International Journal of Science, Strategic Management and Technology
Volume **02** Issue **06** June-**2026** | ISSN: **3108-1762 (Online)** | Impact Factor: 3.8
An International, Peer-Reviewed, Open Access Scholarly Journal Indexed in recognized academic databases

Data-Driven Taxi Fare Analysis Using Microsoft Power BI: Design, Implementation And Business Insights

D Priti Patra
Master of Computer Application
GIFTAutonomous BPUT University

Allupati Chakradhar Patro
Master of Computer Application
GIFTAutonomous BPUT University
Enail ID: allupati@gift.edu.in

https://doi.org/ 10.55041/ijsmt.v2i6.083

Cite this Article: Patra, D. P. (2026). Data-Driven Taxi Fare Analysis Using Microsoft Power BI: Design, Implementation And Business Insights. International Journal of Science, Strategic Management and Technology, *02*(6). https://doi.org/10.55041/ijsmt.v2i6.083

Abstract— The transportation industry generates large volumes of operational data through daily taxi bookings, fare transactions, customer interactions, and service activities. Analyzing this data effectively is essential for improving business performance, customer satisfaction, and operational efficiency. Traditional reporting methods often fail to provide dynamic insights and require significant manual effort. Therefore, Business Intelligence tools have become increasingly important for transforming raw transportation data into meaningful information.

This paper presents a Taxi Fare Analysis Dashboard developed using Microsoft Power BI. The proposed system utilizes data cleaning, transformation, modeling, and visualization techniques to analyze taxi booking data and generate actionable business insights. The dashboard provides detailed analysis of booking trends, revenue generation, vehicle performance, cancellation patterns, payment methods, and customer ratings. Power Query and Data Analysis Expressions (DAX) are used to preprocess and analyze data efficiently. Interactive visualizations such as KPI cards, charts, graphs, and slicers enable users to explore business performance dynamically.

The developed system demonstrates how Business Intelligence technologies can support data-driven decision-making in transportation services. The results indicate that Power BI provides an effective platform for analyzing taxi operations and identifying opportunities for business improvement.

Keywords— Power BI, Business Intelligence, Data Analytics, Taxi Fare Analysis, Dashboard Development, Data Visualization, Transportation Analytics.

I. INTRODUCTION

The rapid growth of urban transportation services and ride-booking platforms has resulted in the generation of massive volumes of operational data. Every taxi booking creates valuable information related to trip distance, fare amount, booking status, vehicle category, payment method, customer ratings, and service performance. This information can be utilized to improve business operations and support strategic decision-making.

Modern transportation companies increasingly rely on data analytics to understand customer behavior, monitor service quality, identify operational inefficiencies, and improve revenue generation. However, traditional reporting systems often provide static reports that are difficult to interpret and do not support interactive analysis.
As a result, Business Intelligence tools have emerged

as effective solutions for transforming raw transportation data into meaningful insights.

Microsoft Power BI is one of the most widely used Business Intelligence platforms due to its powerful data visualization capabilities, interactive dashboards, and advanced analytical features. Power BI enables organizations to connect multiple data sources, perform data transformation, create analytical models, and generate comprehensive reports.

The objective of this project is to develop an interactive Taxi Fare Analysis Dashboard using Microsoft Power BI. The system analyzes taxi booking records and presents business insights related to revenue performance, booking trends, vehicle utilization, cancellation behavior, and customer satisfaction. The dashboard provides a user-friendly interface that supports efficient monitoring and evaluation of taxi service operations.

The remainder of this paper is organized as follows. Section II discusses challenges in taxi fare analytics. Section III presents open research issues and analytical requirements. Section IV describes tools and technologies used in the project. Section V discusses future enhancement opportunities, and Section VI concludes the study.

II. CHALLENGES IN TAXI FARE ANALYTICS

The transportation sector continuously generates large datasets from booking platforms and operational systems. While these datasets provide valuable information, extracting meaningful insights presents several challenges.

A. Data Collection and Management

Taxi service datasets contain information from multiple sources including booking systems, payment records, customer feedback, and operational logs. Managing such large volumes of data efficiently remains a significant challenge. Data inconsistencies, duplicate records, and missing values often affect analytical accuracy and require extensive preprocessing.

B. Data Quality and Preprocessing

Raw transportation datasets frequently contain incomplete records, formatting inconsistencies, and invalid values. Data cleaning and transformation are essential to ensure reliable analysis. Poor data quality can lead to inaccurate business conclusions and negatively impact decision-making processes.

Taxi Dataset
↓
Power Query
↓
Data Cleaning
↓
Data Modelling
↓
DAX Measures
↓
Power BI Dashboard
↓
Business Insights

C. Revenue and Performance Analysis

Transportation companies require continuous monitoring of revenue generation and operational performance. Identifying profitable vehicle categories, analyzing booking trends, and understanding revenue distribution across services are important analytical tasks. Performing these analyses manually becomes increasingly difficult as data volume grows.

