respondents listed increased order as a benefit than named disorganization as a problem. People believe the end to the “chaos” in transport, increased ease of use, and the scrapping of debilitated buses, would improve the experience of travel. Similarly, although fewer than 2 % of respondents listed air quality as a problem, 11.3 % listed it as a benefit of SITP.

Many users also stated that SITP would improve the speed of transportation in the city, typically from reduced congestion and the enforcement of official bus stops. Some were more skeptical; Sandra, age 35, said that she hoped SITP would improve the speed of transportation, but that without an exclusive right-of-way for buses, “it will be complicated because of congestion.” Conversely, many residents complained that the official bus stops would result in increased walking.

Changes in price were the predominant concern, with 44.7 % of respondents raising the issue. Respondents who believed the system would be less expensive generally attributed this decrease in costs to the discounted transfers. The most

popular aspect of the farecards was that neither users nor drivers would need to handle money on the street; participants believed this could reduce crime and driver inattention.

However, more residents believed the cost would increase than decrease. 16.7 % of these respondents named the fare cards as a reason for this increase, and another 13.9 % specifically mentioned the discontinuation of informal discounts.

While the experts interviewed described full buses as an efficient way of keeping fares low, transit users interviewed universally described this as a negative, often making unfavorable comparisons to TransMilenio. Hilda, age 30, predicted, “if they’re going to make it [full] like TransMilenio, it’s going to be a serious problem.”

Though SITP is expected to increase the number of bus drivers in Bogotá, unemployment of bus operators was one of respondents’ most common concerns. Though the majority of current drivers have made arrangements to continue work under the new system, some drivers may become unemployed. Aída Peñuela, whose husband has been driving a bus for 31 years, lamented “He’s already 50 years old and companies think he’s not useful because they’re going to look for someone who’s 25 years old. What chance does my husband have to continue working in transport? None!”

Decreased coverage was another area of concern. Users were concerned about losing transportation options because they might need to transfer more or be left without an alternative to reach their destination. Several users believed eliminating competition would negatively affect them. Alejandro (age 28 strata 3) said that “TransMilenio is no longer an option but rather an imposition, and one is obligated to pay.”

### 5 Comparison of professional and public visions

Table 3 compares the most discussed issues among public officials responsible for implementing SITP and users of collective public transport. The themes for users were identified based on the percentage of the sample discussing the issue either as a problem or as a benefit of SITP. The themes for public officials were identified through a two-step process. First, we identified themes that were mentioned spontaneously or in response to neutral probing by a majority of interviewees. We

**Table 3** Most prevalent professional and user concerns

	Transport professionals only	Shared concerns (professionals and users)	Public transport users only
High prevalence	Reliability	Organization	Crowding
	Traffic safety	Speed	Price
Moderate prevalence	Integration		Crime
	Formalization		Inconvenience

then narrowed this group down based on the total number of times respondents discussed each issue. In addition, many interviewees explicitly identified the concerns we list above as critical. Because analysis was based on aggregating several types of quantitative and qualitative data, concerns are classified categorically rather than compared statistically.

### 5.1 Common ground

“You will have orderly operations, confidence in the system, [and] a distinct vision of the future”—TM Official.

Many users decried the “chaos” of transit in Bogotá. Officials used the same vocabulary. This strong concern with organization across both groups represents the most significant overlap between the priorities of transport professionals and transport users.

“[Boarding the bus] will be faster, and therefore overall speed may improve, but I’m not even going to mention it. We’ll study it afterwards.”—TM Official

The shared concern with speed is somewhat more problematic. The gains in travel time are likely to be modest, if they occur. Because of this uncertainty, TM’s advance communications plan intentionally de-emphasizes travel time. If travel times decrease, these gains will be after the fact. However, regardless of this decision, *bogotanos* are hoping for a reform which will improve the speed of public transportation, and more than a quarter believed that SITP will solve the problem, even without any indication from the interviewer that the program will improve speed.

