



Analysis of citizens' behavior with respect to formal and informal waste selective collection

Navarro Ferronato^{1,*}, Marcelo Antonio Gorritty Portillo², Edith
Gabriela Guisbert Lizarazu³, Vincenzo Torretta¹
in Bolivia

¹ University of Insubria, Department of Theoretical and Applied Sciences, Via G.B. Vico 46, I-21100, Varese Italy

^{2,3} Universidad Mayor de San Andrés (UMSA), IIDEPROQ, Calle 30, Cota Cota, La Paz, Bolivia

³ Universidad Mayor de San Andrés (UMSA), Department of Environmental Engineering, Av. Mariscal Santa Cruz 1175, La Paz, Bolivia

*Presenting author email: nferronato@uninsubria.it (N. Ferronato)

OUTLINE

1. Introduction: Study area and objectives of the research
2. Methods
3. Results
4. Discussion
5. Conclusions



1. Study area

Bolivia

Low-middle income country
GNI: about 3 000 USD
About 10 800 000 inhabitants
9 inhabitants per km²

La Paz

About 900 000 inhabitants
420 inhabitants per km²



(about 600 t of MSW per

1. Introduction

Green points and SC



Started
in 2014

Formal MSW collection

- About 1 t per day of MSW selected at the GP, of which 80% is recycled
- About 90% of MSW sent to sanitary landfill



2017/20
18

Informal MSW collection

- About 40 t of MSW selected per day
- About 1000 people work in the city as waste pickers or in “waste shops”
(Swisscontact, 2008)



1. Objective of the research

The research would:

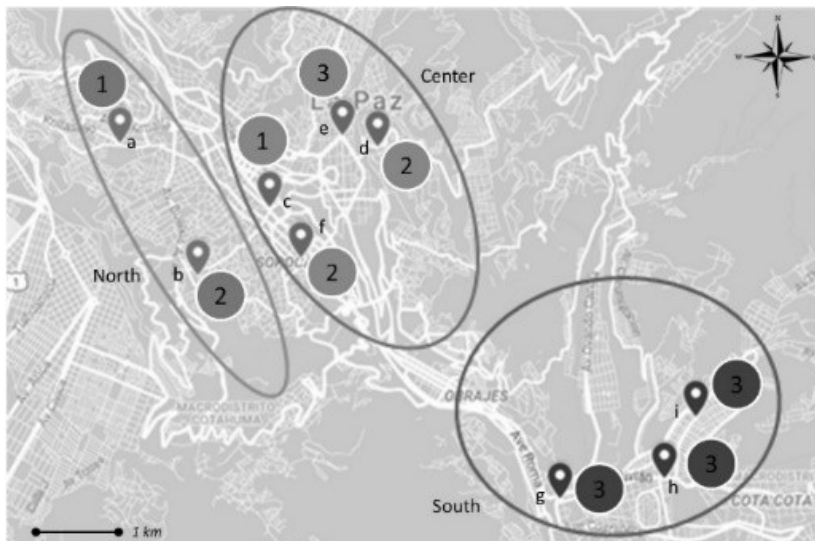
- Assess when the **users of the GP started to implement the formal SC system**
- Assess **how many citizens implement the SC** at home
- What are the main **waste fractions separated** at municipal level
- **Social level of the users** of the GP and of the people that implement the SC system



2. METHOD: Face to face interviews

Interviews to the users of the GP and to the citizens:

- ✓ 354 citizens interviewed at the GP
- ✓ 364 citizens interviewed at the neighbourhoods
(Confidence interval < 5%)
- 774 citizens were finally interviewed (3 months, during the weekend)



