**REAL-TIME DASHBOARD FOR ANALYZING THE DELAY IN DUBLIN BUS CAUSED BY LOCAL WEATHER**

**ABSTRACT**

Public transportation plays a crucial role in the daily lives of citizens across countries, facilitating their routine activities. Dublin Bus stands as a prominent public transport system within the city of Dublin, greatly facilitating the daily lives of its residents. However, occasional unforeseen delays in bus arrivals may inconvenience passengers, despite the overall utility the service provides. This study aims to analyze the delays experienced by Dublin buses on individual routes and explore any potential correlation with local weather conditions. It seeks to determine whether local weather factors contribute to these delays. The method involves developing a real-time dashboard to showcase delays, calculated using the NTA dataset, which is GTFS and GTFS-R data, in conjunction with local weather data. The dashboard provides valuable assistance to the public by enabling users to identify delays on specific Dublin bus routes at particular times or weather conditions. This functionality aids in planning journeys more effectively, especially during specific time frames or weather scenarios. The summary of the primary findings indicates that local weather significantly contributes to delays in Dublin buses.

1. **INTRODUCTION**

For any modern country, public transportation plays a crucial role in the daily lives of its citizens. A fast and reliable transportation network is vital for easy access across the country. Time is invaluable and cannot be regained once lost, making punctuality a key aspect of public transport services. One of the significant challenges in public transport is the city service, which is heavily utilized by most people for their daily activities such as commuting to work, school, and other destinations. The reliability and availability of city services, like buses, are crucial, especially in cities like Dublin, where the Dublin Bus system is the primary mode of transportation due to its widespread availability and dependability. Dublin Bus is an Irish state-owned bus operator providing services in Dublin(‘Dublin Bus’, 2024). Dublin bus is the largest bus operator in the city, it carried over 145 million passengers in the year of 2023(2024).

Despite being one of the most widely utilized public transportation systems in Ireland, Dublin Bus occasionally encounters unforeseen circumstances leading to significant delays. At times, passengers experience prolonged waiting periods before boarding a bus, and even upon boarding, journeys may take longer than expected to reach their destinations. Dublin Bus, affiliated with the National Transport Authority of Ireland, offers advanced services including travel schedules, estimated arrival times, travel predictions, vehicle positioning, and real-time updates to passengers. However, despite these provisions, passengers may occasionally experience delays in reaching their destinations within the estimated arrival times. Road transport, especially buses, is vulnerable to delays influenced by factors like traffic, weather conditions, and road infrastructure. Weather significantly affects journey durations. Adverse weather conditions not only affect the operational efficiency of buses but also alter road conditions, leading to increased travel times and extended stops at each station, consequently elongating transit durations. “Weather can affect the total trip duration by increasing the access time, transfer time and the normal trip duration and also by causing schedule disruptions”(Singhal, Kamga and Yazici, 2014). The aim is to examine the influence of weather on Dublin Bus, specifically assessing its impact on travel times and potential delays. This analysis seeks to understand how varying weather conditions contribute to fluctuations in the efficiency and punctuality of bus transportation services.

* 1. **Research Question**

Arrived at research question by initially selecting the broader topic of challenges in public transport in Ireland. Subsequently, honed in on the research problem, focusing specifically on the timeliness of public transport, particularly buses. The purpose statement outlined the objective of analyzing the causes of delays in scheduled arrival times. This process led to the final research question concerning the correlation between local weather conditions and the punctuality of public transport. And the research question is follows:

***“How much does the local weather affect the delay of Dublin buses?”***

Figure 1 Narrowed down to the Research Question

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Problems in Public Transport in Ireland

Timeliness of Public Transport in Ireland, especially Dublin Bus

Analysis on the causes of delays in scheduled arrival time

Question?

* 1. **Research aim(s)**

The aim is to publish the extent to which weather conditions impact delays in public buses, especially Dublin buses, determining which weather conditions are most conducive to bus delays. The study also seeks to publish the average/current duration of delays associated with each distinct weather condition or distinct times of the day in general or from specific bus routes.

* 1. **Research objective(s)**

The National Transport Authority of Ireland provides a transport feed service containing essential information such as trip schedules and real-time updates, including vehicle positioning and arrival times. Utilizing this data along with local weather information from Dublin city allows us to conduct diverse analytical activities to achieve our research objectives. This involves publishing bus delays on specific days under a particular weather condition and identifying which weather conditions contribute most to delays. The objective also includes displaying the current delay, both in general and for specific routes of Dublin Bus.

* 1. **Research hypothesis**

Dublin Bus delays are more probable during days characterized by rain and strong winds. Adverse weather conditions, specifically rain and wind, tend to have a notable impact on the timeliness of bus services, increasing the likelihood of delays during such conditions.

1. **LITERATURE REVIEWS**