Not only does the failure to separate SITP’s buses from mixed traffic represent a lost opportunity to address a concern shared by both users and policymakers, absent measures to prioritize public transportation, the space vacated by public buses will be filled by private vehicles (Downs 2004; Littman 2011). Such a transfer of public space from low-income users of public transit to higher-income owners of private vehicles would be extremely regressive. Increased use of private vehicles could also offset projected reductions in emissions.

Conversely, Combs (2013) found that access to TransMilenio trunk routes correlates with reduced vehicle ownership among upper-middle class *bogotanos*. For these reasons, it is important to incorporate measures to prioritize public transport. SITP will provide service both within and between neighborhoods, including in some areas that TransMilenio’s original planners hoped would be served by BRT. While full BRT is not politically feasible, incorporating elements of BRT such as separated lanes into SITP’s high-demand corridors could both improve travel times for current users and mitigate the upward trend in vehicle ownership rates.

### 5.2 Professional priorities

“We’re going to have to communicate that this is a system that’s safer and more reliable.”—TM Official



Reliability and integration were not part of the vocabulary of users. However, users did express concern about variability in travel and wait times, central components of the technical definition of reliability (Knight 1974). Users also valued organization, a highly related issue. Thus, while transit users and professionals were not using the same language, they valued similar goals.

The situation is similar with road safety. Transport professionals typically discussed road safety in terms of saving lives and preventing serious injuries. About 5 % of users mentioned road safety in similar terms. However, twice as many passengers complained of aggressive driving. The problem was often discussed as something that detracts from the daily quality of service that users personally experience rather than explicitly connected to its less visible but deadlier consequences. Since aggressive driving is a major contributing factor to traffic collisions, these issues represent different facets of one problem. That problem is expected to be addressed by SITP.

Though these differences might seem to be just words, they have practical consequences. It has been well documented that people are less likely to notice or remember information that is not perceived as relevant to the “culturally available schemata” on which they habitually rely when thinking about a given topic (DiMaggio 1997, p. 269). Thus, the differences in framing between planners and users could potentially reduce the *perceived* relevance of SITP to transit users, regardless of the substantive overlap with their concerns. Dissonant language and framing can also unintentionally erode trust between stakeholders and public officials (Kaminstein 1996).

“[The informal discount] is an irregular thing that shouldn’t continue.”—TM official

Professionals typically discussed formalization as a benefit in its own right and informality, in all its forms, as a problem. This contrasts sharply with the views of users, who value the ability to negotiate. For example, Irene (age 61 strata 1) said she had no complaints about current bus service: “People have always been good to me because there’s always someone to take me for 1,000 COP.”

TM officials characterize this behavior as fare evasion, whereas transit riders perceive it as an unwritten, legitimate rule of the system.

### 5.3 User priorities

#### 5.3.1 A hidden cost increase

“The fare isn’t going to increase... If you have to make a transfer and use two services, you won’t have to pay... two full fares.”—TM Official

Though TM officials did not frequently mention fares, maintaining fares at an accessible level to low-income people is something they value. For this reason, the decision was made to hold the fare constant. And yet, the disparate views of the informal pricing structure put this laudable goal of preventing economic harm at risk. While TM officials at the time of our interviews viewed the discounts as a

marginal issue that might cause “a few protests in a few sectors of the population,” our survey results suggest that the end of the discount will create a hidden cost increase for a significant portion of users. Transit users in Bogotá and elsewhere have shown a willingness to protest unsatisfactory conditions in public transport or to evade paying fares (Ardila-Gómez 2004; Muñoz et al. 2009); the hidden fare increase in Bogotá could lead to similar behavior.

### 5.3.2 Crowding versus efficiency

“This is the conclusion: With fewer buses, the same supply [of transportation] for the city, more efficient.”—TM Official

A key distinction hidden in this statement is the difference between supply and seats. Even after removing a large quantity of buses from service, SITP is designed to move the same number of people. The oversupply of buses will be reduced, keeping costs lower for users.

From the user’s perspective however, a more crowded bus can be experienced as a loss of supply. TM has opted to use the same density target for SITP as for TransMilenio BRT, despite growing user dissatisfaction with the quality of service on TransMilenio and recognition by many planners outside of Bogotá of the discomfort of extremely full vehicles (Vuchic 2005).

