

# **COSTS AND BENEFITS OF GENDER POLICIES IN TRANSPORTATION. STATE OF THE ART OF QUANTITATIVE APPROACHES**

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## **ABSTRACT**

The transport sector has been a pioneer in the quantification and even monetization of complex issues, such as the value of life or the value of time. Gender issues are more and more in the core of many policies, but its analysis is usually qualitative at most. The objective of this paper is to review current quantitative approaches, and highlight their advantages, their drawbacks and their gaps.

The transport sector can be analysed with a gender perspective, either considering its workers or its users. In both cases, men and women show different attitudes and behaviours. To begin with, workforce in transport is predominantly male, while public transportation is used mostly by women.

There are numerous studies with a gender perspective in the transport sector. Most are qualitative and simply describe the problem or the project in question. More and more are using quantitative approaches, but mostly for describing interventions, not for assessing impacts. In many respects, such as gender violence, there have been notable advances, despite methodological difficulties. In others, almost nothing can be found. In any case, evaluations are far from systematic and important gaps remain.

The large experience of the transport sector when dealing with intangible impacts should facilitate the development of quantitative assessments and evaluations, but the lack of quantitative ex-post analyses makes it difficult to assess gender-oriented projects.

## **1. GENERAL FRAMEWORK**

In the transport sector, impacts as diverse as the cost of accidents and life loss or the benefits due to time savings have been quantitatively evaluated for decades. However, the gender approach, which is currently the axis of many policies, is frequently assessed from a merely qualitative point of view.

This article provides a review of quantitative analyses related to the gender approach in the field of transport. Three large analysis groups have been identified, each of which subdivided as follows:

- Regarding women as employees of the transport sector, where two types of impacts arise:
  - Direct ones, either related to labour costs (which include salaries, absenteeism and productivity) or derived from accidents.
  - Indirect ones due to the female participation gap.
- Regarding women as transport users, two types of impacts can be considered:
  - Direct ones related to gender-related violence when using public transport.
  - Indirect ones linked to the mobility of the users.
- In addition, there are other highly important impacts, of indirect nature and delayed over time, derived from female empowerment.

Most these issues may be considered from the point of view of costs, whose reduction are benefits. In the following paragraphs, this distinction is not dealt with and must be taken for granted.

## **2. WOMEN AS EMPLOYEES**

### **2.1. Labour costs for companies**

From a managerial point of view, labour costs in general (men or women) are highly relevant in the transport sector. In Spain, in the freight transport by road, the cost of drivers (without subsistence allowances) ranges between 54.7% of total operating costs for a van and 16.7% for a refrigerated trailer in international transport (Ministerio de Transportes, Movilidad y Agenda Urbana, 2020a). In road passenger transport, the equivalent value varies between 55.8% for a minibus with 10 to 25 seats and 28.8% for a bus with more than 55 seats (Ministerio de Transportes, Movilidad y Agenda Urbana. 2020b).

The wage gap is the difference in salaries between men and women with the same position and performance. In Spain, the harmonized wage gap (isolating the effect of differences in age, seniority, educational level, working hours, etc.) in the transport and storage sector was 10.5%, as an average value for the 2002 - 2014 period. As a comparison, the value of this indicator in the education sector was 5.5%, in the Public Administration 6.7%, in commerce 11.8%, in construction 14.0% and in manufacturing 19.5% (PWC, 2019). Transport is, therefore, in an intermediate position.

A study of direct differential monetary costs for hiring a woman instead of a man in several Latin American countries showed that they are less than 1% of the total labour cost of female employees. The additional cost for companies in Argentina for hiring a woman was 0.39%, in Chile 0.92% and in Uruguay 0.50% (Abramo and Todaro, 2002).

In Spain, and particularly in Andalusia, before the increase in paternity leave, maternity leave represented an extra cost for women of between 0.24 and 0.36% of salary (Junta de Andalucía, 2010).

Productivity refers not to the input cost but to the cost of the input relative to the output. A study carried out with a wide series of data in industries in the United States (data from 1974-1978), Sweden (data from 1990) and Norway (data from 1990) found negative differences of 2%, 1% and 3%, respectively, in the productivity of women compared to men, although it was indicated that it could be due to factors that had not been considered (Trond and Vermond, 2006). In studies related to specific sectors, such as agriculture in various Central American countries and in Mexico, levels of female productivity are very similar to those of men (CEPAL, 2011).

