



## **Revenue Insights in Hospitality Domain**

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The domain of the Project

Revenue Insights in Hospitality Domain  
(SQL and Power BI)

Under the guidance  
Of

Mrs. Siddhika Shah

By

Mr. Akshay Kishor Nehete  
(MCA Graduate)

Period of the project December 2024 to March 2025



SURE TRUST

PUTTAPARTHI, ANDHRA PRADES



## DECLARATION

The projects titled “**Revenue Insights in Hospitality Domain with Power BI**” has been mentored by **Mrs. Siddhika Shah** and organized by SURE Trust from December 2024 to March 2025. This initiative aims to benefit educated unemployed rural youth by providing hands-on experience in industry-relevant projects, thereby enhancing employability.

I, **Mrs. Siddhika Shah**, hereby declare that I have solely worked on this project under the guidance of my mentor. This project has significantly enhanced my practical knowledge and skills in the domain.

Name

Mr. Akshay Kishor Nehete

Signature

Mentor

Mrs. Siddhika Shah

Signature

Seal & Signature

Prof. Radhakumari

Executive Director & Founder

SURE Trust



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## Executive Summary

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This Power BI project focuses on analyzing two distinct datasets—guest stay data and financial transaction data—to derive actionable insights through interactive dashboards. The **Occupancy and Revenue Dashboard** visualizes room booking trends across various hotel locations, seasons, and room categories, helping identify high-revenue zones and optimize pricing strategies. Simultaneously, the **Spending Behavior Dashboard** analyzes guest behavior, in-house purchases, and time-based spending patterns to uncover trends in guest preferences and detect anomalies or opportunities for upselling. These dashboards not only enhance data-driven decision-making for hotel management but also provide a scalable solution for improving revenue streams and guest satisfaction in the hospitality industry.



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## Introduction

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### Background and Context

In today's competitive hospitality industry, data-driven decision-making plays a pivotal role in driving business growth and improving customer satisfaction. Hotels, resorts, and other hospitality services generate vast volumes of data daily—from booking trends and seasonal occupancy rates to guest preferences and revenue streams. To remain competitive and profitable, it is essential to harness this data effectively.

This project leverages **Microsoft Power BI** to visualize and analyse key revenue-related data within the hospitality domain. The datasets used include detailed information on room bookings, revenue by service category (e.g., room service, dining, spa), guest demographics, and seasonal trends. Through comprehensive data cleaning and modelling, the project delivers dynamic, interactive dashboards that help stakeholders uncover patterns, monitor performance metrics, and make informed strategic decisions to optimize revenue generation and enhance guest experiences.

### Problem Statement

The hospitality industry faces significant challenges in understanding and optimizing revenue due to the complexity and volume of data generated from various sources such as room bookings, ancillary services, seasonal fluctuations, and customer preferences. Manual analysis of this data is not only time-consuming but often fails to reveal deeper insights necessary for strategic decision-making. There is a lack of intelligent, visual analytics platforms that offer real-time, interactive dashboards to monitor revenue trends, identify high-performing areas, and detect underperforming segments. The core issue lies in transforming raw, fragmented data into actionable insights that can help hospitality businesses maximize revenue, enhance operational efficiency, and improve customer satisfaction.

### Scope

This project focuses on developing two comprehensive dashboards designed to enhance revenue analysis within the hospitality sector:

- **Revenue Overview Dashboard:** Presents key metrics such as total revenue, revenue by room type, service-wise income (e.g., food & beverage, spa,



events), and occupancy trends across different time periods.

- **Customer Insights Dashboard:** Analyses guest demographics, booking behaviours, average spend per customer, and seasonal trends to help identify high-value customers and optimize marketing strategies.

Both dashboards are built using **Power BI's interactive and real-time visual analytics capabilities**, aiming to empower hospitality managers, revenue analysts, and decision-makers to identify patterns, track performance, and make strategic business decisions quickly and efficiently.

