

**DISSERTATION:** Efficient Methodology to Depict Strategic Maps of Railway Noise. Application to the FFGC lines between Vallès and Baix Llobregat.

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Noise has been a problem for human beings for centuries. However, in the last few decades, noise pollution has become a global problem, in no small part thanks to the growth on a massive scale of industry and transport infrastructures. At the same time, different organisations and institutions around the world have discovered the many negative effects that loud and continuous noises have on human health.

The railway, together with other means of transport, is one of the main causes of the increase in noise in our cities due to the large number of daily journeys that are carried out, both for public transport and freight.

Governments and local councils have already reacted towards this problem, developing specific legislation in order to find a solution. Since the early 90s, the European Union has kept fixing the general guidelines that the Member States have to follow to guarantee an acceptable acoustic level for their citizens. Consequently, in 2002, the Catalan Parliament passed Law 16/2002 for protection against noise pollution and, in 2003, Spain passed its own Noise Law.

Even though each country adapts its laws to suit its own local characteristics, there's one thing common to all of them: the strategic noise chart, one of the main present and future tools for noise evaluation and the principal aim of this work. This type of map allows us to determine the number of people that are exposed to excessive noise levels and, at the same time, reveal the places where it is necessary to have special measures set up against this type of pollution.

The main objective of this dissertation is to establish an efficient methodology for fabricating and depicting strategic maps of railway noise. Specifically, we will focus on the Barcelona – Vallès and Llobregat – Anoia lines, managed by the Ferrocarrils de la Generalitat de Catalunya, and we will determine the seriousness of the acoustic impact that they suffer from.

The work is based on the method of noise evaluation published by the C.E.R.T.U. (Centre d'Etudes des Transports Urbains) that considers the characteristics of the trains (reference noise level, length and speed) and the railway lines (amount of traffic and type of trains) in order to find out the relationship between sound level and distance. Introducing adequate changes to this method, and making necessary adaptations to the trains that run on our lines, you can calculate the distance a specific sound level reaches from the track. Depicting this distance on maps and considering different aspects, it is possible to estimate the number of people who suffer from noise pollution above the limits established by law and exactly what sound level they are exposed to.

The production of the maps has been carried out in accordance with the instructions given by Royal Decree 1513/2005 published in BOE on 17th December 2005. In this document, the strategic maps are defined, the acoustic levels that have to be depicted are fixed and the possible formats for displaying the results obtained are indicated. Again, it has been necessary to make certain modifications to achieve our goals.

After bringing together all of the necessary information on the railroad lines in the study, we are finally in a position to locate the worst affected areas. The natural outcome of making a strategic noise chart is the subsequent writing of Plans of Action, where the necessary precautionary or corrective measures to put an end to the problem of noise pollution will be decided and planned.