Regarding absenteeism, no specific data has been found for the transport sector, but there are some results of interest for other sectors and certain geographical areas:

- Absenteeism due to family reasons is higher in women with small children, although if absenteeism due to illness or other reasons is taken into account, it may become higher in the case of men (Álvarez, 2000).
- In different Australian companies 84.2% of employees had taken at least one time off during the year for a reason not anticipated by their employer. The absence rate was slightly higher for women (2.7%) than for men (2.3%) (VandenHeuvel and Wooden, 1995).
- In the UK, the average absenteeism rate for the entire population was 3.7%. If only absenteeism due to illness and accidents was considered, this rate dropped to 2.4%. The difference between these two measures was much higher for women than for men. The average total absenteeism rate for women was 5.2% and 2.9% for illness and accidents, respectively. For men, these values were 2.4% and 2.0%, respectively (Bridges and Mumford, 2000).
- In a major metropolitan area in the United States, women were absent more frequently than men, but with a difference that was not very significant (2.88% of women versus 2.14% of men) (Scott and Mabes, 1984).
- In Andalusia (Spain), female absenteeism explains an extra cost of between 0.83% and 0.87% of the average salary with data from 2006 (Junta de Andalucía, 2010).

Regarding accidents, in the transport sector it is relevant to make a distinction between two types of accidents:

- Accident at work, common to any other sector, considering all kinds of accidents.
- Traffic accidents, due to vehicle handling, as a case of accidents in general.

In Spain, and referring to all types of accidents by gender, the “incidence index” is used. It is defined as the number of accidents that occur at work in a given period for every 100,000 people on the workforce. For 2015 the values were as follows (INSHT, 2016):

- For all sectors, the index value was 2,088.9 for women and 4,313.6 for men.
- For the transport and communications sector, the value was 3,331.2 for women and 5,561.2 for men.

About traffic accidents by gender, there is information from several countries, always very favourable for women:

- In Spain, an investigation carried out in Andalusia found that, taking into account the travel time as an indicator of the degree of exposure, the risk of injury in a traffic accident was lower for women: in serious injuries 23.6% less than men and in deaths 35.1% (González, 2019).
- In the United States, an analysis carried out in the road freight sector showed that, compared to a female participation rate of 5.0% of total drivers, women were 2.0% of drivers involved in accidents without injuries and 2.7% of those involved in accidents with injuries (TRB, 2016).
- In Jordan and for an average annual driving distance for women of 12,000 km and for men of 17,000 km, the results regarding the adjusted accident rate per 1,000 drivers and per km travelled was 2.42 times higher for men (Al -Balbissi, 2003).

## **2.2. Gender gap**

The “gender gap” describes any difference between the values of one variable for men and for women. The “wage gap” has already been discussed, as a difference in remuneration between men and women for the same position and performance. The “participation gap” is the difference between men and women in share of the labour force.

The participation of women in the “transport and logistics sector” has increased in the EU countries in recent years, although there are still clear differences between countries. France and Germany show female participation rates of over 25%, while other countries, including Spain, are still around 20-21% (Eurostat, 2019).

Country	2013	2017
France	25.83%	26.23%
Germany	25.48%	25.26%
United Kingdom	19.28%	20.95%
Italy	20.23%	20.22%
Poland	20.73%	19.31%
Spain	17.96%	19.02%

**Table 1 – Percentage of women over the total number of people between 15 and 64 years employed in the transport and logistic sector in several EU countries**

As a comparison, the percentage of female participation in the transport, storage and communication sector in 2014 in the set of 18 countries in Latin America and the Caribbean was 20.9% (CEPAL, 2017).

If the analysis is carried out in specific subsectors, it is found that in road passenger transport Spain was the EU country with the highest percentage of female drivers: 15% compared to the European average of 12% (IRU, 2019). This is one of the results of the huge growth of women in obtaining a bus driver's license between 2012 and 2018: 60.51% (DGT, 2020).