Another dominant concern of users, summarized as inconvenience in Table 3, encapsulates similar conflicts between efficiency and comfort. Users will need to walk further, wait longer, transfer more often, and make more trips standing. TM officials are aware of this tension. Said one:

“We don’t have any [publicity] message associated with the comfort of the system because we understand that the buses should go fuller because this is what makes the system more efficient.”

Users value lower fares, which are only possible with efficient transit or large subsidies. However, efficiency as a concept is not part of users’ vocabulary and framing of transportation issues. It is notable that not a single user surveyed mentioned efficiency at any point.

## 6 Discussion

Virtually every expert interviewed agreed that communication with the public is at least equally important as technical considerations. Only a few months before the expected commencement of operations, this vital work was lacking. As Bogotá’s Secretary of Transport, Fernando Álvarez explained “the biggest challenge... is to do a good job *selling* this to the public so that they appreciate and appropriate the system and make it theirs” (personal communication, emphasis by the authors). The results of this investigation reveal gaps in three major areas: awareness, expectations, and goals.

### 6.1 The awareness gap

The vast majority of Bogotá residents simply were not aware of the profound transformations SITP was expected to bring to their day-to-day lives. Users who were not expecting change were likely to be confused and frustrated. Not only may people be upset at the interruption to their routine; a lack of knowledge may result in inefficient functioning of the system, as happened in Transantiago (Muñoz et al. 2009). Since CPT is still operating in Bogotá, the change thus far has been gradual and optional rather than sudden and mandatory. As a result, while low awareness has not resulted in the type of confusion observed in Chile, it may have contributed to the low levels of demand experienced during SITP's initial months of operations (Redacción Bogotá 2013a).

### 6.2 The expectations gap

Even once the principal operational aspects of SITP were explained, most people surveyed did not accurately foresee the changes SITP is likely to bring. For example, nearly three times as many residents complained about crowding on collective buses as realized that SITP will increase bus occupancy. In fact, 2 % of respondents believed that SITP would decrease crowding. Travel time benefits from SITP are uncertain, yet more than a quarter of users believe that SITP will improve the speed of public transportation in Bogotá. Careful expectations management will be important to ensure that users are not disappointed. During the first months of operations SITP routes have not experienced crowding as they co-exist with CPT; the situation may change as CPT is phased out.

### 6.3 The goals gap

At a very basic level, the problems SITP is designed to resolve do not match user perceptions of the problems with public transport. After hearing a presentation on SITP at a public meeting, one resident commented, "in truth, I think we should be very worried about this meeting because we can't see very clearly the aspects which respond to the needs we have" (2010 Public Meeting Transcribed by J. Burbano).

Part of this concern may be about perceptions, as with the difference between personal experiences of aggressive driving and the more abstract concept road safety. In this case, adapting official communications to users' framings of the issues might increase the perceived salience of SITP to users' self-described needs.

However, much of the mismatch is substantive. Aside from aggressive driving, SITP is not guaranteed to improve any of the other most common complaints about current bus service (crowding, travel time, and crime). In fact, by design, crowding is going to become more intense; while transport planners view this as an increase in efficiency, all available evidence suggests that users will perceive this as an extremely negative impact (Hidalgo and Carrigan 2010; Hidalgo 2009; BCV 2010).

In 2009, 73 % of Bogotá's citizens viewed the TransMilenio as unsafe, largely due to crowding and the attendant possibility of crime; city streets were also considered unsafe (CCB 2009). Longer walks to more crowded vehicles could

reduce the perceived security of city public transport; user feelings of safety have been shown to be affected by changes in the environment whether or not the actual crime rate changes (Reed et al. 2000).

Additionally, based on the current prevalence of informal transit discounts, a large number of users are likely to experience a “hidden” cost increase of up to 40 %. When choosing a mode of transportation, Lecompte Plata (2011) found that Bogotá women value security and price above all else; they are likely to perceive SITP as a decline in both these aspects.