- **Non-ML Approach:** The project demonstrates the ability to derive meaningful insights through structured data modelling, filtering, and visualization techniques—without the use of complex machine learning algorithms—proving that significant business value can be unlocked through effective business intelligence solutions alone.

### **Limitations**

- The analysis is confined to the available datasets, which may not fully represent the entire spectrum of hospitality operations or revenue streams across different properties or regions.
- Real-time data integration is not implemented; the dashboards are based on static data snapshots, which may limit the ability to make up-to-the-minute decisions.
- The accuracy and relevance of insights are dependent on the quality, granularity, and completeness of the input data.
- External influencing factors such as economic conditions, tourism trends, local events, and competition are not accounted for in this project, which may impact revenue performance but lie outside the scope of this analysis.

### **Innovation**

This project distinguishes itself by combining multiple revenue-related dimensions—such as bookings, customer behavior, and service-wise income—into a unified, interactive BI framework tailored for the hospitality domain. Leveraging Power BI's advanced data modeling, DAX measures, and dynamic visuals, the dashboards uncover hidden trends and relationships that are often overlooked in traditional reporting systems.



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## Project Objectives

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### Project Objectives:

#### 1. Data Cleaning and Preparation

To preprocess and transform raw hospitality datasets into a structured format suitable for insightful analysis in Power BI. This includes handling missing values, correcting data types, renaming columns for clarity, and creating calculated columns and measures using DAX for meaningful aggregations (e.g., revenue per customer, average occupancy rate)

#### 2. Design Interactive Dashboards

To develop two intuitive and visually engaging dashboards—**one focused on overall revenue performance** and **another on customer behavior insights**—that enable users to filter, slice, and drill down through data with ease.

#### 3. Enable Insightful Data Visualization

To leverage Power BI's advanced visualizations (e.g., bar charts, pie charts, line graphs, KPIs, and heat maps) to highlight essential business metrics such as revenue trends, service-wise contribution, occupancy patterns, and seasonal performance

#### 4. Support Data-Driven Decision Making

To empower hospitality stakeholders—such as revenue managers, hotel owners, and marketing teams—with real-time, visual representations of data that support accurate, timely, and strategic decisions to boost profitability and enhance guest satisfaction.

#### 5. Lay the Groundwork for Predictive Analytic

To structure the dashboards in a way that allows for future integration of predictive models, enabling the forecasting of demand trends, customer behavior, and revenue potential using machine learning techniques.



## **Expected Outcomes:**

### **1. Crime Dashboard showing:**

- Total revenue segmented by room types, services (e.g., dining, spa, events), and locations
- Time-based revenue trends (daily, weekly, monthly, seasonal)
- Occupancy rates and average daily rate (ADR) across different periods

### **2. Fraud Detection Dashboard revealing:**

- Booking behaviour and spending patterns by customer demographics
- Seasonal trends in customer demand
- Identification of high-value guests and most profitable services
- Improved strategic visibility for hospitality managers and executives through **intuitive visuals, drill-down reports, and dynamic slicers/filters**
- Enhanced operational efficiency by minimizing manual data aggregation and enabling real-time data exploration
- A **scalable BI solution** that can be easily updated with new datasets or extended with advanced features such as predictive analytics, alert systems, or AI-driven guest behaviour forecasts





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## Methodology and Results

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### Methods/Technology Used

The project applies Data Analytics and Business Intelligence (BI) methodologies to transform raw data into meaningful insights. It includes:

- **Data preprocessing:** Cleaning and transforming raw datasets using Power Query Editor in Power BI to handle missing values, correct data types, and prepare data for analysis.
- **Data modeling:** Establishing relationships between tables, defining hierarchies, and creating DAX measures and calculated columns to perform essential aggregations (e.g., revenue per room, occupancy rate, average customer spends).
- **Interactive visualization:** Utilizing Power BI's interactive visual tools—such as bar charts, line graphs, pie charts, cards, and slicers—to identify patterns, seasonal trends, and revenue fluctuations across services and timeframes.
- **Descriptive analysis:** Summarizing historical booking and revenue data to understand past performance, peak periods, and popular services.
- **Diagnostic analysis:** Applying filters, drill-throughs, and segmentation to investigate reasons behind trends like low occupancy, high cancellation rates, or underperforming service categories

