

Assessment of Measures to Ease Pedestrian Congestion

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Abstract

Improving the pedestrian environment in large cities is a major policy priority for many metropolitan authorities. One of the main concerns of local authorities is the level of heavy pedestrian congestion observed during cultural events, at main transport interchanges and at busy parts of some urban pavements. A high concentration of pedestrians can lead to conflict, delays and a complicated evacuation procedure.

This paper looks at some of the possible ways to improve the quality of pedestrian facilities by assessing the performance of different schemes developed to ease pedestrian congestion. The schemes assessed consist either of allocating more space for pedestrians (furniture relocation) or segregating the pedestrian flow (by directions or speeds). These schemes already exist indoors and outdoors but there is no systematic way to evaluate their adequacy on different pedestrian environments.

The paper proposes a comprehensive methodology to assess the current Level of Service that a pedestrian facility is offering. The proposed methodology is the blending of two other existing methods, taking into account physical as well as environmental factors. Indicators of the physical component are flow, density, speed and probability of conflicts. The level of satisfaction of users with respect to several environmental factors such as convenience, comfort, safety, security, system coherence and attractiveness forms the indicator of the environmental component.

The paper carries on describing how the framework is then modified and adapted to be used in hypothetical conditions (i.e. if the schemes to be tested were implemented). Special emphasis is made to study the conflicts among pedestrians, as an indicator of the physical quality of the pedestrian flow. Systematic collection and classification of conflict data, which has been rarely used in other investigations, was carried out. This research proves that pedestrian conflict can be a very useful indicator to understand the current situation as well as to assess hypothetical scenarios, for which flow, speed and density data are not available.

The methodology was applied to a study case, on selected pavement segments of Oxford Street, London, which with 60,000 commuters and 10 million visitors a year has the most heavily trafficked pavements in Europe. Oxford Street is utilized by a heterogeneous mix of users including commuters, shoppers, students and tourists, which would allow extracting information for different types of pedestrians.

The paper recalls on the data collection exercise. With respect to the physical component of the Level of Service, a pedestrian survey with video camera formed the applied methodology. Data about pedestrian numbers, flow

composition and directional split was extracted for the different locations at different times of the day, with the objective to cover a typical day.

Regarding the environmental component of the Level of Service, questionnaires were handed out to users. The questionnaires contained questions about the current satisfaction of the users with respect to the different environmental factors and if the satisfaction level would go up or down if such schemes were implemented. In addition to this, and most importantly, a constant sum paired comparison ranking exercise was included in the questionnaire in order to provide information about the relative importance of the environmental factors with respect to each other. This was necessary in order to find out the potential of the schemes to improve the environmental factors that the users value the most. The questionnaire also included questions to gather socio-economic characteristics about the respondents, as well as a question about conflict annoyance to complement the conflict survey.

The data collected through surveys and questionnaires was subject to statistical analysis, which allowed relevant questions to be answered about the current Level of Service the facility is offering, and also about the potential of the schemes to improve the overall situation. It also gave important clues as to what pedestrians value more from their walking experiences, as well as the strengths and weaknesses of each scheme, and their potential to suit different pedestrian environments.

The paper presents the results of the study case, which show that the schemes studied have the potential to avoid conflicts and therefore improving the quality of the pedestrian flow. In addition to this, the percentage of users satisfied with the facility is anticipated to increase. Finally, the paper concludes on the advantages and disadvantages of the applied methodology and data collection techniques and draws the scope for future work, specially the need for dynamic simulation of the schemes with positive results.

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