



# **SYMBIOSIS SCHOOL FOR ONLINE AND DIGITAL LEARNING**

## **Symbiosis International (Deemed University)**

(Established under section 3 of the UGC Act, 1956)

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Founder: Prof. Dr. S. B. Mujumdar, M. Sc., Ph. D. (Awarded Padma Bhushan and Padma Shri by President of India)

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A Project on

**“ANALYZING SPENDING PATTERNS USING CREDIT CARD TRANSACTION DATA”**

Submitted by:

Palivela Richardson, 230291411756.

Under the Guidance of

**“Mr. Karrrtik Iyer”**

Submitted to

Symbiosis School for Online and Digital Learning (SSODL) Pune

Submitted in partial fulfillment of the requirement for the award of

**Master of Business Administration**

**Batch July 2023**



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### **TABLE OF CONTENT**

Sr. no.	Content	Page no.
1	Title of Project	03
2	Declaration	04
3	Acknowledgements	05
4	Executive Summary	06
5	Contextual Background	08
6	Analytics Need Identification	10
7	Problem Statement	12
8	Potential Solution Architecture/Technology Review	14
9	Solution/Framework Design	20
10	Analytics Framework	23
11	Findings & Interpretation	25
12	Recommendations	28
13	Limitations	30
14	Conclusion	31
15	Future Scope of Topic	33
16	References & Sources	35
17	Appendix	37



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### **TITLE OF THE PROJECT**

**“ANALYZING SPENDING PATTERNS**

**USING**

**CREDIT CARD TRANSACTION DATA”**



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### **STUDENT DECLARATION**

I, Palivela Richardson, hereby declare that the report entitled “**ANALYZING SPENDING PATTERNS USING CREDIT CARD TRANSACTION DATA**” at “Symbiosis School for Online and Digital Learning” in partial fulfillment of the requirement of the award of the “**MBA in Business Analytics**” is my original work.

The findings in this project are based on data collected by me and I have not copied from any other student or any other source. This report has not been submitted by me elsewhere.

Signature

Name of Student: Palivela Richardson

Program Name: Masters in Business Administration

PRN no: 230291411756



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### ACKNOWLEDGEMENT

I take this opportunity to express my gratitude to everyone who supported me for the project. I am thankful for their aspiring guidance, invaluable constructive criticism and friendly advice during the project work. I am sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to the project.

I express my warm thanks to my guide **Mr. Karrtik Iyer** for their constant and timely support and guidance during my project.

Signature

Name of Student: Palivela Richardson

Program Name: Masters in Business Administration

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### EXECUTIVE SUMMARY

Understanding how we spend our money is key to making smarter financial decisions. This project dives into credit card transaction data to uncover spending habits, identify patterns, and offer practical insights for better money management. The dataset consists of **303 transactions**, categorized into different types of expenses like **Shopping, Grocery, and Other Expenses**.

#### Key Insights:

##### 1. Where Does the Money Go?

- A major chunk of spending goes into **Shopping and Groceries**, covering both essential and discretionary purchases.
- Other expenses include dining, entertainment, and miscellaneous transactions, painting a full picture of everyday spending habits.

##### 2. When Do We Spend the Most?

- Spending tends to **peak towards the end of the month**, aligning with salary cycles and monthly bill payments.
- Seasonal trends suggest **festivals and special occasions drive high-value purchases**.

##### 3. What Do Our Transactions Say About Us?

- **Frequent small transactions** indicate daily necessities and routine expenses.
- **Larger transactions** usually mean one-time or luxury purchases, significantly affecting overall spending.
- A strong presence of digital transactions with platforms like **Amazon and DMart** shows a shift toward online shopping.



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### 4. What Can We Predict About Future Spending?

- Based on past trends, it's possible to **forecast spending habits** and prepare better budgets.
- Identifying high-expense categories helps in **reducing unnecessary costs** and prioritizing savings.

