

# Behavioral changes due project implementation: Tramway in pedestrianized street in Medellin city

Juan Camilo RESTREPO VASQUEZ<sup>1</sup>, Fumihiko NAKAMURA<sup>2</sup>, Shinji TANAKA<sup>3</sup>  
Shino MIURA<sup>4</sup> and Ryo ARIYOSHI<sup>5</sup>

<sup>1</sup> Master student, Graduate School of Urban Innovation, Yokohama National University, Japan  
(79-5 Tokiwadai, Hodogaya-ku, Yokohama 240-8501, Japan)

E-mail: juan-vasquez-wb@ynu.jp

<sup>2</sup>Member of JSCE, Executive Director, Vice President, Graduate School of Urban Innovation, Yokohama National University, Japan

(79-1 Tokiwadai, Hodogaya-ku, Yokohama 240-8501, Japan)

E-mail: f-naka@ynu.ac.jp

<sup>3</sup>Member of JSCE, Associate Professor, Graduate School of Urban Innovation, Yokohama National University, Japan  
(79-5 Tokiwadai, Hodogaya-ku, Yokohama 240-8501, Japan)

E-mail: stanaka@ynu.ac.jp

<sup>4</sup>Member of JSCE, Assistant Professor, Graduate School of Urban Innovation, Yokohama National University, Japan  
(79-5 Tokiwadai, Hodogaya-ku, Yokohama 240-8501, Japan)

E-mail: miurashino@ynu.ac.jp

<sup>5</sup>Member of JSCE, Researcher, Graduate School of Urban Innovation, Yokohama National University, Japan  
(79-5 Tokiwadai, Hodogaya-ku, Yokohama 240-8501, Japan)

E-mail: ariyoshi-ryo-np@ynu.jp

In Medellin, Colombia; a tramway solution has been implemented early this year. It has been accompanied with an implementation process where the community has been the protagonist. This project carries a distinction over the others; the route where the Tramway runs was made exclusive for it and pedestrians, in spite of crossing the city's business district and reaching residential zones.

This decision carries important changes on resident's lives, business and drivers as well, and if it is not well managed and negotiated, it will perform under the designed expectations.

This research focuses on tracking the first operational year on 4 stages; through it defining key behavioral indicators to check its changes and establishing possible relations that can explain them. Pilot study was executed, finding drawbacks on implementation process but despite of it, very positive perception by respondents, situating it as the third most used transportation mean in the zone, and positive appreciation due creation of new urban spaces accompanied with safety feeling increase. However, comfort and speed are users' main concerns and should be traced.

With this paper, it's expected to generate early alerts on aspects that need attention or adjustment, also producing an experience documentation will allow a basis for similar developments so the city keeps its innovation and sustainable path through the improvement of its citizens' quality of life.

**Key Words:** *Medellin, Ayacucho Tramway, Tramway, pedestrianized street, behavior changes, post evaluation, implementation process*

## 1. INTRODUCTION

When Medellin's Metropolitan Mass Transportation System, referred here on as Metro, put under operation it's first elevated train line; it did not come only with an improvement of its citizens' mobility options but also, with a change on users' culture when they start riding it, creating what has been called as 'Cultura Metro' (Metro Culture).

Defined as the result of the application of a social, educational and cultural model, which purpose is the construction of a new citizen culture where harmonious coexistence, solidarity, polite behavior, respect, following basic rules while when public infrastructure, among others.

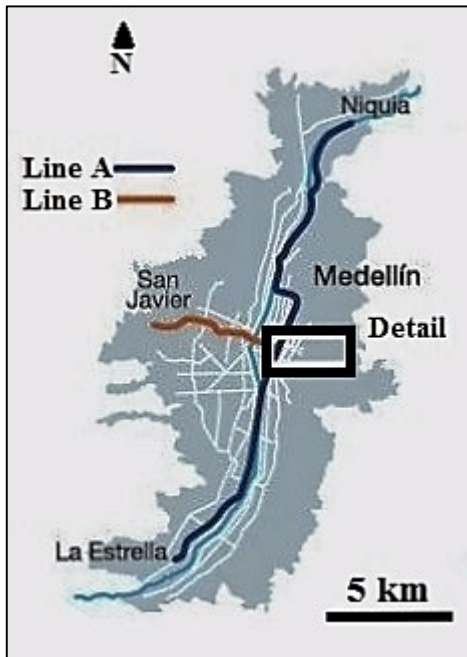


Fig.1 Medellín City

Also it consolidated trustful relationships between the System and its neighbors, inviting them to protect and take care of it because they have a feeling that they belong. All of this created a milestone by establishing that by proper investment accompanied by a careful implementation process, it is possible to modify transportation and daily life behavior of a city for good.

In a characteristic Latin American city like this, where complex social process and marked differences are easy to find, the creation of such atmosphere, became a great asset for the Metro Company, something desirable to be replicated outside the System too.