While SITP offers tangible benefits to Bogotá such as improved air quality and decreased traffic fatalities, these benefits are more distal than the direct inconveniences users may experience. There is a high risk that many residents will perceive SITP as a decline in quality of service rather than an improvement. This is concerning because there is evidence that perceptions and objectively measured attributes may be only loosely correlated, and both have distinct effects on behavior (Adamowicz et al. 1997; McGinn et al. 2008).

#### 6.4 Dissonant visions

Taken together, these three gaps in awareness, expectations, are emblematic of a conflict we refer to as *vision dissonance*. Vision dissonance is comprised of latent differences in stakeholders’ processes for considering and evaluating policy issues. Stakeholders may consider an issue through the lens of differing values, norms about what constitutes reliable and relevant evidence, and with differing access to information. This can contribute to incompatible understandings of existing conditions and the problems thereof and differing conceptions of needs such as those observed in Bogotá.

Individuals employ different modes of analysis and heuristics (Van Stekelenburg and Klandermans 2007), which can lead to divergent conclusions from the same information. Morgan (2007) argues that groups have shared norms regarding acceptable evidence and analysis strategies, and that these norms constitute a paradigm which can differ between groups. He identifies paradigmatic differences between qualitative and quantitative researchers as a source of conflict within scientific communities. Laypeople, too, operate based on a variety of paradigms and, just as with any other intergroup paradigmatic difference, these differences create conflict.

Our interview responses suggest that community members and transportation professionals may, indeed, be operating under different paradigms. Transport professionals approached the issues from a perspective of efficiency and quantified costs and benefits. Transit riders, like many laypeople, tended to argue based on qualitative evidence such as their personal experience using transit (Corburn 2005).

In transportation planning and policy situations, these paradigmatic differences are often exacerbated by a lack of the type of interpersonal trust that encourages people to accept new information (Van Stekelenburg and Klandermans 2007; Kaminstein 1996). As a result, opposing parties may simply dismiss each other’s claims out of hand, escalating the conflict. Not only can vision dissonance of this type fuel public opposition to transportation reform programs, it can also prevent

planners from accessing community intelligence that can be used to improve technical planning outcomes (Corburn 2005). Professionals and community members with a shared goal, for example keeping transportation costs low, may find themselves stalled in vehement agreement with no clear path forward.

## 6.5 Policy implications for Bogotá

### 6.5.1 *Equity concerns*

In addition to potentially negatively affecting public perceptions of SITP, the hidden cost increase will adversely impact a significant portion of users. Twenty-one percent of Bogotá residents report that their income is inadequate to cover even minimum expenses. When faced with this situation, twice as many residents said they would sacrifice food than said they would reduce transportation expenditures (DANE 2008). Increased costs could also price-out low-income residents from public transport, forcing many to walk or bike long distances (CCB 2008).

While formalization has the potential to cause inadvertent harm to low-income residents, it is also an opportunity to improve equity by using formal subsidy to more precisely target recipients with the greatest need. Right now, a discounted fare is available to any user willing to haggle. As a result, some higher-income passengers pay the low fare, while some low-income passengers avoid doing so due to fear of social stigma. Requesting an informal discount is a very public act. Rather than entering with other passengers, a person must approach the front window to speak with the driver. On those buses with turnstiles, they must enter through the back door; if the bus is full, they may even be obligated to pass their *mil pesos* to the driver by way of other passengers. Many respondents who said they did not request the discount replied “no, I’m ashamed!” The ability to receive an official discount privately with an intelligent farecard could ensure that the subsidy is allocated based on need rather than personality.

One positive development in recent months has been an increased recognition of the importance of affordability by the municipality. The issue of high user fares, especially for the low-income population, became central in the agenda of the incoming administration of Mayor Gustavo Petro (2012–2015). The city reduced the fare for TransMilenio BRT in July 2012 (CARACOL 2012), financing the change through public subsidies and reduction in payments to concessionaires (Redacción Bogotá 2013b). A plan to for direct subsidies for low-income TransMilenio users is advancing (CARACOL 2013). However, neither of these positive developments will affect users of CPT.