### Tools/Software Used

- **Microsoft Power BI Desktop** – For creating dashboards, visualizations, and data models
- **Power Query Editor** – Used for cleaning and transforming raw data
- **DAX (Data Analysis Expressions)** – For building custom measures, KPIs, and calculated columns
- **Excel/CSV Files** – Served as the primary data sources for the project
- **MS Excel / Google Sheets (Optional)** – Used for initial data review and basic preprocessing before import



## Data Collection Approach

The datasets were sourced from open-source repositories and simulated hospitality environments to reflect realistic business scenarios:

- **Revenue Dataset:**  
Includes data points such as booking ID, room type, service availed (e.g., dining, spa), check-in/check-out dates, amount spent, and customer demographics.
- **Customer Behaviour Dataset:**  
Contains details like booking frequency, preferred services, time of booking, feedback scores, and seasonal trends.

The data was downloaded in **CSV format**, with no real-time APIs involved. These datasets were designed to simulate actual hospitality business operations and were used to test the effectiveness of Power BI dashboards in uncovering actionable revenue insights.

## Project Architecture

### 1. Data Source Layer

CSV files containing revenue and customer behaviour data

### 2. Data Preparation Layer

Power Query Editor used for cleaning, transforming, and formatting data (e.g., removing nulls, adjusting data types)

### 3. Data Modelling Layer

Relationships defined between tables; calculated columns and DAX measures created for KPIs (e.g., Total Revenue, ADR)

### 4. Visualization Layer

Dashboards built using visuals like bar charts, pie charts, line graphs, heatmaps, cards, and slicers

### 5. User Interaction Layer

Interactive filters and slicers allow users to explore data by service type, date range, customer segment, and more



## **Results**

### **1. Revenue Trends Identified:**

Clear patterns in revenue generation across different services (rooms, dining, spa) and time periods (monthly/seasonal).

### **2. Occupancy & Performance Metrics:**

Calculated metrics such as Occupancy Rate, Average Daily Rate (ADR), and Revenue per Available Room (RevPAR) helped evaluate property performance.

### **3. Customer Segmentation Insights:**

Analysis revealed spending behaviour by customer type (e.g., corporate vs. leisure), enabling targeted marketing opportunities.

### **4. High/Low Revenue Sources:**

Pinpointed underperforming services and top revenue generators using bar charts and category-wise comparisons.

