

## Research on Extent of the Effect on Poverty Reduction by Improvement of Mobility —Case Study of Metrocable in Medellin, Colombia

Sarika Okami\*, Mihoko Matsuyuki\*\* and Fumihiko Nakamura\*\*\*

### 1. Research backgrounds and objectives

Poverty has been an issue that the international society has continuously been tackling for many years. In recent years, improvement of mobility such as introducing public transportation, constructing and improving infrastructure, has been assumed as important to reduce poverty and the number of this kind of projects has been increasing. Therefore, it is obvious that to clarify the extent of the effect of the mobility improvement project should be useful henceforward.

Medellin, the second largest city in Colombia, introduced a ropeway which is called “Metrocable” in 2004. This mobility improvement project is highly appreciated worldwide. However, as in the some of the similar projects, it is assumed that not all the people in the area are benefited equally by Metrocable. Instead, only people who live close to Metrocable, or who can afford to pay the fare of Metrocable might be able to use it. Based on this assumption, this study has a purpose of identifying the extent of the effects of Metrocable from two points of view, that is, spatial and socio-economic perspectives. This research reveals who are benefited by the introduction of Metrocable, by comparing groups that have different accessibility to Metrocable, income level, and personal behavior.

### 2. Characteristics of research area and project

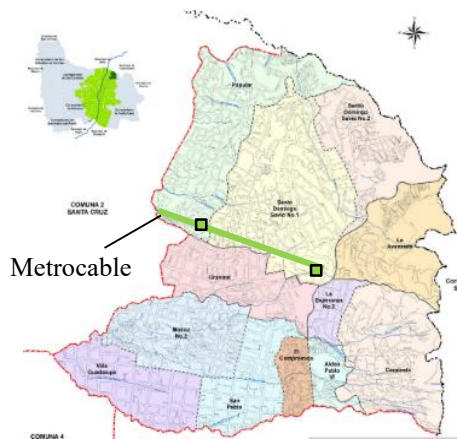


Figure-1 Comunal1 and Metrocable  
(Source of map: Alcaldia de Medellin, *Plan de Desarrollo Local*, Medellin, 2014, p.36)

Medellin developed along the river that runs at the center of the city, and it has a vast area of slums spreading across the hillsides. The inconvenience of going to the central city area caused an economic disparity between slum areas and other districts. The city introduced Metrocable as public transportation to solve this problem aiming at the improvement of mobility of slum dwellers. It connects with a line of a train which runs along the river.

This study aimed at analyzing the extent of the impact of Metrocable focusing on one district called Comunal1 (Figure-1). It includes two stations of Metrocable and the area is assumed as the poorest one in the city. The area of Comunal1 is about 3.1 km<sup>2</sup> and the population is about 150,000.

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\* Student member, Institute of Urban Innovation, Yokohama National University,  
 \*\* Regular member, Institute of Urban Innovation, Yokohama National University  
 \*\*\* Regular member, Yokohama National University  
 E-Mail: okami-sarika-ht@ynu.jp

### 3. Outline of research

#### 3.1 Outline of survey

This research is based on the data of questionnaire survey done from October 2016 to May 2017. The survey to the residents targeted the heads of households in Comuna1, who continuously work and live there before and after Metrocable has been introduced. The questionnaire contains questions about personal behavior, structure of the family, income of each member of the household, commuting place, and mode of transport to commute. The total sample size is 372 individuals. Among them, 36% are men and 63% are women. The average of age is 45 years old.

#### 3.2 Methodology

To identify the extent of the effect of Metrocable, this research reveals the relationship between their uses of Metrocable and their behaviors from spatial and socio-economic aspects. The authors also analyze the relationship between their utilization status of Metrocable and their poverty reduction based on the increase in income.

### 4. Characteristics of Metrocable users

#### 4.1 Spatial aspect

The authors classified the sample into four groups of different accessibility to Metrocable by calculating the linear distance between their houses and the closest station of Metrocable. According to the Figure-2, it is clear that the closer they live, the more they use it for commuting. In case of other trips (Figure-3), many people use it indifferent from where they live. Most of the people in Comuna1 use Metrocable, but low proportion of them use it as a commuting mode.