Green points



Neighbourhood

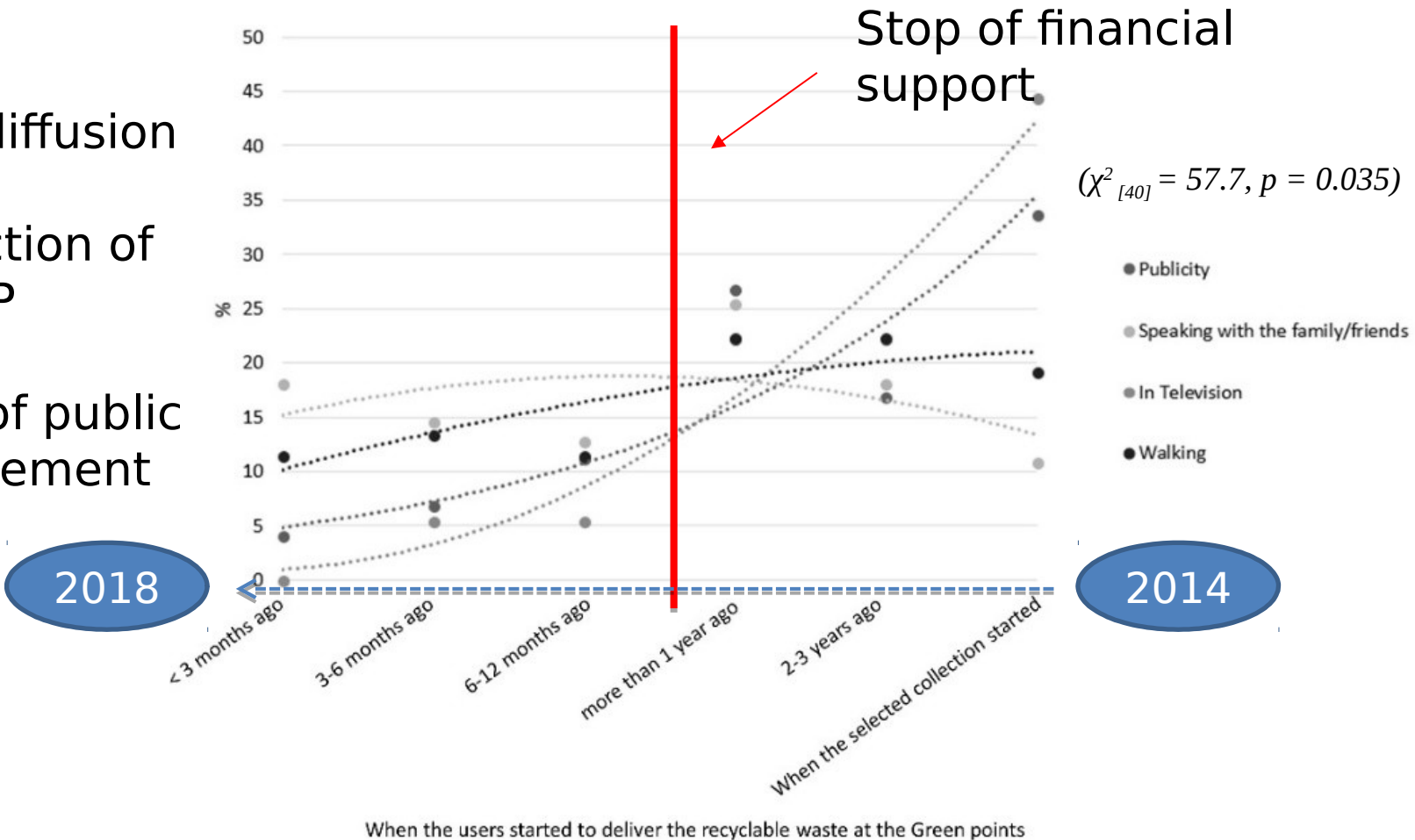
2. METHOD: Cooperation with local stakeholders

- Municipal Government of La Paz
- Universities (Insubria and UMSA)
- Volunteers (mainly university students)



