Consumer Data Research Centre

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Transport for West Midlands

The impact of events on traffic demand and performance in the West Midlands and what factors influence the time taken to return to normal traffic demand and performance levels.

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Background and Motivation

Events such as football matches, concerts and collisions can cause a substantial change in the demand or capacity of the highway network, which in turn causes delays. These delays have socio-economic and environmental impacts on the surrounding area. However, without knowing which factors relating to events, such as location, time of day and number of people involved, it is difficult for Transport the West Midlands (TfWM) to implement appropriate mitigation to limit the impact of these events.

Data and Methods

The project used Waze irregularities data as a measure of congestion and delay, which was combined with data relating to events such as football matches, concerts, rail strikes and collisions data. The data covered three months in 2021-2022, and irregularities and events were paired based on spatial and temporal proximity. Regression modelling was used to identify which factors relating to events had the biggest influence on the duration of the irregularity associated with events. Principal component analysis was used as an independent check of the regression modelling, and T-tests were used to assess whether the difference in the number of irregularities associated with the occurrence of events was statistically significant. Events were split into planned (football matches, concerts and rail strikes) and unplanned (collisions) and were treated separately throughout.

Key Findings

The research found that the type of road the irregularity occurred on (motorway, key route network, town centre road or other) was a key determinant in the duration of the irregularity for both planned and unplanned events. For planned events, the amount of time added to the journey time and the number of people attending the event were also influential in determining the duration of the irregularity. For unplanned events (collisions), the typical traffic flow on the road and time period were more important. These findings were found by both the regression modelling and the principal component analysis. In terms of the number of irregularities occurring with events, it was found that days with rail strikes or football matches had a statistically significant increase in the number of irregularities occurring compared to non-strike/match days. This was not the case for Ticketmaster events and collisions, although the data at the macro-scale makes it challenging to determine the differences caused by individual events due to the data not being well defined.

Value of the research

This project built on existing work in the field which examined how highway networks can be affected by events occurring in the local area. This project used real-world data from the UK, which was not readily available in the literature, and enables TfWM to better understand how events impact on the highway network in the West Midlands area specifically. This can be used by TfWM to shape policies and strategies for mitigation measures to prepare for planned events and respond to collisions and other unplanned events. This work could be further extended by looking at longer term events in the area such as the impacts associated with climate change and the construction of HS2. It also found that Waze irregularities provide a viable metric for monitoring the duration of traffic impacts caused by both planned and unplanned events.

Figure 1: Waze irregularities location by type of road