### 6.5.2 *Bridging the gaps*

The gaps we have identified awareness and expectations gaps can be addressed with intensive, content-rich user education. Though user education cannot provide a total solution to the goals gap nor to eliminate the vision dissonance that results from these gaps, it can be used to mitigate problems during implementation. Users can be informed not only of how to use the new system but also in what ways it benefits

them. Particular attention should be paid to explaining benefits related to the user priorities identified in this survey (for example, the increase in organization and the decrease in aggressive driving). However, to avoid unrealistic expectations, it will also be important to be honest about the limitations of SITP with regards to crowding and travel time.

However, communication alone cannot resolve the goals gap; this can only be accomplished by making adjustments to the system to reflect user needs and desires. The user subsidies described above are an example of the type of policy action required for this task. However, the subsidies to date only affect TransMilenio users. It is important that they be accompanied by measures targeted specifically at users of other SITP services.

It is also important to provide well-publicized and effective channels for users to provide feedback about system functioning. TM has made several provisions to do this, including contractually linking user satisfaction surveys to operator compensation and the planned establishment of an independent, publicly financed SITP Ombudsperson (TM staff, personal communication). These aspects of SITP could be very effective at diminishing the goals gap if implemented in such a way that they avoid “capture” of the regulatory agencies by operators strong enough to shape regulations to their own advantage, as has happened in several systems in Brazil (Orrico Filho et al. 2009).

## 6.6 Implications for future projects

There are many aspects of Bogotá’s SITP which the designers of future systems may wish to emulate. Technical planning was strong, with a focus on learning from previous experience in Bogotá and other cities. TM officials also did an excellent job of soliciting participation from current bus owner-operators and affiliated companies. In addition to opening a business center where current operators could come to learn how to participate, TM sent operatives into the field to talk to bus drivers at depots and stations. Though a minority of drivers continued to oppose the change,<sup>9</sup> nearly 80 % of the original companies received concessions to continue operations under SITP.

As with the planning of the original TransMilenio system (Ardila-Gómez 2004), TM’s efforts to encourage input from users in the design of SITP were significantly less robust. For the majority of the planning process, officials conflated operator participation with public participation. This conflation was evident in interview responses; when asked about public involvement, several interviewees spoke instead of participation by transport providers.

Several local NGOs had noticed this discrepancy, and urged TM and the Secretariat of Mobility to hold a series of town-hall meetings focused on users. As a result, the secretariat and TM adapted the NGO’s suggestions, hosting meetings in all the urban localities. Attendees at these meetings then formed committees to provide feedback on local route design for SITP. However, this avenue for two-way

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<sup>9</sup> One group of operators, APETRANS, staged two brief strikes. As a result, the rate of compensation to current bus owners for the use of their vehicles nearly doubled.

communications in Bogotá did not open until after the fundamentals of the system were designed and specifications and requirements for contractors were already published. While useful, this form of feedback gave community members a voice about adjustments to a system whose goals were already immutable.

To avoid generating the type of goals gap Bogotá currently faces, it is important to incorporate user desires into the design of the system itself at an early stage. We perceive that the resulting program addresses the needs of city government and transport providers, who had a voice in the process, much more directly than it addresses quality of service for users, who were excluded from discussions. This is typical of a pattern noted by Ardila-Gómez (2004): if transit users do not have representation in the planning process for a reform, “The resulting allocation of costs and benefits is not as fair as when the user is empowered (p. 397).”

To be sure, there are many structural barriers to achieving full user representation in planning processes. Users are typically numerous and poorly organized, making it difficult for them to demand inclusion in the process or even for reformers who wish to include them to know with whom they should talk (Ardila-Gómez 2004). However, existing tools such as surveys, focus groups, and charrettes can partially overcome these barriers, if used at the appropriate time. As Dotson (2011) notes, “It is increasingly being realized both in the developed and developing world that the greatest value of public consultation is derived when it is undertaken during the initial planning stages of a project—as an aid to problem identification and the formulation of solutions. (p. 292)”.