Later on, at each System network's expansion, the Company has carried out a similar implementation with the community in order to maintain the culture that has been attached to it.

The latest infrastructure developed for the city, is a tramway system which started commercial operation on this year's April. It links the east zone of the city to the Metro central station, San Antonio.

Although streets at city center are not especially wide, and car congestion is an issue with an average speed around 20 km/h, by choosing Ayacucho street as the tram's route and as a walking-only path, indisputably it creates new dynamics to drivers in the zone.

Moreover, crossing one of the city's CBD, interacts with many shops and business along the street for at least half of the route forbidding its', common until then, door-to-door supply system. Also, new strategies should be undertaken by them to catch new customers attracted by the zone renovation as a pedestrianized street.

Furthermore, affectation by the targeted residents does not only compromise the providing of the new transportation system, but also withdrawal of several bus routes, creation of new urban spaces to be shared, reaffirmation of their neighborhood identity and challenges for the zone new vocation.

This new infrastructure exists at floor level and is not located in segregated ways or in the heaviest traffic zones; on the contrary, now it runs at the local shops and residents' front door. Would be possible to generate positives changes on peoples' daily life as well?



Fig.2 Detail: Study Area, Ayacucho Tramway Zone

This paper begins by providing the background,

followed by the research methodology and the data collection. Finally, the paper concludes with the research findings.

## 2. BACKGROUND

The built tramway system runs for 4.3 km, its road width includes 3m sidewalks approximately and in some of point the way reaches a 12% slope. In order to overcome it, it uses Translohr vehicles. The system has 3 transfer stations and 6 stops. At 2 of these 3 transfer stations, two new cable car lines are being constructed to reach the limits of the city and provide access to areas where transportation access is not easy. When finished, both will feed the tramway as well.

Some of its characteristics are listed as follows: the system will keep using its one-fare policy, allowing a person with one ticket reach any point of the whole Metro structure. The vehicles circulation is synchronized with the City's traffic signal control system to prioritize tram when crossing intersections; also as mentioned before, the floor level is the same for pedestrians and the tramway and no physical barrier come between them.

From San Antonio Station to Pabellon del Agua EPM Stop, comprehends the City Center with high business concentration and vibrancy; from the last one to Buenos Aires Stop, comprehends a transition zone where education centers, business and various facilities are mixed with housing. Starting from this point, gradually transforms into residential zone with some local business, most of them providing groceries and similar services.

**Table 1** Ayacucho Tramway basic information.

Elements	Description
Length	4.3 km
Max. slope	12%
Technology	Translohr
Frequency during peak time	4 min
Number of tracks	2
Stops (excluding transfer stations)	6
Transfer stations	3
Average speed	25 km/h

It started construction on August 2013, and in October 15<sup>th</sup>/15, began an educational operation period, it was first announced it will last until November 30<sup>th</sup>, though finally went until April 4<sup>th</sup>/16. However, relationship through a socialization process dates back from the 2010 when the Municipality started to look for resources for its construction.

**Table 2** Pilot study general information.

Elements	Description
Target	Men and woman along the tramway
Date Method	Saturday, April 9th 2016 Open questionnaire with answers recorded by interviewer
Number of respondents	70

The educational operation period was defined as the space of time where users can get to know the system: learn how to interact with the new structure and other users while riding it, notice which are the differences with the train, BRT, bus or cable car operating in the city. All of this in reduced stations and working hours a day during the week, with the support of the 2 organizations coordinating the socialization and more than 30 traffic policeman along the way. At the beginning, the process accepted only people living in the area, and then opened for the rest of the city

As explained, the Ayacucho Project interacts and will have a direct influence in several groups in the society. Therefore, the main goal of this paper is to investigate the changes on three targets: drivers, business and residents. It will collect information around the implementation process including the 'Metro Culture' program and the interaction with the new transportation system and facilities. Through such information, it will be possible to establish key points and indicators to pursue a further study on people behavioral changes due this.

## 3. RESEARCH METHODS

Since the process is happening alongside with the development of the investigation, it is possible to get data directly from the field to test.

Therefore, the investigation was divided in 4 stages. The first one was a field recognition of the education process, carrying out non conducted interviews to get a general perception of it at the beginning of the educational phase. The second one, a pilot study, carried out at the beginning of the commercial operation. The third one, based on the previous results, defines different key indicators for each target group to be measured. And the final one, carrying out a similar from last stage, will allow last comparison.

Descriptive statistics and behavior analysis will be applied to examine its changes and its relationship with social phenomena.

## 5. DATA COLLECTION

For stage 1, the field trip; 3 respondents were selected: a resident, a community user who was participating in the educational process, and a new housing project in the area.