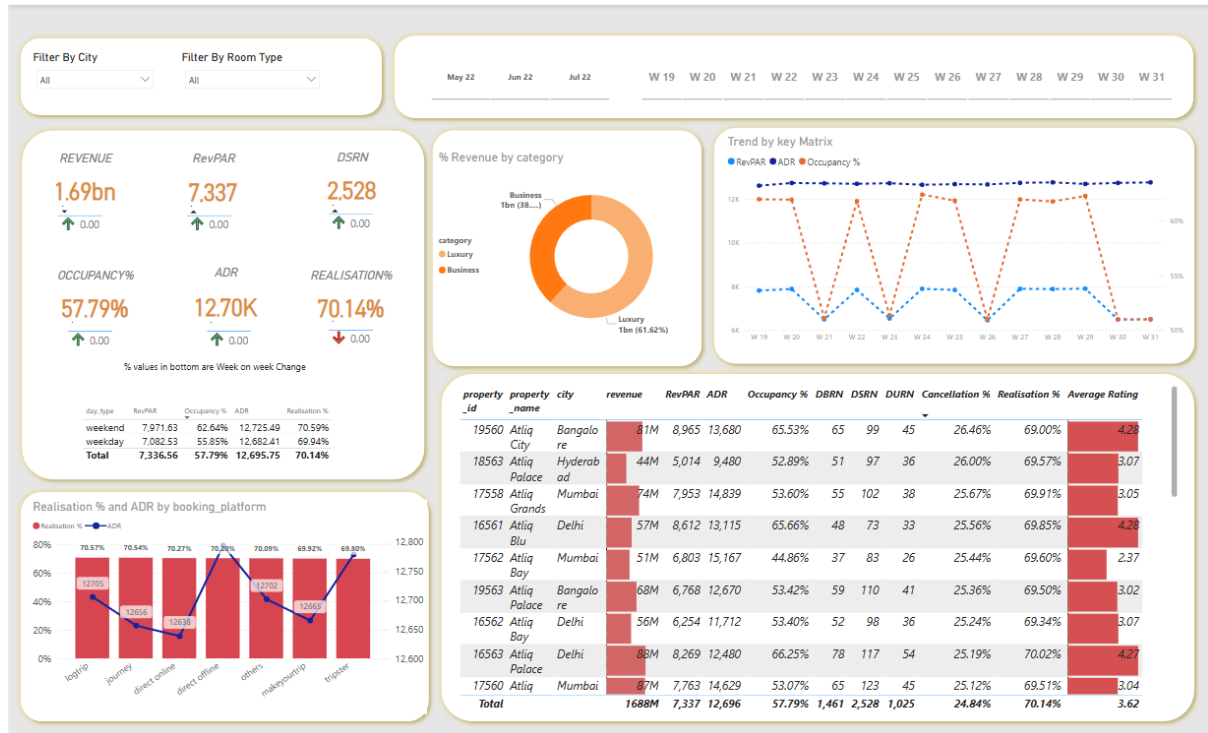
### **5. Interactive Dashboards:**

Enabled dynamic filtering and real-time insights for stakeholders to explore trends, identify anomalies, and support strategic decisions.

