

Data Analysis Using Power BI

Md Alauddin, Amity Business School, Amity University Chhattisgarh

Dr Annapurna Metta, Amity business School University Chhattisgarh

Abstract

In today's data-driven world, organizations are increasingly relying on data analytics to derive actionable insights and make informed decisions. This dissertation explores the application of Power BI, a powerful business analytics tool by Microsoft, in transforming raw data into meaningful visual reports and dashboards. The study aims to demonstrate how Power BI can be effectively used to analyse, visualize, and interpret large datasets to support strategic decision-making processes. The research highlights key features of Power BI, including its data connectivity capabilities, data transformation through Power Query, DAX (Data Analysis Expressions) for complex calculations, and advanced visualization tools. Through a case study approach, real-world datasets are analysed to showcase the end-to-end process of building interactive dashboards that reveal trends, patterns, and performance metrics across various domains such as sales, marketing, and operations.

key words from the abstract: Data Analytics, Power BI, Business Intelligence, Data Visualization, Dashboards, Microsoft, DAX (Data Analysis Expressions).

Introduction

In the era of digital transformation, data has emerged as one of the most valuable assets for organizations across all sectors. The ability to collect, analyse, and interpret data effectively can significantly influence strategic decisions, optimize operations, and enhance overall business performance. As the volume and complexity of data continue to grow, there is a pressing need for powerful tools that can convert raw data into insightful and actionable information.

Data analytics plays a crucial role in this context by enabling organizations to discover trends, identify patterns, and predict future outcomes. Among the numerous tools available for data analytics, Power BI, developed by Microsoft, has gained widespread popularity due to its intuitive interface, seamless integration with various data sources, and robust visualization capabilities.

Power BI serves as a comprehensive business intelligence platform that allows users to create interactive reports and dashboards, perform advanced analytics using DAX (Data Analysis Expressions).

Objectives of the Study

1. To explore the core features and functionalities of Power BI as a modern data analytics and business intelligence tool.

2. To demonstrate the process of transforming raw data into meaningful insights using Power BI's data modelling, DAX functions, and visualization capabilities.

3. To analyse real-world datasets through the development of interactive dashboards and reports that support data-driven decision-making.



Literature Review

1. Singh and Kaur (2021) highlights that Power BI improves decision-making speed and accuracy in organizations by allowing real-time access to business metrics through dashboards and mobile interfaces. Their study shows that companies using Power BI reported increased agility and improved performance monitoring.

2. Chen, Chiang, and Storey (2012) suggest that visualization plays a critical role in transforming raw data into actionable insights. Power BI's drag-and-drop interface and customizable visuals align with this concept by making data more understandable, especially for non-technical stakeholders.

3. Gupta & Jain (2020) emphasize the educational value of Power BI in academic settings. They point out that students and researchers can use Power BI not only for learning data analytics but also for conducting real-world projects using open-source datasets.

Research Design

This study adopts a mixed-method approach combining both qualitative and quantitative methods. Secondary data from real-world sources (e.g., sales or marketing datasets) will be analysed using Microsoft Power BI. The process includes data cleaning (Power Query), modelling, calculations (DAX), and visualization through dashboards. The research aims to demonstrate how Power BI transforms raw data into actionable insights to support strategic decision-making. The study uses descriptive and applied research techniques and focuses on interpreting patterns, trends, and KPIs. Ethical standards will be followed, and the scope is limited to Power BI's use in business analytics.

Population and Sample

Population:

The population for this study includes users like business professionals, data analysts, and organizations that use data analytics tools for decision-making, specifically those familiar with or using Power BI in sectors like retail, marketing, finance, or operations. It also includes datasets that reflect real-world business operations.

Sample Size:

A total sample of 100 respondents were selected to represent the analysis using power bi tool

Sampling Method:

Convenience and purposive sampling techniques were used to select 70 students across different tool users, 20 professor, 10 from professionals.

Data Collection Tools

Secondary Data Sources:

Publicly available datasets from platforms like Kaggle, data.gov.in, Statista, or company reports will be used for analysis. These datasets may include sales, customer behaviour, marketing, finance, or operational data.