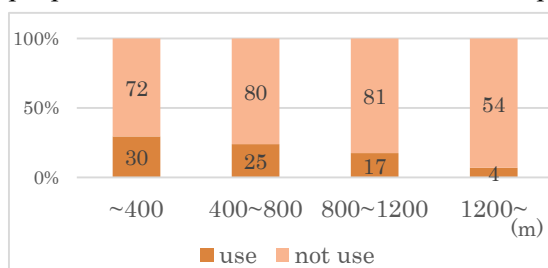


Figure-2 Linear distance and commuting trip by Metrocable

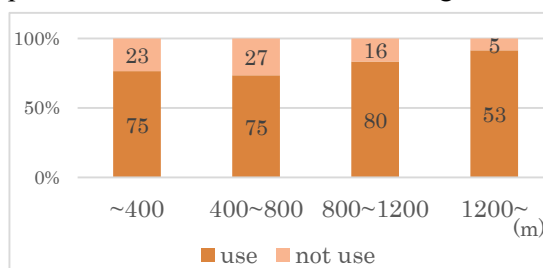


Figure-3 Linear distance and other trips by Metrocable

#### 4.2 Socio-economic aspect

To analyze the use of Metrocable from the socio-economical point of view, we classified samples by their gender, academic background, and economic condition, type of occupation, commuting district, and transportation to the workplace.

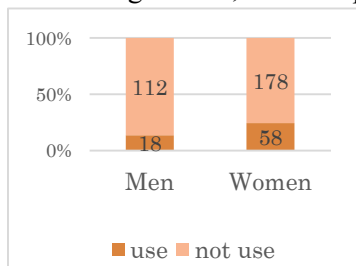


Figure-4 Gender and use of Metrocable

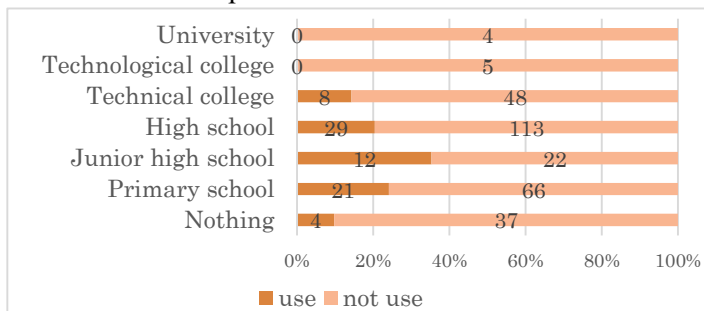


Figure-5 Academic background and use of Metrocable

Figure-4 shows that women are likely to use Metrocable for commuting more than men. Figure-5 shows the classification by the academic background, which reveals that the percentage of Metrocable users is the highest in the group whose final academic histories are junior high school. So it can be said that people whose the level of the academic background is relatively low but not the lowest tend to use Metrocable as a commuting mode. In addition to their direct influences to the use of Metrocable, these characteristics must be related to their job and workplace.

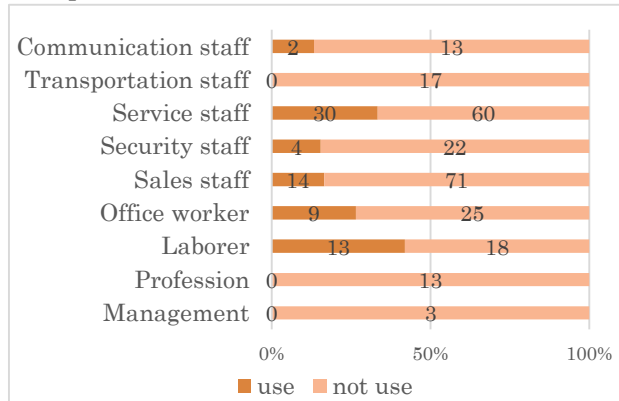


Figure-6 Type of occupation and use of Metrocable

In case of a comparison the type of occupation (Figure-6), remarkable tendency is that Laborers and service staffs are more likely to use Metrocable than other jobs. It is assumed that people who do management or professional work such as teacher never use Metrocable to go to work in spite of their high income. This result is somehow related to the work place, car ownership, and willingness to use other transportations.