D. Customer Satisfaction Evaluation

Customer satisfaction plays a critical role in transportation services. Evaluating customer ratings, feedback patterns, and service quality metrics helps organizations improve user experience. However, analyzing large volumes of customer interaction data remains challenging without appropriate analytical tools.

E. Data Visualization and Decision-Making

Complex transportation datasets often contain information that is difficult to interpret through traditional reports. Effective visualization techniques are required to transform raw data into understandable business insights. Interactive dashboards provide better decision-making support compared to conventional reporting methods.

III. OPEN RESEARCH ISSUES IN TRANSPORTATION ANALYTICS

Transportation analytics continues to evolve with advancements in Business Intelligence, cloud computing, machine learning, and real-time data processing technologies.

A. Real-Time Monitoring Systems

Most existing analytical dashboards rely on historical datasets. Integrating real-time booking

information would enable organizations to monitor operational performance continuously and respond quickly to changing business conditions.

B. Predictive Analytics

Future transportation systems can utilize predictive analytics to forecast booking demand, customer behavior, and revenue generation. Predictive models can help organizations optimize resource allocation and improve service planning.

C. Machine Learning Integration

Machine learning techniques can enhance transportation analytics by identifying hidden patterns and generating automated insights. Demand prediction, customer segmentation, and fare forecasting represent promising research areas for future development.

D. Geographic Data Analysis

Location-based analytics can provide valuable information regarding trip routes, service coverage, and demand distribution. Integration of mapping technologies can improve transportation planning and operational efficiency.

Fig. 2: Project Implementation Process

IV. TOOLS AND TECHNOLOGIES USED

The Taxi Fare Analysis Dashboard was developed using Microsoft Power BI and various Business Intelligence techniques. The selected tools provide efficient data processing, visualization, and reporting capabilities.

A. Microsoft Power BI

Microsoft Power BI is a leading Business Intelligence and Data Visualization platform developed by Microsoft. It enables organizations to transform raw data into meaningful insights through interactive dashboards and reports. Power BI supports data integration, data transformation, data modeling, and advanced analytical capabilities.

The major features of Power BI include:

- Data Import and Integration
- Power Query for Data Transformation
- Data Modeling
- DAX Calculations
- Interactive Visualizations
- Dashboard Development
- Report Sharing and Collaboration

Power BI serves as the primary platform for dashboard development in this project.

Business Intelligence and Data Analytics have become essential technologies for modern organizations. Researchers have explored various approaches for transforming raw operational data into actionable business insights. Transportation analytics has emerged as an important research area due to the rapid growth of ride-booking services and urban transportation systems.

Several studies have highlighted the importance of Business Intelligence tools in improving operational efficiency and decision-making processes. Interactive dashboards allow organizations to monitor key performance indicators and identify performance trends effectively. Microsoft Power BI has gained significant popularity because of its user-friendly interface, powerful visualization capabilities, and efficient data processing features.

Recent research indicates that transportation organizations generate large volumes of data related to bookings, fares, customer behavior, vehicle performance, and service quality. Proper analysis of these datasets can help improve revenue generation, customer satisfaction, and resource utilization. Researchers have also emphasized the importance of data visualization for understanding complex datasets and communicating business insights effectively.

Various analytical techniques have been proposed for transportation data analysis including descriptive analytics, predictive analytics, and machine learning-based forecasting models. However, many organizations still face challenges related to data quality, real-time monitoring, and efficient reporting mechanisms. Business Intelligence platforms such as Power BI provide effective solutions by enabling data integration, transformation, visualization, and reporting within a single environment.

The present study focuses on the development of a Taxi Fare Analysis Dashboard using Microsoft Power BI to provide interactive business insights and support data-driven decision-making.

B. Power Query

Power Query is used for extracting, cleaning, and transforming raw taxi booking data. Data preprocessing activities include removal of duplicate records, handling missing values, data type conversion, and column formatting. These operations improve data quality and analytical accuracy.

C. Data Modeling

Data modeling organizes relationships between different data fields and supports efficient analysis. Proper modeling improves dashboard performance and ensures accurate calculations. Relationships among booking information, revenue data, vehicle categories, and customer ratings are established to create a unified analytical framework.

D. DAX (Data Analysis Expressions)

DAX is used to create custom calculations and performance measures within Power BI. Several important measures were developed during the project, including:

- Total Bookings
- Total Revenue
- Average Customer Rating
- Cancellation Rate
- Booking Success Rate
- Vehicle-wise Revenue Analysis

These measures provide valuable insights into transportation business performance.