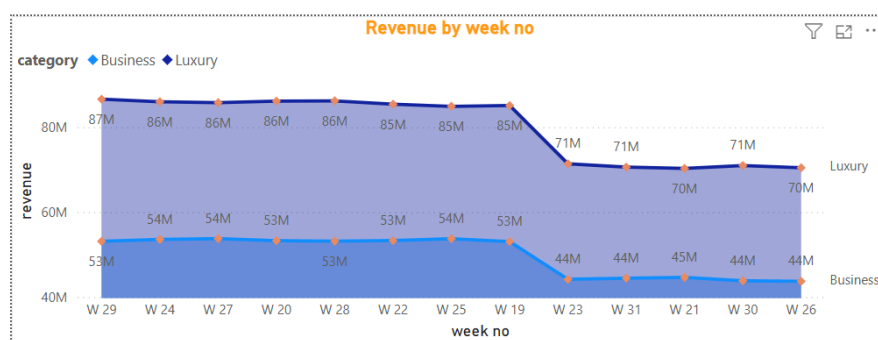


## Final Project Working Screenshots

### Home

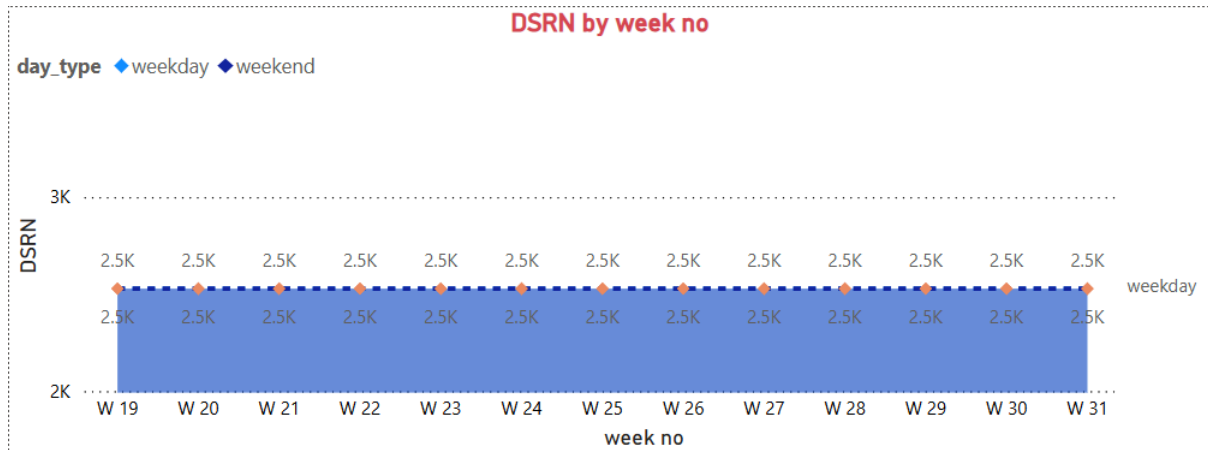


### Rev by Trends

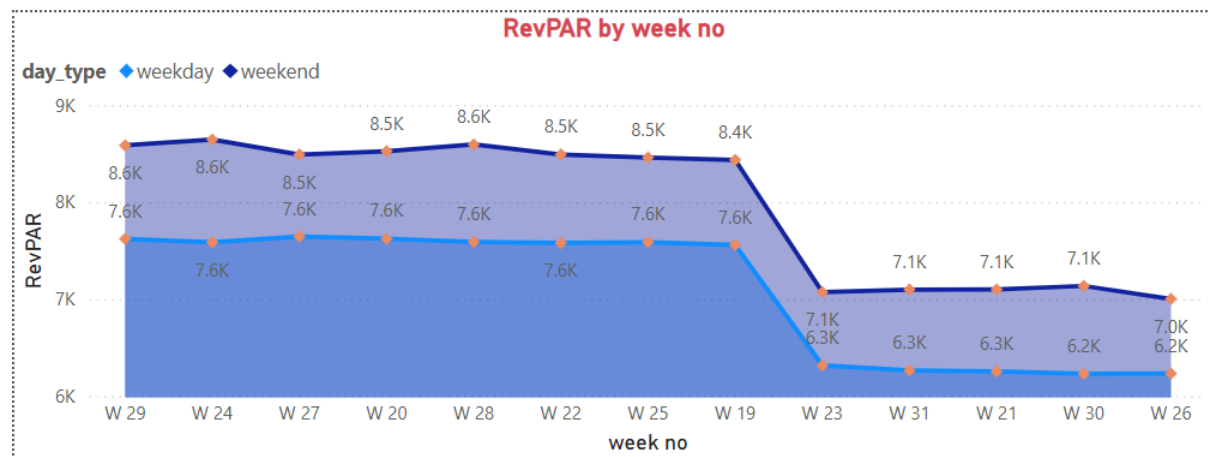




## DSRN

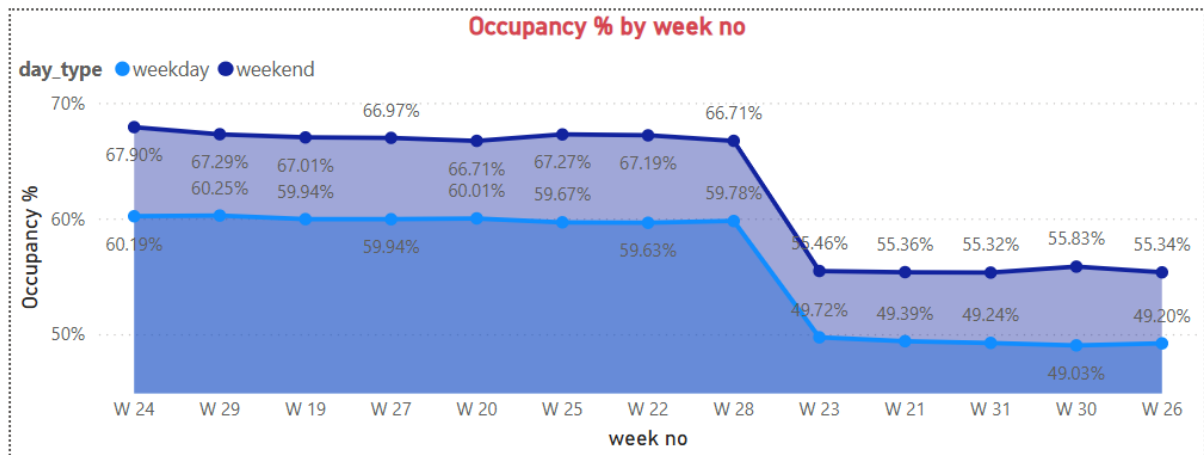


## RevPAR

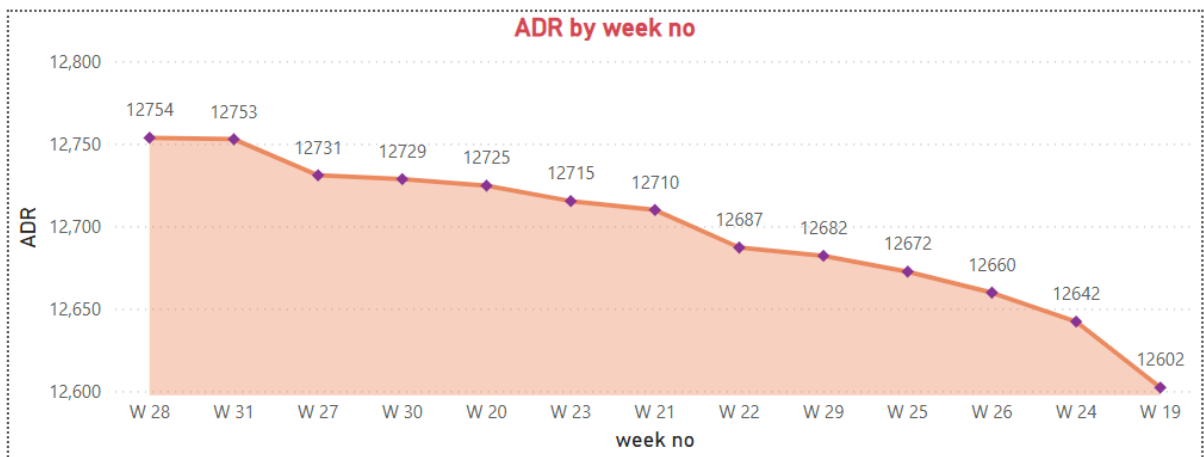




## Occupancy



## ADR



## GITHUB Link

<https://github.com/Akshay-arc/Revenue-Insights-in-Hospitality-Domain.git>



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## **Learning and Reflection**

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### **Learning and Reflection**

This project has been a transformative journey that significantly enhanced both my technical proficiency and analytical mindset. Working extensively with Power BI allowed me to gain hands-on experience in data visualization, dashboard development, and the core principles of business intelligence. I learned how to clean and preprocess raw datasets, build data models using relationships and DAX, and transform complex data into intuitive, actionable visuals. One of the most impactful aspects was learning how to tell a compelling story through data. By incorporating interactive elements such as slicers and filters, I discovered how to make dashboards more engaging and user-centric—empowering stakeholders to explore insights on their own terms and make informed decisions.

Beyond the technical skills, this project deepened my appreciation for data quality, integrity, and clarity. Whether analysing revenue patterns or uncovering user behaviour trends, I realized the importance of designing visuals that are not only informative but also purposeful and easy to interpret. Personally, it improved my problem-solving abilities, strengthened my attention to detail, and boosted my confidence in handling real-world data scenarios. Overall, this experience not only expanded my BI capabilities but also reinforced the value of data as a powerful tool for driving meaningful impact in both business and society.



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## Conclusion and Future Scope

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### Objectives

The primary goals of this project were to:

#### 1. Clean and Prepare Raw Data

Transform unstructured data into a clean, usable format using Power Query Editor.

#### 2. Build Interactive Dashboards

Create dynamic and user-friendly dashboards for both revenue trends and customer insights.

