Detailed Case Study

Calgary Public Library

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1. Introduction

The Calgary Public Library plays a vital role in promoting literacy, learning, and community engagement across Calgary. As public libraries evolve to meet the digital and social needs of their communities, data-driven decision-making becomes increasingly essential. This project is designed to harness open-source data from Calgary Public Library operations to develop an insightful, interactive dashboard using Power BI. The goal is to provide stakeholders with a clear understanding of how library services are utilized and how they can be improved.

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2. Data Overview

The dataset used for this project includes a wide range of attributes related to the usage of Calgary Public Library facilities and services. Key variables include:

- **RecordID: Unique identifier for each transaction or record.**
- **VisitDate: Date of the library visit.**
- **Branch: Name of the library branch.**
- **MemberID: Anonymized identifier for each library member.**
- **NewMembership: Indicates whether a member was newly registered.**
- **BooksBorrowed / EbooksDownloaded: Count of physical and digital materials borrowed.**
- **ComputerSessions / WifiSessions: Number of technology sessions used.**
- **EventType / EventAttended / ProgramRegistered: Participation in community or educational events.**
- **SatisfactionScore: Feedback rating by visitors.**
- **PostalCode / NeighborhoodIncome / PopulationDensity: Socioeconomic and demographic data.**
- **AgeGroup: Age categorization of library members.**
- **BooksReturnedLate: Instances of overdue book returns.**
- **StaffOnDuty / VolunteerHours: Operational staffing metrics.**
- **FeedbackSubmitted: Indicates whether user feedback was submitted.**

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3. Project Goals

The project has the following core objectives:

- **Develop a comprehensive dashboard to visualize key metrics.**
- **Identify patterns of library usage across different demographics and locations.**
- **Support data-driven policy and program development for the library.**

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4. Key Questions

The analysis aims to answer the following questions:

1. **Which age groups and income levels are most engaged with library services?**
2. **Which branches experience the highest and lowest utilization rates, and why?**
3. **How do different program types and digital services correlate with user satisfaction?**

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5. Key Performance Indicators (KPIs)

We established the following KPIs to measure operational efficiency and strategic impact:

Category	KPI/Metrics
Visitor Engagement	Total Visits, New Memberships, Repeat Visitors
Program Success	Program Registration Rate, Event Attendance, Feedback Volume
Digital Usage	Ebooks Downloaded, Computer and WiFi Sessions per Visitor
Community Satisfaction	Average Satisfaction Score, Feedback Submission Rate
Demographics	Utilization by Age Group, Postal Code, and Income Bracket
Operations	Average Staff on Duty, Total Volunteer Hours

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6. Data Model

The data model includes the following primary tables:

- **VisitData Table: Includes RecordID, VisitDate, Branch, MemberID, AgeGroup, and Visit Details.**
- **UsageData Table: Contains BooksBorrowed, EbooksDownloaded, ComputerSessions, WifiSessions.**
- **EventParticipation Table: Contains ProgramRegistered, EventType, EventAttended.**
- **Demographics Table: PostalCode, NeighborhoodIncome, PopulationDensity.**
- **Feedback Table: SatisfactionScore, FeedbackSubmitted.**
- **Staffing Table: StaffOnDuty, VolunteerHours.**

Primary Keys: RecordID, VisitDate, and MemberID serve as the primary keys to ensure uniqueness and enable joins across tables.

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7. Dashboard Layout & Data Presentation Strategy

To effectively communicate the findings, we used Power BI to create a multi-tabbed dashboard layout including:

- **Executive Overview Page: High-level KPIs and summary metrics.**
- **Demographics Page: Breakdown of library usage by age group, income, and postal code.**
- **Branch Performance Page: Comparative analysis of visits, events, and satisfaction across branches.**
- **Program Insights Page: Event attendance, feedback trends, and program registration over time.**
- **Digital Usage Page: Trends in ebooks downloaded, internet usage, and digital access.**

Visuals include bar charts, line graphs, pie charts, and heat maps with filters for time, location, and demographics.

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8. Results

The analysis yielded the following key insights:

- **High Engagement Age Groups: Children and adults aged 25-34 showed the highest participation.**
- **Branch-Level Variation: Some branches in high-income neighborhoods showed higher program participation but lower digital service usage.**
- **Community Impact: Branches in lower-income areas had higher digital service usage and volunteer involvement.**
- **Satisfaction: A strong correlation exists between volunteer hours and higher satisfaction scores.**
- **Program Success: Educational events and workshops had the highest satisfaction ratings and feedback submissions.**

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9. Conclusion

The Calgary Public Library dashboard project demonstrates the power of data analytics in enhancing community services. By analyzing a variety of operational and demographic indicators, we were able to:

- **Identify gaps in service delivery.**
- **Highlight successful programs and services.**
- **Provide actionable insights for future resource allocation.**

The dashboard serves as a valuable tool for library administrators, allowing them to monitor usage trends, understand community needs, and make evidence-based decisions.

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10. Individual Contributions

- **Abhishek Kumar: Led data preprocessing, coordinated dashboard structure, and conducted overall quality assurance.**
- **Pruthak Patel: Designed key visuals in Power BI, created interactive filters and slicers, and analyzed demographic data.**
- **Mfonoboing Umoh: Documented the report, led insight generation, and contributed to KPI definition and stakeholder presentation.**

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11. Future Recommendations

- **Integrate real-time data feeds for continuous monitoring.**
- **Conduct sentiment analysis on open-ended feedback.**
- **Expand demographic data to include education level and language preference.**
- **Introduce predictive analytics to forecast future trends in library usage.**

12. Dashboard