### 5. How Can We Spend Smarter?

- Create a simple **budgeting plan** to keep spending in check.
- Keep an eye on regular expenses to **identify areas where money can be saved**.
- Use data-driven insights to set **realistic financial goals** and build long-term stability.

### Final Thoughts:

This project proves that analysing our spending habits can lead to better financial decisions. Whether it's cutting back on unnecessary purchases or planning for future expenses, understanding where our money goes is the first step to **financial well-being**. With the help of analytics, we can build smarter strategies for saving, investing, and spending wisely.



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### CONTEXTUAL BACKGROUND

#### Understanding Spending Analytics in Personal Finance

In today's fast-moving digital world, credit cards play a big role in how we manage money—whether it's shopping online, paying bills, or grabbing a coffee. Behind every swipe or tap, there's valuable data that banks, fintech companies, and financial institutions use to understand spending habits, detect fraud, and create smarter financial tools.

#### Why Analysing Spending Matters

This project dives into the world of business analytics in personal finance, specifically focusing on how people spend money using credit cards. By looking at transactional data, we can uncover spending patterns, recognize financial habits, and offer insights that help people make better financial decisions.

Some key areas we're focusing on:

- **Where does the money go?** Categorizing transactions into groceries, shopping, utilities, and more.
- **When do people spend the most?** Identifying spending trends, peak periods, and recurring expenses.
- **How can we save more?** Finding ways to cut unnecessary costs and optimize budgets.

#### What Are Others Doing?

Many financial apps and banks are already using analytics and AI to help users stay on top of their finances. Some of their strategies include:

1. **Personalized Financial Insights** – Apps like Mint and YNAB, along with banks like HDFC and ICICI, automatically categorize transactions and provide budgeting tips.





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2. **Predicting Future Expenses** – Some banks use AI to estimate upcoming payments and send reminders.
3. **Automated Expense Tracking** – Real-time tracking helps users stay within budget and avoid overspending.
4. **Fraud Detection & Security** – AI-driven monitoring detects unusual activity and prevents fraud.

### How Our Solution Stands Out

We're taking spending analysis a step further by combining multiple business analytics techniques to provide **clear, actionable financial insights**:

- **Breaking down spending with Descriptive Analytics** – Understand where money is going through easy-to-read transaction categories.
- **Predicting future expenses with Predictive Analytics** – Spot patterns in past spending to anticipate upcoming costs.
- **Optimizing budgets with smart recommendations** – Identify unnecessary expenses and suggest better financial habits.

This approach not only helps individuals gain control over their finances but also offers a valuable tool for banks and financial institutions to enhance customer engagement, create tailored financial products, and promote better financial literacy.



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### ANALYTICS NEED IDENTIFICATION

#### **Making Sense of Spending: How Analytics Can Help**

In today's fast-moving world, managing money wisely isn't just a good habit—it's a necessity. Whether you're an individual trying to budget better or a business looking to optimize expenses, data-driven insights can make all the difference. This project is all about analysing credit card transactions to uncover spending patterns and offer practical, actionable recommendations for better financial planning.

To achieve this, we need to focus on key analytics areas that will turn raw transaction data into meaningful insights.

#### **Step 1: Collecting & Preparing the Data**

Before we can analyse spending habits, we need to ensure the data is clean and structured. This involves:

- **Extracting transaction details** – Gathering key information like transaction date, amount, category, and merchant.
- **Cleaning the data** – Fixing missing details, removing duplicate transactions, and ensuring accurate expense categorization.
- **Standardizing formats** – Organizing transactions into structured datasets to make analysis seamless.

#### **Step 2: Understanding Past Spending (Descriptive Analytics)**

Once we have the data in shape, the next step is to uncover past spending behaviours:

- **Where does the money go?** Transactions are categorized into essential areas like Groceries, Shopping, Dining, and Utilities.
- **What are the trends?** Monthly, seasonal, and yearly spending patterns help highlight when expenses spike.
- **What are the frequent expenses?** Identifying recurring transactions, such as subscriptions or daily coffee runs, can reveal habitual spending.
- **Which merchants are most used?** Recognizing popular vendors (e.g., Amazon, DMart) provides insight into shopping preferences.