3. RESULTS at the Green Points

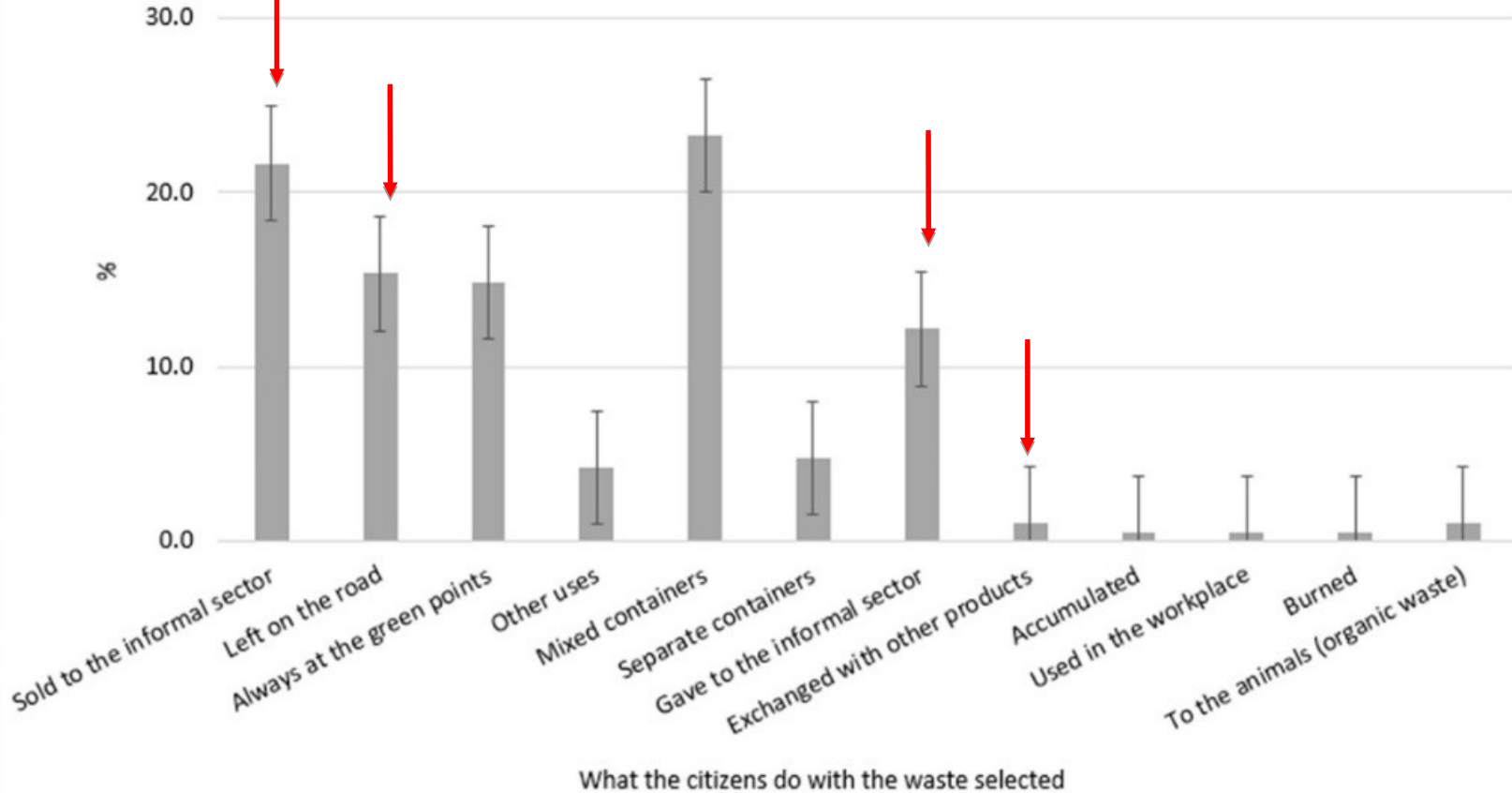
- Less diffusion
- Reduction of the GP
- Lack of public involvement