### 3. WOMEN AS USERS

#### 3.1. Gender violence

Public transport is one of the environments where women can feel a greater feeling of lack of security, although values vary largely (International Transport Forum, 2018):

- A national survey in the United States found that one in four women had experienced sexual harassment situations on public transportation.
- In Paris (France), 100% of women using the regional public transport system had experienced situations of harassment according to a recent survey.
- In Mumbai (India) a survey of 1,000 users at seven metropolitan railway stations found that 54% of respondents had experienced sexual harassment.

On the other hand, in 2014 a survey of more than 6,500 users of public transport in 16 of the world's most populated metropolitan areas, found that the public transport systems of Bogotá, Mexico City, Lima, Delhi and Jakarta were the areas with the worst overall value in the city, but this problem also stood out, although to a lesser degree, in London and New York (Thomson Reuters Foundation, 2014).

However, an adequate official quantification frequently faces problems of lack of representativeness.

The number of complaints is usually very low, especially in countries with weak police and legal support. Continuous perception and victimization surveys, with adequate preparation of the personnel who ask the questions, could make it possible to assess the evolution gender-specific violence (UN Women, 2017; Galiani and Jaitman, 2016).

Going one step further, it is possible to calculate the monetary value of violence by means of methods closely similar to those used in transport economics:

- For the direct costs related to medical, police and legal care, both of the criminal act itself and of the judicial and penitentiary process in the event of the offender's arrest, the so-called accounting method is used, based on the budgets of the departments of health, police and the judiciary, along with the number of complaints made.
- For the valuation of indirect costs (productivity lost by companies, loss of income of victims, etc.), the results of surveys of companies and victims are often used.
- And, as expected, the valuation of intangibles is complex, due to difficulties in monetizing aspects such as pain and suffering, along with other aspects such as the loss of social capital.

Some examples found consider tangible and intangible costs, but others are limited to tangible ones. In the table that follows, the first four countries include tangible and intangible costs, while the last two take into account only health loss costs (health services, lost economic output and physical and emotional impact).

Country	Crime	Unit cost	Note	Source
United Kingdom and EU	Homicide	1,733,192 €	Values in € 2012	EIGE, 2014
	Injuries	14,209 €		
	Common assault	2,316 €		
	Sexual violence	52,486 €		
USA	Homicide	4,474,501 US\$	Values in US\$ 1996	Clark et al., 2002
	Rape	103,560 US\$		
	Sexual assault	32,780 US\$		
Canada	Homicide	7,951,145 C\$	Values in C\$ 2009	Canada Department of Justice, 2014
	Rape	50,007 C\$		
	Sexual assault	14,225 C\$		
	Sexual harassment	630 C\$		
Australia	Sexual violence	26,780 A\$	Annual value per victim in A\$	PWC, 2015
Guatemala	Homicide	94,604 US\$	Values in US\$ 2005	Balsells, 2006
	Rape	6,570 US\$		
El Salvador	Homicide	181,510 US\$	Values in US\$. 2007	Acevedo, 2008
	Rape	5,453 US\$		

**Table 2 – Unit costs for crimes of gender violence**

### 3.2. Mobility

The first observation regarding mobility is that, due to their different social roles, men and women move differently. All data lead to the same conclusion: women walk more and use public transport more. With data from the Basque Country (Spain), more than half of trips of women are walking, while for men walking represents just over a third of trips (Emakunde, 2013).

Mode	Women	Men
Car	27.5%	44.8%
Walking	51.7%	37.3%
Bike	1.4%	2.5%
Railway	7.6%	5.3%
Bus	8.0%	3.9%
Motorcycle	0.3%	1.6%
Multimodal	1.3%	1.1%

**Table 3 - Distribution of trips according to the main modes of transport in the Basque Country**

Improving mobility is the essence of the functionality of a transport system. The benefits of improving women's mobility can be classified into two types:

- The direct benefit is this related to the reduction of travel times, easily monetizable in transport economics.
- The main indirect benefit is associated with the increase in opportunities that the improvement of mobility brings: a greater number of possible jobs, educational premises, places of social interaction, health services, etc.

Regarding the reduction of travel times, most surveys carried out in recent years in metropolitan areas already include the gender perspective in the assessment of travel time according to the trip purpose, the transport mode, etc. Analysis with data from Sweden (Börjesson and Eliasson, 2019) found no general differences in the valuation of travel time according to gender, despite the fact that they had detected different valuations in access to public transport in relation to perceived personal safety (Börjesson, 2012). However, in societies with greater gender inequality, it seems that the social valuation of time is different for men and women, both in terms of travel for work and other reasons. In particular, in Spain it seems that women value travel time between 43 and 50% more than men, as shown in the table below.