Put simply, *planners and policymakers cannot consider information that they do not have*. While conducting surveys does not fully give users a voice in the planning process, it gives planners the ability to consider the users’ self-identified needs and priorities. It is therefore vital to solicit users’ perspectives early in the planning process, before goals and policy have been irrevocably set and certainly before contracts are signed. The type of surveys for the qualitative analysis piloted in this study does not require extensive staff time; they can be completed at a relatively low cost.

The contractual linkage between compensation and user satisfaction rates and the establishment of an ombudsman, described in the previous section, may prove useful corrective measures in Bogotá. User input should not be a one-time occurrence; it is important for users to have an ongoing advocate in the process once the system is operational. If these measures function effectively, they will be useful examples of good practice for maintaining accountability to system users in other locations.

However, just as SITP’s designers have endeavored to avoid the missteps of the projects that preceded theirs, future reformers would be well served by being mindful of the difficulties encountered in Bogotá. An incompatibility between program goals and user needs is much easier to prevent than to correct. Creating avenues for public input can serve as a useful source of information in this regard (Corburn 2005; Fainstein 2010).

Collecting information does not guarantee it will be used. It is important to create mechanisms to incorporate user preferences into the design process in a meaningful way. For example, incorporating a user ombudsman in the planning team during the



design process could potentially increase the extent to which this information is incorporated into the project goals and result in a more equitable outcome. Citizen preferences could also be used to generate parameters and measures of success for evaluation of potential projects. For instance, the system should be designed in a way that it does not increase the average generalized cost (expenditure and travel time), using actual data from field studies, not just the authorized fares.

A commonly cited reason for excluding community voices from the design process is that a reform such as SITP is enormously technically complicated. This need not prevent effective incorporation of user preferences. Good public policy doesn't come solely from finding the right solutions, but from working on the right problems. City residents do not need to be involved in every aspect of technical design, but it is important to incorporate their self-identified needs in the definition of project goals.

We understand that these suggestions make the design and implementation process more cumbersome, but it may ensure quality and public acceptance in the final service delivery, and very likely, reduction of overall costs. The solution of the initial undersupply problems in Transantiago, solved through improvised fleet increases, resulted in a non-planned subsidy in excess of USD 400 million per year (La Tercera 2009) as the user fare was not increased accordingly. In Bogotá, the implementation of SITP has been supported by an implementation subsidy (Redacción Bogotá 2013a), which has been higher than initially planned due to the very slow implementation, lack of user information and the co-existence of CPT routes. A permanent subsidy has been announced (Tellez-Oliveros 2013), but it is likely to be higher than currently expected, as occupancy standards would need to be lower to match user expectations about service quality. Ensuring that users' needs are well served by transit reforms is also important for achieving an equitable distribution of costs and benefits.

## 6.7 Suggestions for future research

As more cities across the developing world consider implementing integrated transport systems, it will be increasingly vital to understand the needs of users in the transition to a formalized network of public transportation. Resident needs vary considerably within and between cities (Ardila-Gómez 2004; de Vasconcellos 2001). This heterogeneity is one of the principal reasons consulting users is important (Corburn 2005). We hope that our methodology and findings serve as a starting point for how to do so effectively.

While this survey allowed for a measurement of the wide variety of user concerns, it is less able to aid our understanding of how users prioritize these concerns relative to each other. One method to compensate for this limitation of open questions while still capitalizing on the format's strength is to follow up with one or more closed-ended questions (Small 2011; Axinn and Pearce 2006; Kash 2013). Note that the open question, if it is to examine uninfluenced attitudes as described, must *precede* the closed question, as distinct from the more common open follow-up question (Schuman and Presser 1979; Tourangeau et al. 2000; Kash 2013).



An additional methodological question concerns the extent to which survey respondents' stated preferences correspond to their revealed preferences. In cases where a reform will dramatically transform available transit options for users by adding "attribute ranges not presently available, stated preference is preferred" (Adamowicz et al. 1994). This statement applies to Bogotá before the implementation of SITP, and will apply again after CPT has been phased out. However, if more cities emulate Bogotá's gradual implementation process, it could be instructive to measure revealed preferences during the transitional period when both types of public transport are available.