!!! Reduction in citizens' participation during the years



3. RESULTS at the Neighbourhoods

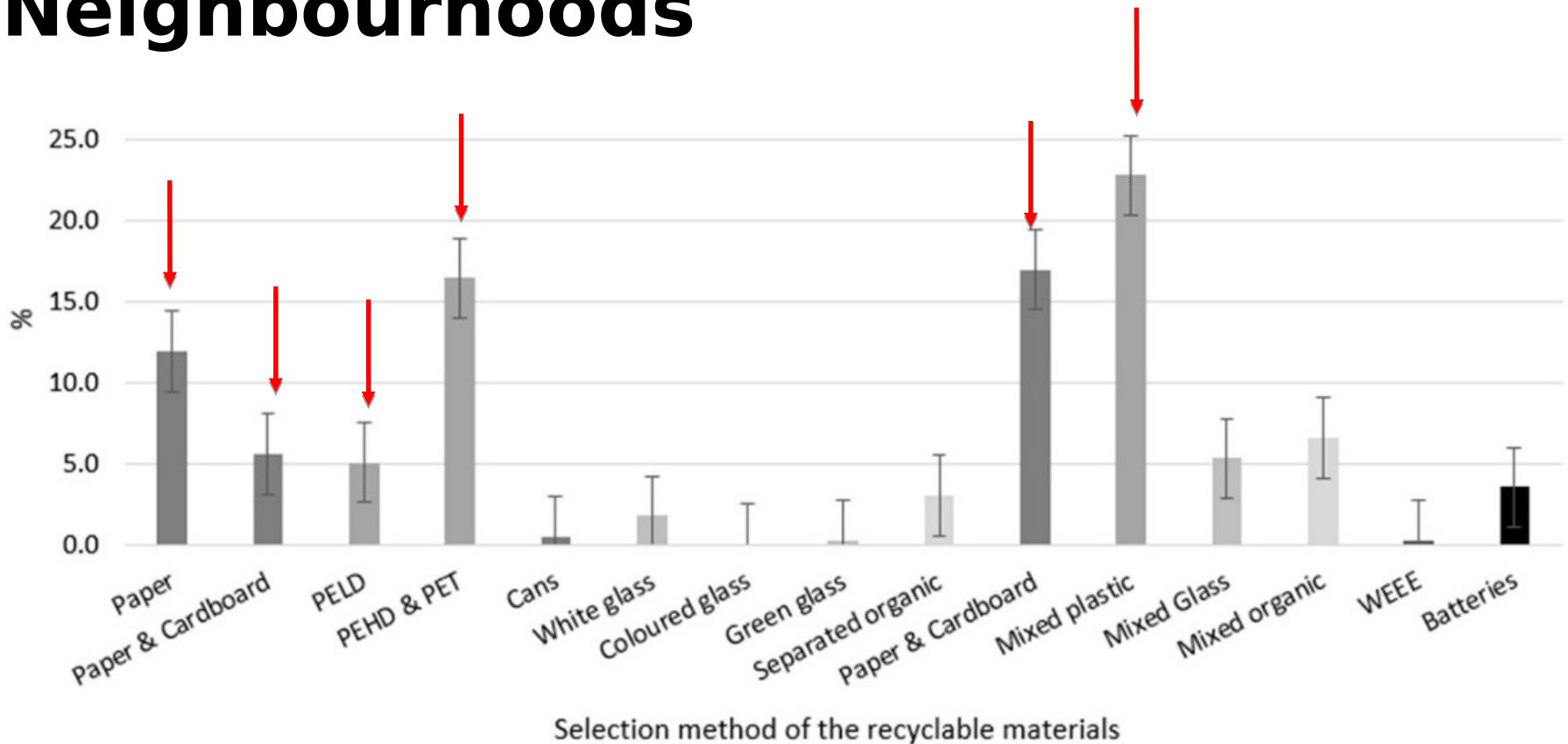


!!! 49% of the citizens implement the SC at home.

