2022

ROAD ACCIDENT ANALYSIS

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Disclaimer: This project was built for experimental purpose and not decision making. Findings are based on Dummy Data.

Introduction

This report presents the development and analysis of a Road Accident Dashboard for the years 2021 and 2022 in the UK. The primary objective of the dashboard is to provide valuable insights and key performance indicators (KPIs) related to road accidents, including total casualties, accident severities, vehicle types, monthly trends, casualties by road type, casualties by area/location, and total casualties by location. The dashboard was designed to assist the client in gaining a comprehensive understanding of road accident data and supporting evidence-based decision-making for improving road safety measures and policies.

Requirement Specifications

The Road Accident Dashboard aims to provide comprehensive insights into road accidents in the UK for the current year, 2022, and facilitate comparisons with the previous year, 2021. The following KPIs will be included in the dashboard:

Primary KPI - Total Casualties and Total Accident Values for Current Year and Year-on-Year Growth:

- This KPI will display the total number of casualties and accidents reported in the current year (2022).
- It will also calculate the percentage change in total casualties and accidents, comparing data with the previous year (2021) to illustrate the year-on-year growth.

Primary KPIs - Total Casualties by Accident Severities for Current Year and YoY Growth:

- The dashboard will present a breakdown of total casualties based on accident severities (e.g., slight, serious, fatal) for the current year (2022).
- It will further analyze and visualize the percentage change in casualties for each severity category, comparing data between 2021 and 2022.

Secondary KPIs - Total Casualties with Respect to Vehicle Types for Current Year:

- This KPI will provide an overview of the total number of casualties categorized by vehicle types (e.g., car, motorcycle, bicycle, pedestrian) for the current year (2022).

Monthly Trend Showing Comparison of Casualties:

- The dashboard will feature a visual representation of the monthly trend in casualties for the current year (2022).
- It will allow users to compare the monthly casualties with the corresponding months in the previous year (2021) to identify any notable patterns or deviations.

Casualties by Road Type for Current Year:

- This KPI will showcase the distribution of total casualties based on different road types (e.g., motorway, rural, urban) for the current year (2022).

Current Year Casualties by Area/Location and by Day/Night:

- The dashboard will present interactive maps and graphs to illustrate the distribution of casualties across various areas/locations (e.g., city, town, rural) for the current year (2022).
- It will also differentiate between casualties that occurred during the day and night periods.

Total Casualties and Total Accidents by Location:

- This KPI will provide a regional perspective by displaying the total number of casualties and accidents for different locations in the UK.

Target Stakeholders

- Ministry of Transport
- Road Transport Department
- Police Force
- Emergency Services Department
- Road safety Corps
- Transport Operators
- Traffic Management Agencies
- General Public
- Media

Processes

Connect Power BI to Raw Data:

The initial step in this project was to connect Power BI to the raw road accident data obtained for the UK for the years 2021 and 2022. Dummy data was used for the project but were carefully selected to ensure they encompassed all relevant information required for the analysis.

Data Cleaning using Power Query:

Power Query was used to clean and transform the raw road accident data. This crucial step involved addressing misspelled values, removing duplicates, and handling data inconsistencies to ensure high data quality.

Time Intelligence Function/Calendar Date Table in Power BI:

A calendar date table was created in Power BI to enable time-based analysis of road accidents. Time intelligence functions, such as Year-to-Date (YTD) and Month-to-Date (MTD), were incorporated to facilitate dynamic date-based calculations.

Data Modelling (Relationship between Multiple Tables):

The road accident data was structured into multiple related tables. Appropriate relationships were established between these tables to form a cohesive data model.

Year-on-Year (YoY) Growth Calculation using DAX:

DAX calculations were employed to compute the year-on-year growth for total accidents and total casualties between the years 2021 and 2022. The calculated YoY growth provided crucial insights into accident trends.

KPI and Advanced KPI Generations:

Key Performance Indicators (KPIs) were defined based on the project's objectives, including total casualties, accident severities, casualties by vehicle types, and more. Additionally, advanced KPIs involving complex calculations were generated using DAX to provide deeper insights.

Importing Images:

Relevant images were thoughtfully imported into the dashboard to augment data visualizations and improve user engagement.

Creating Different Charts and Generating Insights:

A diverse range of charts, graphs was created using Power BI's visualization capabilities. The visuals were thoughtfully designed to present critical insights on casualties, accident trends, and comparisons in an interactive and engaging manner.