Many residents of Comuna1 work in Comuna1, 10, and 14. The authors classified the people who work in Comuna1 into two groups: one is self-employed workers, and the other is workers who pick up garbage or run stalls. Namely, the former group who work there and do not need to use Metrocable contains a disparity of income level. Comuna10 is a downtown area that has many industries there. Comuna14 is a luxury residential area that contains district of high-end shopping

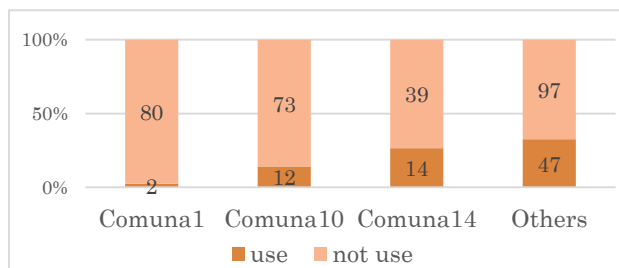


Figure-7 Workplace and use of Metrocable

centers. There are a lot of transportation modes for going to Comuna 10, but the most popular one is microbus, followed by private cars. Therefore, only a few people use Metrocable (Figure-7). On the other hand, they can easily access to Comuna14 and other areas by train, and they use Metrocable as a feeder mode to the train.

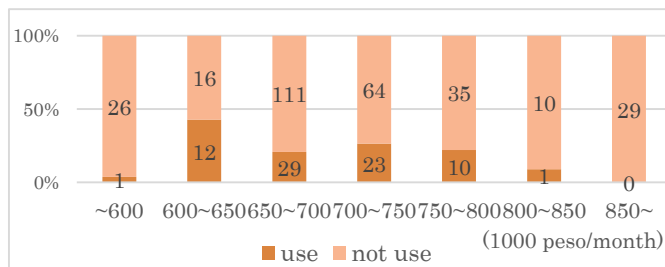


Figure-8 Income level and use of Metrocable

According to the classification of monthly income of the head of household (Figure-8), the group which highly use Metrocable is 600,000 – 650,000 pesos per month. It looks that the lowest and highest group do not tend to use it.

### 4.3 Key findings

In summary, these results show that there is a spatial limit of using Metrocable as a commuting mode, while in case of other trips there is not strong limit of using it. Actually, people

who live far from the stations use it for other trips more than those who live close to the stations.

It is also clear from socio-economic aspect that particular groups such as woman, low level of academic background, and laborer or service staff tend to use Metrocable for commuting more than other groups. The comparison of the different income groups shows that the lowest and highest group do not tend to use it. Therefore it is assumed that people whose economic condition is on the border line which they can afford to buy and manage their vehicles tend to stick to use them.

## 5. Relationship between use of Metrocable and income increase

In 2016, the minimum wage of Colombia increased by 2.08 times compared with that of 2003 <sup>1)</sup>. Especially in Medellin, the average income of the head of household in 2015 increased by 2.20 times compared with that of 2003 <sup>1)</sup>. In case of Comunal, the sampled heads of the households earn 739,697 pesos in average. That increased by 2.49 times more than that of 2003 (296,759 pesos). It means that after Metrocable launched, the economic condition of Comunal has improved much more than the domestic or city economic growth.

Table-1 Average income of head of household and the rate of increase

		(pesos/month)		rate of increase
		2003	2016	
Commuting	use	267	714	2.67
	not use	303	746	2.46
Other trips	use	277	735	2.65
	not use	366	744	2.03

The authors divided samples by the utilization of Metrocable and compared the average income of each group. Table-1 reveals that people who use Metrocable relatively earn less both in 2003 and 2016 than those who do not use it, but the rate of increase is much higher. Moreover, that difference of the rate in other trips is more than that in commuting.

## 6. Conclusion

To sum up, this research identified that there is a spatial and socio-economic tendency to use Metrocable. The extent of the use of Metrocable as a commuting mode is limited. However, people use it as a mode of other trip purposes even if they live far from the stations. It turned out that woman, low level of academic background, and laborer or service staff tend to use Metrocable for commuting more. This result is related to the workplace, and also to the socio-economic environment like car ownership, and willingness to use other transportation modes. Moreover, it became clear that the lowest and highest income group do not tend to use it. It means that Metrocable does not benefit the poorest people directly whom it targeted at initially. Additionally, the increasing rate in income of the group which uses Metrocable is higher than that of the other group.

Keywords: mobility improvement, public transportation, poverty reduction, extent of effect, developing country

This research is founded by the Kajima Foundation's Research Grant.

Reference:

1. Julio D. Davila, *Urban mobility & poverty: Lessons from Medellin and Soacha, Colombia*, Development Planning Unit, 2013, p.46-104