

# GIS approach applied to tourist bus route design in Lanzarote Island

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**Keywords** | Sustainability, Road transport, Tourism activity, Carbon dioxide emission, Geographical information system.

**Objectives** | This work evaluates the impact of road transport usage in accessing tourist activities at Lanzarote Island and its implications for sustainable tourism development. This evaluation is based on the volume of CO<sub>2</sub> emission for the actual tourist mobility model at the island and an alternative option such as a tourist bus route.

**Methodology** | The methodology followed here is the application of Geographical Information System (GIS). Recent developments in GIS mean that certain problems related to transport networks can be approached from a perspective that combines the traditional algorithms of network analysis with geographical information. This fusion has created the branch of studies known as Geographical Information System for Transportation (GIS-T). The main objective of GIS-T is the use of GIS tools to manage, plan, evaluate and maintain transport systems. For a more detailed use of SIG tools in transport network based problems can be found in Smith, Goodchild and Longley (2007).

**Main results and contributions** | In order to evaluate the effect of the introduction of the new tourist route upon the CO<sub>2</sub> levels, various sceneries were considered: 5%, 15%, 25% and the most optimistic case in which the 50% of the visitors use the new tourist bus service. As it is apparent from the papers results the alternative two (Alt2) shows higher percentage decreasing rather than alternative one (Alt1). It can be seen that to obtain a reduction of around 15% compared to current levels, then 25% of visitors to these attractions must use the new tourist bus service. This means that 19.4% of the tourists that previously used rented private cars to access tourist activities at Lanzarote Island would have to switch to the new tourist bus service.

**Limitations** | The provision of public transport in rural destinations is not usually sufficiently attractive to encourage any significant level of modal shift. It is necessary to find a new social construction for the bus travel model, where a multifaceted bus network plays an important role in encouraging people to enjoy their destination without a car. The case

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here is to choose a design approach to meet the needs of all users and that provides a multifaceted service for residents without private cars and tourists, based on social inclusion. However, this approach has a trade off between the need to serve a wide range of users and the reliability of services. The limitations of this study is the lack of an prospection to know if it is possible conjugate bus service efficiency in terms of time with a wide range of users to be served.

**Conclusions** | It is concluded that in order to reduce the current levels of emissions by around 15%, some 19.4% of the tourists that currently use hired cars would have to switch to the new tourist bus service. However, to allow this change in the current tourist mobility model at Lanzarote Island, the design of a new tourist bus service would have to include socioeconomic aspects, such as the social inclusion of rural residents into the dynamics of the opportunities and services provided by the large urban centre. Possible access to better remunerated jobs and more employment options, as well as enjoying better access to medical attention, are positive aspects to be considered in the analysis of a multifunctional tourist bus service.

#### **References** |

Smith, M. J., Goodchild, M. F. & Longley, P. A. (2007). *Geospatial analysis. A comprehensive guide to principles, techniques and software tools*. Leicester: Troubador.