

## CRITERIA FOR TRAMWAY AND METRO LINES IMPLANTATION

Author: Martí Roscadell i García

Tutor: Robert Vergés i Fernández

### ABSTRACT

As time goes by, the evolution of urban transport systems has given rise to new ways of transport and to the improvement of the existing ones, but on the other hand it has also caused the degradation and disappearance of some of them. In many countries, tramway has also suffered this destiny: confidence on it was lost and was condemned to extinction. But in countries where it was kept on duty, tramway evolved and modernised as other ways of transport did, becoming an essential way on their transport net.

Owing to the success of using modern tramways in these countries, recovery and reintroduction proposals have been arranged in other cities. But not everybody seems to agree that this should be a good idea. So, while a part of society expects the return of tramways, the other is clearly against it, mainly arguing that tramway is a way of transport with poor features (less capacity, lower speed, ...) and a series of negative aspects which are far unacceptable (barrier-effect, high noise levels,...). With these reasoning, the underground is called to be a better solution to the mobility problems of a city. Owing to this, the debate whether to build tramway or underground lines is on. And this has specially affected the city of Barcelona, where a modern tramway line is being built so as to link the Diagonal Ave. and Baix Llobregat areas.

The purpose of this thesis is to compile and value the thinkings used on this discussion so as to bring some light to the question: "Tramway or underground, which is better?". Thus, through an extensive bibliographical research, the features of modern tramways and underground have been studied as to be able to choose a series of quantitative and qualitative criteria that will help on deciding the best one. The selected criteria are: speed, capacity, accessibility, cost, environmental aspects, dimensions, safety and urbanistical implications. Thanks to the research made, a group of parameters or indicators have been set and valued for each one of the criteria mentioned above to decide the suitability of one way of transport or the other.

The results of this work have made clear that underground is more suitable after capacity and safety aspects, whereas tramway will surpass the previous one after its higher accessibility, lower construction and operating costs, and urbanistical implications. Concerning environmental aspects, both ways have similar features. And in relation to the rapidity of covering a distance, it has been traditionally said that underground is faster owing to its higher top speed, but the results obtained show that the rapidity of the journey depends on its length. Therefore tramway is faster way of transport for short distances, while underground shows lower travel time on long distances.

Finally, a practical application has been made on a real case: the previous criteria have been valued for "Trambaix" (the already mentioned tramway line) and "Línia 9" (the future underground line in Barcelona). A comparison has been made with the achieved results so as to decide whether it would be suitable to build an underground line instead of this tramway, over the same route. And the result obtained shows that tramway is the best option in this case, mainly because of the aspects related to capacity, cost and accessibility.