Scope and date	Hourly travel time value for women	Hourly travel time value for men	Source
Santander. Bus (2003). Under 24 years and 1,200 Euros/month	3.25 Euros	2.17 Euros	IDAE (2010)
Santander. Bus (2003). More than 24 years old and less than 1,200 Euros/month	13.75 Euros	9.19 Euros	IDAE (2010)
Santander. Bus (2003). Less than 24 years old and more than 1,200 Euros/month	3.59 Euros	2.51 Euros	IDAE (2010)
Santander. Bus (2003). Over 24 years and 1,200 Euros/month	15.19 Euros	10.61 Euros	IDAE (2010)
U. de La Laguna (2000)	8.91 Euros	6.13 Euros	Amador (2005)
Teide National Park. Private and rental car (2016)	12.30 a 13.86 Euros	9.58 a 11.0 Euros	Marina (2017)

**Table 4 – Economic valuation of travel time differentiated by gender in Spain**

Regarding the benefit for access to opportunities, an interesting study in Buenos Aires obtained the following results (Peralta et al., 2014):



- The need to minimize travel times in order to combine work and domestic activities means that women must look for job opportunities at shorter distances from home. In the workforce, women with children must look for jobs within a 20% shorter distance than men.
- The average distance travelled by men on each trip is much higher than that travelled by women: 6.72 km compared to 4.77 km.
- Regarding the speeds of these trips, it is 8.62 km/h for women and 10.93 km/h for men. This difference is due to the larger use of public transport by women.

In Spain, a study carried out in Madrid and Barcelona (Matas et al., 2010) stands out. It assessed accessibility in public transport and its impact on women compared to men in terms of labour market. For the metropolitan areas studied, better access to employment in public transport increases the probability of working. The distinction according to educational level shows that the effect is greater for those women with a lower level of education and, probably, with less car availability. Thus, if accessibility by public transport increases:

- Women without studies in Barcelona would see an increase in employment ratio from 34.3 to 40.8% and those in Madrid from 30.7 to 34.0%.
- In the case of women with primary education, the increase would be from 45.0 to 48.0% in Barcelona and from 37.7% to 39.1% in Madrid.

Other studies show that more than 70% of the women surveyed at some point in their life rejected or gave up a better job due to the distance they travelled, while only 40% of men had to do the same. The results also show that the level of exclusion is higher for low-income women (Fédération Internationale l'Automobile, 2014).

#### **4. EMPOWERMENT**

Empowerment is defined as the “process of access to resources and development of personal capacities to be able to actively participate in shaping one's life and that of their community in economic, social and political terms” (European Commission, 1998). Therefore, most of the benefits discussed above on women as users also lead to greater empowerment.

A first type of empowerment can be classified as “economic empowerment” and is related to time savings and increased opportunities, as well as increases in income, savings and consumption. It has already been discussed previously, particularly about improving mobility, but it may include other aspects such as increased disposable income if transport costs decrease. In addition, there may be issues of more complex monetization, such as improving access to schools or healthcare facilities.

“Social and political empowerment”, related to participation in the public sphere is an area where the existence of numerous intangibles makes it difficult to find significant examples of impact quantification, let alone monetization. The most complete references found of ex post analyses are related to rural areas in poor countries, and the role of women employed in road and highway improvement and maintenance tasks. Although they are of utmost importance, they provide information only about some isolated indicators, without any consolidation:

- Following the implementation of a rural road improvement program in Bangladesh with active female participation, the results showed a decrease from 31% to 16% of poverty, while girls' school enrolment increased by 5.7% and the number of jobs healthcare coverage doubled (Quader, 2011).
- Various rural road improvement programs in Peru between 1995 and 2013 with female participation entailed an increase in school enrolment of 19.2%, while the number of health consultations increased by 17.8% in the communities that benefited from the project (World Bank, 2017).

## 5. ECONOMIC EVALUATION

In the research carried out, no manuals or guides with quantitative methods of evaluation of the gender approach have been found, not to mention specific ones in the transport sector.