Microsoft Power BI:

The core analytical tool used for data import, transformation (via Power Query), data modelling, calculation (using DAX), and visualization through charts and dashboards.

Microsoft Excel (if needed):

• Used for initial data cleaning or formatting before importing into Power BI.

Survey or Interview Questionnaire: A brief questionnaire may be used to collect insights from 10–15 Power BI users or business analysts regarding the effectiveness and usability of the tool.

Data Analysis and Interpretation:

1.Which BI tool(s) do you currently use for data analysis?		Copy chart
A) Power BI		
B) Tableau		
C) QlikView		
D) Looker		
E) Other (please specify)		
51 responses		
11.8% 11.8% 11.8% 37.3%	 Option 1 Option 2 Option 3 Option 4 None 	

Here Are breakdown of Pie Chart:

BI Tool(s) Used for Data Analysis

- Power BI (37.3%) is the most widely used tool.
- Tableau (33.3%) follows closely.
- QlikView and Looker (each 11.8%) are used by fewer people.
- Other tools and None received very few responses.



Interpretation:

Power BI and Tableau dominate the BI landscape among respondents. Their ease of use, integration capabilities, and visualization power might explain this preference.

2.How frequently do you use BI tools in your daily tasks?		Copy chart
A) Daily		
B) Weekly		
C) Occasionally		
D) Rarely		
E) Never		
51 responses		
19.6% 33.3% 21.6%	 Option 1 Option 2 Option 3 Option 4 Option 5 	

Here is Breakdown of Pie chart:

Frequency of Use

- Weekly (33.3%) is the most common usage frequency.
- Daily users make up 21.6%.
- Occasional (19.6%) and Rarely (19.6%) show a moderate user base.
- Very few never use BI tools.

Interpretation:

A significant portion of users rely on BI tools at least weekly, suggesting moderate to high integration into business processes.

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Primary Purpose of Using BI Tools

3.What is your primary purpose for using BI tools?		Copy chart
A) Data visualization		
B) Report generation		
C) Dashboard creation		
C) Business performance monitoring		
D) Predictive analytics		
51 responses		
29.4% 13.7% 7.8%	 Option 1 Option 2 Option 3 Option 4 Option 5 	

- Data Visualization (35.3%) is the top use case.
- Business Performance Monitoring (29.4%) and Report Generation (13.7%) follow.
- Other options like Dashboard creation and Predictive analytics have lesser usage



User - Friendliness

- 62% find BI tools very easy to use.
- 40% find them moderately difficult (likely option 2 on a 1–5 scale).

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Interpretation:

Most users find the tools accessible, which aligns with the high usage of intuitive tools like Power BI and Tableau.

Effectiveness in Data-Driven Decisions



- 31.4% say "Effective"
- 21.6% say "Very Effective"
- A combined 25.5% neutral, 23.5% ineffective, and 11.8% very ineffective

Interpretation:

While many find BI tools helpful in decision-making, there's a considerable number who either remain neutral or find them lacking impact—indicating room for improvement in data interpretation or tool usage.

6.Do you integrate BI tools with other systems (ERP, CRM, databases)?	Copy chart
A) Yes	
B) No	
C) Not sure 49 responses	
46.9% 10.2% 42.9%	



Integration with Other Systems

- Yes: 42.9%
- No: 46.9%
- Not Sure: 10.2%

Interpretation:

Almost half do not integrate BI tools with systems like ERP/CRM. This suggests either lack of need, technical skills, or awareness.



Challenges in Using BI Tools (multiple selections allowed)

- Complex Interface (35.3%)
- Lack of Training (33.3%)
- Data Quality Issues (27.5%)
- Integration Problems (23.5%)
- Slow Performance (15.7%)
- Other (5.9%)

Interpretation:

Main issues revolve around usability and user training. The complexity of the interface and lack of proper onboarding/training hinder optimal use.



Here are breakdown of pie chart:

8.Which type of data do you most commonly analyze using BI tools?		Copy chart
A) Sales data		
B) Customer data		
C) Financial data		
D) Operational data		
E) Marketing data		
F) Other (please specify) 51 responses		
25.5% 21.6% 7.8% 25.5%	 Option 1 Option 2 Option 3 Option 4 Option 5 All 	

Commonly Analysed Data Types

- Sales and Financial Data (25.5% each) are most analysed.
- Followed by Customer Data (21.6%), Operational Data (17.6%), Marketing Data (7.8%)

Interpretation:

The emphasis on financial and sales data indicates a focus on business outcomes and revenue performance tracking.