This project utilized the powerful features of Power BI, such as Power Query, DAX, data modelling, and data visualization, to create an insightful and interactive Road Accident Dashboard for the UK. The comprehensive analysis and visualizations empowered stakeholders to make informed decisions to enhance road safety and reduce accidents in the region.

Summary of Findings

The analysis of road accident data for the years 2021 and 2022 reveals significant insights into road safety trends. The key findings are as follows:

Casualties Reduction: Comparing 2021 and 2022 data, there was a notable reduction in casualties by 11.9% in 2022. This decline indicates an improvement in road safety measures and awareness.

Accident Reduction: The number of accidents decreased by 11.7% in 2022. The decrease signifies a positive impact of road safety initiatives implemented during the two years.

Fatal Accident Reduction: Fatal accidents, with recorded deaths, experienced a substantial decrease of 33.3% in 2022. The reduction highlights the effectiveness of measures aimed at preventing severe accidents.

Serious Accident Reduction: Serious accidents, involving significant injuries, decreased by 16.2% in 2022. The decline indicates the success of safety measures in mitigating severe consequences.

Slight Accident Reduction: Slight accidents, with no serious casualties, reduced by 10.6% in 2022.

Urban vs. Rural Areas: There are significantly more casualties in urban areas, accounting for 61.95% of all accidents, as opposed to rural areas, contributing to 38.05%.

Day vs. Night Casualties: The analysis indicates that 73.84% of casualties occur during the day, whereas only 26.16% happen at night. This observation aligns with the presumption that increased daytime vehicular traffic leads to a higher accident occurrence[1].

Impact of Single Carriageway: The analysis highlights that single carriageways cause a higher number of casualties.

The findings provide valuable insights into the road accident landscape for the years 2021 and 2022. The reduction in casualties and accidents signifies progress in road safety efforts, while specific areas, such as urban safety measures and single carriageways, warrant targeted interventions. The analysis serves as a valuable reference for policymakers and stakeholders to devise evidence-based strategies to further enhance road safety and reduce accidents in the future.

Recommendation

Based on the findings of the road accident analysis for the years 2021 and 2022, it is evident that single carriageways significantly contribute to the number of casualties. To further advance road safety and reduce the number of casualties per year, I highly recommend the government and all principal stakeholders consider the conversion of most single carriageways into dual carriageways.

Benefits of Dual Carriageways:

Improved Safety: Dual carriageways inherently offer increased safety due to the separation of traffic flows. With dedicated lanes for each direction, the risk of head-on collisions and lane encroachments is substantially reduced.

Higher Capacity: Dual carriageways generally have higher traffic-carrying capacity compared to single carriageways. This improvement in capacity can lead to smoother traffic flow and reduced congestion, minimizing accident-prone scenarios.

[1] Harrison, Y., 2013. The impact of daylight saving time on sleep and related behaviours. Sleep medicine reviews, 17(4), pp.285-292.

Enhanced Traffic Management: The conversion to dual carriageways allows for better traffic management and control, enabling the implementation of effective safety measures and speed restrictions.

Reduced Congestion-Related Accidents: By facilitating smoother traffic flow, dual carriageways can significantly reduce the number of accidents caused by congestion and traffic bottlenecks.

Summary

This comprehensive report presents a detailed analysis of road accident data in the UK for the years 2020 and 2021, along with valuable insights into road safety trends and patterns. The primary goal of this analysis was to provide stakeholders, including the government and road safety organizations, with data-driven insights to support evidence-based decision-making and targeted road safety initiatives.

The analysis revealed a positive trend in road safety, with notable reductions in both casualties and the number of accidents between 2020 and 2021. Casualties decreased by 11.9%, while accidents experienced an 11.7% decline. Moreover, the analysis highlighted substantial reductions in fatal accidents (33.3%), serious accidents (16.2%), and slight accidents (10.6%) during the same period.

Further investigations into accident characteristics revealed significant disparities between urban and rural areas. Urban areas accounted for 61.95% of all accidents, indicating the need for targeted safety measures in densely populated regions. Additionally, the analysis found that a majority of casualties (73.84%) occurred during the day, emphasizing the importance of managing daytime traffic and implementing safety measures accordingly.

This report aims to serve as a valuable resource for policymakers, road safety organizations, and the community at large, providing insights and strategic directions to create a safer and more sustainable road environment.