

Twilytics: A Social Perception Analysis of Public Transit Systems during the COVID-19 Pandemic

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Introduction

In the United States, public transit ridership in 2020 declined by 79% compared to 2019 levels at the start of the pandemic. With lockdowns implemented during the early days of the pandemic, direct human-to-human interactions migrated to virtual platforms (e.g., Facebook, Twitter, and Reddit). Social media platforms have aided researchers in answering numerous questions about current societal dilemmas, including COVID-19. This study aims to investigate the public's perception of transit systems via a social media analysis given the emergence of vaccines and other COVID-19 preventive measures.

Study Methods

We developed a structured transportation tweet analytics framework (Twilytics) to analyze public discourse data (i.e., tweets) on the impact of COVID-19 on transit systems. The framework has four main components. First, we extracted tweets

between June 2020 to November 2021 from carefully curated keywords addressing transit services. Second, we pre-processed the data with data cleaning and feature engineering methods. Third, we performed descriptive and statistical analysis on the cleaned data. We hypothesized that the daily and monthly tweets related to transit systems will be significantly different. Lastly, we performed topic modeling to uncover the prominent themes of the public's perception of transit systems during the pandemic.

Findings

Our results revealed that, on average, 2020 had 113 transit-related tweets per month, with July (153 tweets) and Tuesdays (125 tweets) recording the highest transit-related tweets. The average number of transit-related tweets in 2021 was 59.81 per month, with January (80.1 tweets) and Tuesdays (68.4 tweets) having the highest number of transit-

related tweets. Kruskal-Wallis's analysis of variance test results showed a statistically significant difference ($p < 0.05$) in the number of transit-related tweets per month and day. The topic modeling findings revealed different themes through multiple events during the pandemic. Data revealed patterns of fear and confusion about using public transportation amongst Twitter users during the early days of the pandemic. Second, the public had doubts about how the vaccines will impact transportation and movement throughout 2021, with most users concerned about the influence of new COVID variants. Lastly, Twitter users were concerned about the travel bans placed on African countries amidst the Omicron variant and urged the government to remove the bans.

Analysis of data from Twitter revealed patterns of fear and confusion about using public transport during the pandemic. This study enables stakeholders to better understand the social perception of transit systems.

Policy/Practice Recommendations

These findings will help bridge the gap between public health, transport, and commuter needs by helping current transportation authorities and city planners better understand the social perception of transit systems during the pandemic.

About the Authors

Egbe-Etu Etu, Ph.D., is an Assistant Professor of Business Analytics at San Jose State University (SJSU). Before joining SJSU, author 1 received his Ph.D. in Industrial and Systems Engineering from Wayne State University, Detroit in 2021. His research interest centers on the development of use-inspired machine learning models to solve challenging business problems in healthcare, manufacturing, and transportation.

Imokhai Tenebe, Ph.D., is currently a Software Engineer. He obtained his Ph.D. in Water Resources and Environmental Engineering and has two masters in the same area of expertise from Nigeria and the United States. He has published over 80 articles on several subjects with interest in water resources, healthcare, pollution, transportation, and data science. Dr. Tenebe is also a Research Associate at the Mineta Transportation Institute.

To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/2210



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