E. Data Visualization Components

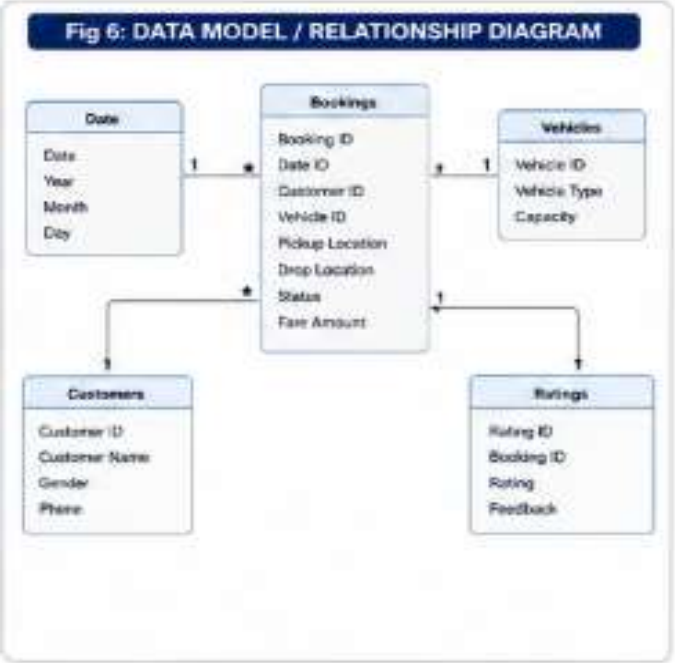
Various visualization components are used to present information effectively. These include KPI cards, bar charts, pie charts, line charts, tables, slicers, and filters. Interactive visualizations allow users to explore business information dynamically and support better decision-making.

V. IMPLEMENTATION AND RESULTS

The Taxi Fare Analysis Dashboard was successfully implemented using Microsoft Power BI. The system transforms raw transportation data into interactive reports and business intelligence dashboards.

The implementation process consisted of the following stages:

1. Dataset Collection
2. Data Cleaning and Validation
3. Data Transformation
4. Data Modeling
5. DAX Measure Development
6. Dashboard Design
7. Report Generation and Analysis



The developed dashboard provides multiple analytical views including booking analysis, revenue analysis, vehicle performance analysis, cancellation analysis, and customer rating evaluation.

The results demonstrate that interactive visualization significantly improves business understanding compared to traditional reporting techniques. Revenue trends can be monitored efficiently, booking patterns can be identified quickly, and customer satisfaction levels can be evaluated effectively.

The dashboard also enables stakeholders to analyze operational performance using filters and drill-down

capabilities. This supports faster decision-making and improves organizational transparency.

Taxi Dataset
|
Data Import
|
Data Cleaning
|
Data Transformation
|
KPI Creation
|
Dashboard Design
|
Interactive Reports
|
Business Decisions

VI. SUGGESTIONS FOR FUTURE WORK

Although the proposed system provides effective analytical capabilities, several enhancements can be implemented in future versions.

Future improvements may include:

- Integration of real-time taxi booking data.
- Development of predictive analytics models for fare forecasting.
- Machine learning-based demand prediction.
- Cloud database integration for automatic updates.
- Geographic route and location analysis using maps.
- Driver performance monitoring systems.
- Mobile dashboard deployment.
- Automated report generation.
- AI-based transportation forecasting.
- Advanced customer behavior analysis.

These enhancements can further improve analytical accuracy and provide deeper business insights for transportation organizations.

VII. CONCLUSION

The Taxi Fare Analysis Dashboard developed using Microsoft Power BI successfully transforms raw transportation data into meaningful business insights. The project demonstrates the practical application of Business Intelligence techniques for analyzing taxi service operations and supporting data-driven decision-making.

The dashboard provides comprehensive analysis of bookings, revenue generation, vehicle performance, cancellation patterns, payment methods, and customer ratings through interactive visualizations. Data cleaning, transformation, modeling, and DAX calculations ensure reliable and accurate analytical results.

The implementation confirms that Business Intelligence tools can significantly improve operational monitoring and performance evaluation within transportation services. Interactive dashboards simplify complex datasets and enable organizations to identify trends, monitor key performance indicators, and make informed strategic decisions.

Overall, the proposed system serves as an effective analytical solution for transportation data management and highlights the growing importance of Business Intelligence technologies in modern business environments.

REFERENCES

[1] Microsoft Corporation, Microsoft Power BI Documentation, Microsoft Learn.
[2] Microsoft Corporation, Power Query Documentation, Microsoft Learn.
[3] Microsoft Corporation, Data Analysis Expressions (DAX) Documentation, Microsoft Learn.
[4] Alberto Ferrari and Marco Russo, The Definitive Guide to DAX, Microsoft Press, 2019.
[5] Marco Russo and Alberto Ferrari, Analysing Data with Power BI and Power Pivot for Excel, Microsoft Press, 2017.
[6] Reza Rad, Power BI from Rookie to Rock Star, RADACAD Publications, 2020.
[7] Ralph Kimball and Margy Ross, The Data Warehouse Toolkit, Wiley Publications, 2013.
[8] Thomas H. Davenport and Jeanne G. Harris, Competing on Analytics, Harvard Business Review Press, 2007.

[9] Provost, F. and Fawcett, T., Data Science for Business, O'Reilly Media, 2013.

[10] Sharda, R., Delen, D., and Turban, E., Business Intelligence, Analytics, and Data Science, Pearson Education, 2020.