In terms of women as employees, the economic assessment of the gender gap has not been found for the transport sector, but there are various estimates for the economy as a whole. In Spain, a recent analysis with data from 2018 and 2019 showed that Spanish GDP would increase by more than 200,000 million euros, equivalent to 16.8% of GDP in 2018, if the gender gap was eliminated (PWC, 2019). In any case, the value of impacts and the low cost of implementation make it obvious that the overall balance is neatly positive.

When it comes to women as users, there are interesting efforts to define its main impacts of (Inter-American Development Bank, 2016) or to establish systematic evaluation methods, but they are usually limited to stating general principles, without providing the typical default values that help evaluators so much in other fields of transport (García-Calvente et al., 2016).

Some efforts have been made in several sectors in order to assess gender-oriented projects, but very few in the transport sector, where most analyses are simply valuation of impacts, which in this context is no minor feat. In transportation, some ex-post studies give information on the impact of measures oriented towards the reduction of gender-based violence and the difficulties of valuing it simply:

- The “Viajemos Seguras” (Let's Travel Safely) Program in Mexico City, in operation since 2008 and recently strengthened, is a set of actions that range from prevention to care actions. The impact of the measure to have specific subway cars for women has been evaluated and the results have been mixed: sexual violence disappears but physical violence increases. (Soto et al., 2017).
- The “Bájale al Acoso” (Come Down to Harassment) strategy in Quito (Ecuador) in the main bus and trolleybus corridors began in 2014 and in 2017 it was structured as a program of actions. The latest references obtained from a continuous impact evaluation showed a decrease of 34.5% in situations of sexual harassment, considered to be the result of more than 2,500 complaints and the conviction of 20 harassers (Banco Inter-American Development, 2018).

When it comes to mobility, the higher speed of the private vehicle compared to public transport in Buenos Aires means that, when women have access to the car, the average speed of their trips increases by 5.76 km / h. If the travel speeds of women were compared to those of men (keeping the number of trips), their opportunities in the labour market would open between 20 and 80% (Peralta, 2014). In this case, incidentally, the reflection might be whether, for other social and environmental considerations, the transfer from public transport to private vehicle is desirable.

More structured analyses comparing costs and benefits are very few. Two notable cases in relation to assessing gender-violence related projects have been found. Both have in common the use of the benefit to cost ratio as an indicator.

- Ratios of B/C up to of 17 have been obtained for reducing violent assaults, regardless of the gender of the victim (Copenhagen Consensus Center, 2016).
- A B/C ratio of 9.25 was estimated in an evaluation of five years of actions established by the Violence Against Women Act of 1994 in the United States (Clark et al., 2002).

## 6. CONCLUSIONS

In a context where gender-responsive policies are ubiquitous, data related to women as a part of the workforce in the transport sector are relatively abundant. Common measures such as the wage gender gap are well established, as it happens in any other sector. Even some specific aspects, such as traffic accidents are well documented. Most indicators are either similar for men and women, or positive in favour of women. This reinforces the need to increase the role of women in the transport sector as employees. Be it from the strict point of view of the operating companies or from the point of view of the whole society, it becomes obvious that the reduction of the gender gap is positive and its social and economic impacts are huge.

But from the point of view of women as transport users, information is not as clear. Some projects in different sector have assessed quantitative impacts of gender-based projects, but in the transport sector experiences are scarce and figures less available. Violence reduction or time savings have been valued, and its final impacts even monetised. But many other aspects are simply not analysed with quantitative tools. More often than not, results are shown in terms of resources spent (investment done, for instance) or, at most, in terms of direct results (such as number of complaints). Concepts such as empowerment, which may be considered the backbone of many policies, are rarely quantified and probably have never been assessed.

If economic evaluation is systematically used in other types of transport projects, including so sensitive issues such as the value of human life, one could expect that actions with a gender focus might be also assessed using, at least, a quantitative approach, but this is the exception to the rule. The main barrier to this improvement is the lack of ex post data: although costs may be well defined, values of benefits (or reduced costs) are unknown.

Rational priority setting requires information of high quality. If such information is not available, governments may be making inefficient decisions. The transport sector is used to dealing with intangibles: well-planned, quantitative ex-post assessments of the many recent and planned actions should be high on the gender agenda.

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