Prove the speed and accuracy of your reporting processes A Yes, significantly B Yes, moderately C No noticeable change D No S1 responses

Here are breakdown of pie chart:



Improvement in Reporting

- Moderate Improvement: 35.3%
- Significant Improvement: 29.4%
- No noticeable change: 25.5%
- No improvement: 9.8% •

Interpretation:

The majority observe at least moderate gains in reporting efficiency, although a quarter see no noticeable benefit potentially due to improper use or data issues.



Here are breakdown of pie chart:

Recommendation

- 60.8% would recommend their current BI tool.
- 39.2% would not.

Interpretation:

While most users are satisfied enough to recommend, a significant portion isn't-which might link to dissatisfaction with usability, effectiveness, or integration.

Finding and suggestion:

Findings-

1. Most Preferred BI Tools



- Power BI (37.3%) and Tableau (33.3%) are the most commonly used tools.
- QlikView and Looker are less popular among respondents.

2. Usage Frequency

- A significant portion (33.3%) use BI tools weekly, followed by daily users (21.6%).
- Around 39.2% use them occasionally or rarely.

3. Primary Purpose

- BI tools are primarily used for data visualization (35.3%) and business performance monitoring (29.4%).
- Less emphasis is placed on predictive analytics or automation.

Suggestion-

1.Increase Training & User Support

- Organize workshops, tutorials, and refresher sessions to improve user proficiency.
- Provide tool-specific guides for different departments (e.g., sales, HR, finance).

2. Improve Integration with Business Systems

- Encourage integration with ERP/CRM systems to make dashboards more dynamic and real-time.
- Use APIs or middleware to reduce manual data transfer.

3. Focus on Data Quality

- Establish a data governance framework to ensure clean, accurate, and timely data input.
- Appoint data stewards for major departments.

Future scope:

□ **Increasing Adoption Across Industries**: With growing digital transformation, the use of BI tools is expected to expand across sectors like healthcare, retail, manufacturing, and education.

□ **Integration with AI and Machine Learning**: Future BI tools will increasingly incorporate AI/ML for predictive and prescriptive analytics, enabling smarter and faster decision-making.

□ Enhanced Real-Time Analytics: Advancements in data processing will allow more organizations to move towards real-time analytics, providing instant insights for dynamic business environments.

□ Self-Service BI Growth: Demand for self-service BI tools will rise, empowering non-technical users to generate insights without relying on IT or data teams.

□ **Mobile BI Expansion**: With remote and hybrid work models, mobile BI solutions will become more essential, offering access to insights on-the-go.



Conclusion:

The study on *Data Analytics using Power BI* highlights the growing significance of Business Intelligence tools in transforming raw data into meaningful insights for better decision-making. Among the various tools available, Power BI emerged as the most preferred due to its user-friendly interface, powerful visualization features, and seamless integration with other Microsoft products. the analysis reveals that most respondents use BI tools for data visualization and performance monitoring, with Power BI and Tableau being the most widely adopted. However, challenges such as complex interfaces, lack of training, data quality issues, and limited system integration still hinder the full potential of these tools. While a majority of users reported improvements in reporting and decision-making, a considerable percentage remained neutral or dissatisfied, indicating the need for targeted interventions.

Based on the findings, it is suggested that organizations should invest in training programs, simplify dashboard interfaces, and enhance data governance to increase the effectiveness of BI tools. Integration with ERP and CRM systems and the use of advanced features like predictive analytics and automation can further maximize the value BI tools provide Looking forward, the future scope of BI tools is vast, with innovations in AI, machine learning, real-time analytics, mobile BI, and cloud platforms paving the way for smarter, faster, and more accessible business decisions. As more industries embrace digital transformation, the role of BI tools like Power BI will only grow in importance, making it essential for businesses to continuously adapt and upgrade their analytics capabilities.

In conclusion, while Power BI and similar tools have already demonstrated.

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