The documented prevalence of informal discounts, which were not considered in the design of SITP, suggests an urgent need to assess actual user behavior in current transportation systems *before* designing reforms. It is important to understand the written and unwritten rules of the system, and also how flexible those rules are. Otherwise, transport reform runs the risk of causing unforeseen and unwanted harm to the very people it is trying to help. This research will be most useful if it is conducted early in a reform process.

Finally, the vision dissonance between public and professionals we have identified in the case of Bogotá is likely present to some extent in many, if not most, large-scale reform processes. More research is needed to understand the extent and form of the differences between how lay-people and professionals form their views on transportation issues. Understanding potential problems in advance has the potential to reduce friction between experts and laypeople, smooth implementation processes, and improve the fit between community needs and policy initiatives.

## 7 Conclusion

This paper has compared the self-identified needs of transit users in Bogotá with the judgments of professionals working to implement SITP, an Integrated Public Transport System. This project was mixed-methods in terms of both data collection and analysis (Axinn and Pearce 2006; Small 2011). It incorporated a survey of users of informal transit (known locally as Collective Public Transit) and extended interviews with local transport professionals. Both data sources were analyzed qualitatively and quantitatively, using statistics for the survey and quasi-statistics as appropriate for the smaller sample of transport professionals. This allowed measurement of the magnitude of observed differences as well as more subtle distinctions such as the divergent frames through which transport users and professionals understood and discussed their shared concern with road safety.

The open format of questions used for the community survey enabled this mixed-methods analysis, revealing a wide breadth of user-identified needs regarding public transportation. It also captured the reasoning behind participant's opinions and allows for some analysis of the latent concerns underlying concrete responses (Tourangeau et al. 2000; Kash 2013). The combination of detailed qualitative findings and statistical generalizability makes a survey with open-ended questions a particularly powerful instrument for achieving a nuanced understanding of users' views.

Using open questions also provided the opportunity to examine issues that were not identified in advance in order to form a more complete picture of community concerns (Marshall 2011). This methodology can aid in understanding the broad landscape of user concerns and subsequently to design transit reform programs that maximize benefits for individual users and the city as a whole.

The SITP bus reform in Bogotá has the potential to bring large positive environmental and road safety impacts and had a careful technical planning and overall risk management. Several challenges remain, including filling in gaps in user information and ensuring that the system adequately meets users' needs. We contend inadequate user consultation contributed to the incompatibility or "gap" between user and city goals, particularly regarding crowding and the discontinuation of the informal fare discount. We proposed specific measures to help address the risks these gaps pose for implementation in Bogotá and consider how planners of future reforms can reduce the formation of incompatibilities between users' self-identified needs and project objectives.

Since the preliminary results of this study were presented to TRANSMILENIO S. A. officials in 2011, several issues mentioned here have become important to the implementation of SITP. One example is the realization by the city administration that the fares in the integrated system are too high for certain populations. This study provided evidence for this point by documenting the importance users place on affordability and the prevalence of informally discounted fares. As a result of realizing the importance of the affordability gap, the city administration has introduced subsidies to reduce user fares and is planning the implementation of targeted subsidies for the low-income population. How the city will fund these subsidies over time remains an open question.

The methods developed for this research and an understanding of Bogotá's lessons are also useful for improving planning and implementation of large-scale transit integration processes in other cities. Perhaps the most important lesson is that timing is important. It is important to incorporate user preferences into the design of the *system itself* at an early stage. Therefore, whether planners solicit user feedback through surveys, focus groups, public meetings, or some other method, this consultation must begin *before* the project's goals and major strategies have been settled. As shown in this study, such consultation need not be very expensive or difficult; the fact that it is not yet common practice has led to preventable implementation difficulties.

The inclusion of effective user consultation mechanisms such as this in the design and implementation process of this type of reforms admittedly increases the difficulty of an already complex process. However, reducing the potential for vision dissonance also reduces the risk of conflict between user and city goals and the negative social and fiscal impacts that would follow improvised solutions to these problems. For this reason, the long-term benefits could easily outweigh the initial modest investment required to collect information about transit users' preferences.

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