#### 3. Perform Data Modelling

Establish relationships between tables and define calculated columns/measures using DAX.

#### 4. Visualize Key Insights

Use charts, graphs, and slicers to highlight trends, patterns, and anomalies in the data.

#### 5. Enable User Interactivity

Allow users to filter data by date, service type, customer segment, etc., for deeper insights.

#### 6. Enhance Decision Making

Provide stakeholders with visual tools to support quicker and smarter decision-making.

#### 7. Ensure Scalability

Design dashboards to allow easy integration of real-time data or predictive analytics in the future.

#### 8. Improve Analytical Skills

Strengthen proficiency in data analysis, Power BI, and business intelligence practices





## **Achievements**

### **1. Designed Dual Dashboards**

Created two interactive dashboards for Crime Analysis and Fraud Detection in Power BI.

### **2. Performed Advanced Data Modelling**

Built data relationships and used DAX for KPIs, calculated columns, and measures.

### **3. Transformed and Cleaned Data**

Used Power Query Editor to handle missing values, type conversions, and inconsistencies.

### **4. Visualized Key Insights**

Developed impactful visuals like bar charts, heatmaps, pie charts, and cards to highlight trends.

### **5. Built User-Friendly Interfaces**

Enabled intuitive filtering by crime type, location, time, and transaction behaviour.

### **6. Applied Analytical Thinking**

Identified hidden trends and anomalies in both crime and financial datasets.

### **7. Ensured Scalability**

Designed dashboards with future upgrades in mind, including real-time data and AI integration.

### **8. Enhanced Technical Skills**

Improved proficiency in Power BI, DAX, data visualization, and storytelling with data.

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## **Conclusion**

This Power BI project demonstrates the significant value of data visualization in transforming raw datasets into meaningful, actionable insights. The Crime Analysis Dashboard effectively pinpoints high-risk areas and common premises for criminal activity, supporting more strategic policing and public safety initiatives. Meanwhile, the Fraud Detection Dashboard offers a clear view of suspicious transaction behaviors based on timing, user patterns, and transaction types—enabling financial institutions to strengthen fraud prevention efforts. Through the use of interactive visuals, dynamic filters, and detailed modeling, the project empowers users to make faster, more informed decisions. Overall, it highlights the critical role of business intelligence tools in enhancing operational efficiency, improving situational awareness, and laying the foundation for future predictive analytics.

## **Future Scope**

The project lays a strong foundation for real-time, data-driven decision-making in the domains of public safety and financial fraud detection. While the current dashboards are static and based on historical data, there is significant potential for future enhancements:

### **1. Real-Time Data Integration**

By connecting Power BI to live data sources such as APIs, SQL databases, or streaming services, users can monitor crime incidents and financial transactions in real time, allowing for quicker response and proactive interventions.

### **2. Predictive Analytics and Machine Learning**

Integrating predictive models using Python or R within Power BI could help forecast crime hotspots or detect potential fraud before it occurs. These models could be trained on historical data to identify complex patterns and anomalies.

### **3. Geospatial Analysis**

Enhancing the crime dashboard with interactive maps (using ArcGIS or Power BI Map visuals) will allow users to visually explore crime densities and distribution across different regions or zones.



#### **4. User Alerts and Notifications**

Implementing automated alerts based on specific thresholds (e.g., unusual transaction volume or a spike in crime) can help authorities and analysts act quickly and efficiently.

#### **5. Enhanced Role-Based Access Control**

Introducing multiple user roles (e.g., police, financial auditors, investigators) with customized views and filters will make the dashboards more secure and user-specific.

#### **6. Mobile Dashboard Accessibility**

Optimizing the reports for mobile platforms ensures that decision-makers can access insights on-the-go, increasing the reach and usability of the solution.

#### **7. Scalability to Other Domains**

The current architecture can be easily adapted to other domains such as healthcare fraud, cybercrime, traffic violations, or internal corporate investigations, making it a versatile business intelligence solution.