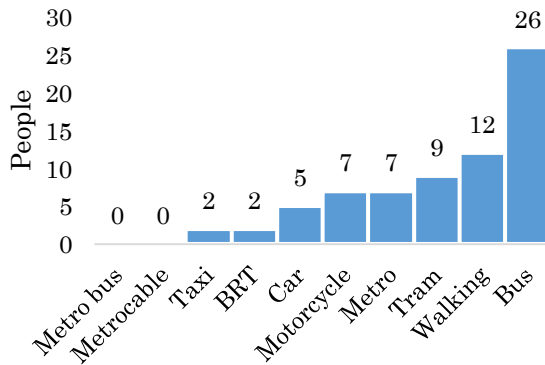


Fig.3 Sample Main transportation mean

As an open interview, focus theme was around the construction of the tram so far, how it affected their lives during the past 2 years, changes perceived during it and their expectations in the future. They lasted for around 30 minutes each and their perception from their role was recorded.

For the second stage, the pilot study; a survey was carried out on April 9<sup>th</sup>/2016 and respondents were selected randomly around the tram. It was a printed questionnaire and answers were recorded by the interviewer. Most of the questions were open answered, in effort to get as many circumstances and perceptions, since the process is happening along with the investigation and is an opportunity to get raw data.

Its structure was divided on 3 topics. The first one, respondent information: age, gender, academic level, main transportation mean, occupation, address and private vehicle ownership.

The second one inquiries about the implementation process: participation on it and method, also what kind of short comings found during it. If the person didn't participate, the reason why could not join and how wished it to be. Finally, perception on Municipal Transportation performance during the process was asked too.

The third one, asked for infrastructure perception: mention problems expected to be solved, the biggest change in the area, the tramway biggest drawback and finally their travel experience since the project started education phase, rating as better, same or worse travel time, comfort, fare, reliability and safety.

The definition of the indicators for the following 2 stages will establish the surveys for each one of the target groups.

## 6. RESULTS

Based on the interviews, it was common to all of them worries related to the tramway construction especially on business, since some of them were heavily reliant on parking services to work correctly or those local business facing directly to the tramway street with the pedestrian loss, had to close or shift the location of their business to a perpendicular street.

During the pilot study, as shown in figure 3, the sample (n=70) shows how bus service is the main transportation mean in accordance with the last O-D survey carried by the Municipality on 2012.

As for the implementation process, lows were spotted, like the coverage and information distribution, especially perceived by residents, who are supposed to be one of the main focus; reaching around half of the opinions. Perception on the Transportation Office role also had an ambiguous response, particularly regarding field presence of Transit Officers.

For the Tramway perception, high hopes around environment betterment on noise and air pollution were expressed. As a highlight business was the group who expressed the more positive changes in contrast to residents, who had a tendency to answer as no changes or bad changes for community. Comfort, slow system and lacking of signage are the main concerns expressed as a flaws,

During pilot study time, the results of travel experience perception since the implementation of the tramway show a "better" perception, as shown in fig. 4. However, for Comfort and Travel Cost, only around 50% of the respondents, express an improvement on their trips quality.

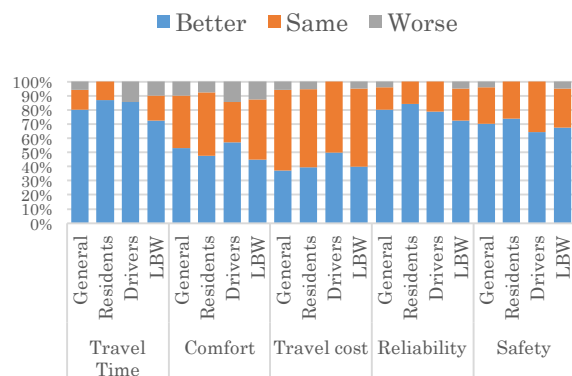


Fig.4 Travel experience rating since tram started operation by target groups

## 7. CONCLUSIONS

Although the tramway only had 3 months of educational operation, it already counts for the third most used transportation method, indicating a good adoption by the community, corroborated by the other results as well.

A slow system, especially at transfers and frequency, is something to be taken into special account since this leads to adoption under the desired levels (Meyer and Miller, 2001).

Comfort and Travel Cost's not so positive opinion, when comparing to the other indicators; could be explained with the flaws spotted on previous questions, where lack of comfort including, lack of seats, sudden stops, among others were expressed. It must be observed that people is used to ride bus, and city buses at Medellin usually have plenty of seats rather than space for stand up people.

Regarding the travel cost, is something likely due bus fare and feeder combined with tramway fare, are around COP\$1900, resulting on a larger proportion on people answering as "same".

For further work, it will be discussed the relations of the flaws and key factors in the implementation process detected, with the behavioral indicators established to keep carrying out the research. This will allow to perceive impact on the zone from an early stage to generate early alert on issues and keep

improving the transportation and implementation system of projects in the city.

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