!!! 73.5% deliver the SC to the informal sector



3. RESULTS at the Neighbourhoods

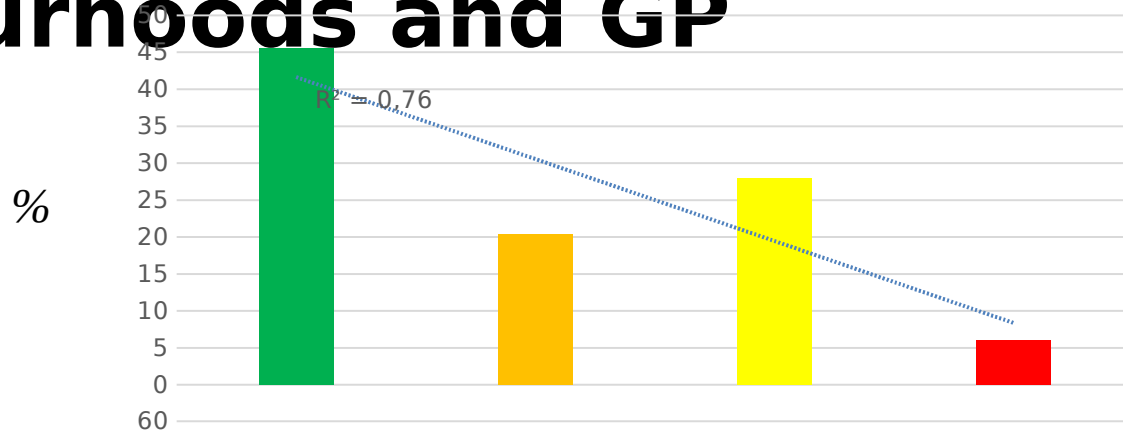


!!! 78.7% of the citizens who implement the SC at home separate plastic and paper (in different methods).

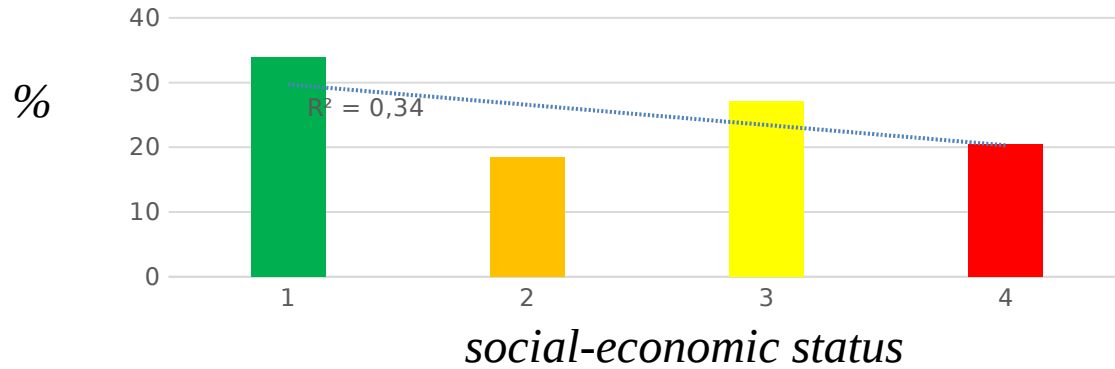


3. RESULTS at the Neighbourhoods and GP

At the GP
Descriptive statistics



At the Neighborhoods
ods.
05



!!! Social-economic status is not a predictor for the MSW SC behavior in La Paz



4. Discussion

- 50% of the population is **ready for implementing the SC**
- Data allowed confirming the **presence of the informal sector**
- There is a form of circular economy in place, although informal, **for recycling plastic, paper and cardboard**
- Information **campaigns and activities** are required for involving the citizens

Issue

How the informal sector can be included?



4. Discussion: Implementation of pilot systems of SC

- The **SC system** was **implemented** by SSC in 2 neighbourhoods of the city
- About **8%** of the MSW generated at the neighbourhoods were **selected**

!!! Issues

- **Involve the citizens** who are not used to implement the SC (about 50%)
- Improve the **quality of the SC**
- Introduce the **SC of other fractions** (i.e. organic)

2018/2019



5. Conclusions

- The study demonstrated how **the inclusion of the informal sector is just supported by the citizens** and **should be only reinforced** with municipal campaigns and specific regulations that should be discussed directly with the waste pickers.
- The analysis also reported how, also in low-middle income developing cities, **the implementation of SCS can be considered feasible (as social point of view)**. **But, what about the other waste fractions?**
- The inclusion of the population, data analysis and **implementation of pilot recycling systems** is required for **introducing a step by step and integrated SC**

Future

- **improvements** **should be replicated** for assessing the main impacts obtained **after the implementation of the SC system** in the city
- The SC system will be implemented at municipal level and the local government will be supported by an **international cooperation project**

Responsibility
of public
policies

!!! Issue:
Political and
economic
barriers.



ANY QUESTION?

For more information:

Presenting author:

Eng. Navarro Ferronato, Ph.D. Student

nferronato@uninsubria.it

Department of Theoretical and Applied Sciences, University of Insubria, Italy