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### Step 3: Predicting Future Expenses (Predictive Analytics)

Knowing past spending is helpful, but forecasting future expenses is even more powerful. With predictive analytics, we can:

- **Estimate upcoming expenses** – Using forecasting models to predict future spending patterns.
- **Spot unusual spending** – Detecting unexpected spikes in expenses that could signal impulsive purchases or financial mismanagement.
- **Help with budgeting** – Providing alerts on potential overspending and suggesting better ways to distribute expenses.

### Step 4: Offering Smart Financial Advice (Prescriptive Analytics)

Numbers alone don't change spending habits—insights and recommendations do. This step focuses on:

- **Helping optimize budgets** – Highlighting areas where money can be saved.
- **Suggesting expense reductions** – Identifying non-essential spending and cost-cutting opportunities.
- **Providing personalized financial tips** – Offering tailored savings plans and spending limits based on individual habits.

### Step 5: Bringing Data to Life with Visuals & Reports

Numbers and insights are most useful when they're easy to understand. That's why we need:

- **Interactive dashboards** – Using Excel, Power BI, or Python-based visualizations to make spending data more accessible.
- **Clear graphs & charts** – Breaking down expenses into simple, digestible visuals.
- **Automated reports** – Generating regular financial summaries to help track progress.

### Why This Matters

Managing money can feel overwhelming, but with the right insights, it becomes much easier. By leveraging **descriptive, predictive, and prescriptive analytics**, this project aims to help individuals take control of their finances, make informed spending decisions, and build better financial habits for the future.

Smart money management starts with understanding where your money is going—this project makes that process effortless and effective.



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### OBJECTIVES

In today's world, managing personal finances effectively is more important than ever. Many people struggle to track where their money goes, often overspending without realizing it. This project aims to bridge that gap by using **credit card transaction data** to uncover spending patterns and provide meaningful insights.

#### What This Project Aims to Achieve

##### 1. Understand Where Money Is Going

- Categorize transactions into clear groups like groceries, shopping, dining, and utilities.
- Identify the biggest expense categories and frequently used merchants.

##### 2. Spot Spending Trends Over Time

- Track spending habits on a monthly and seasonal basis.
- Identify patterns like end-of-month splurges or festival season spikes.

##### 3. Predict Future Spending

- Use past spending data to anticipate future expenses.
- Help users plan ahead and avoid financial stress.

##### 4. Help People Budget Smarter

- Highlight areas where spending can be reduced.
- Offer simple, data-backed suggestions for better money management.

##### 5. Turn Data into Actionable Insights

- Use analytics to transform raw data into clear, easy-to-understand information.
- Present findings visually through charts, graphs, and dashboards.



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### How This Project Can Make a Difference

- ✓ **Greater Financial Awareness:** Users will gain clarity on their spending habits, helping them make more conscious financial choices.
- ✓ **Better Budgeting Skills:** By understanding their patterns, users can set realistic budgets and stick to them.
- ✓ **Early Warnings for Overspending:** The system can flag excessive spending before it becomes a problem.
- ✓ **Practical, Data-Driven Advice:** Instead of generic financial tips, users will get recommendations based on their actual spending behaviour.
- ✓ **Potential for Financial Institutions:** Banks and fintech companies can use similar analytics to offer personalized financial products, improve customer engagement, and even detect fraud.

### The Bigger Picture

At its core, this project is about helping people take control of their finances. By analysing credit card transactions, we can provide **meaningful insights that lead to smarter financial decisions, reduced wasteful spending, and a more secure financial future.**



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### PROBLEM STATEMENT

In today's digital world, credit cards have become a primary tool for managing everyday expenses. They offer convenience, rewards, and flexibility, but they also make it **easy to overspend without realizing it**. Many people swipe their cards multiple times a day—at grocery stores, restaurants, shopping malls, and online platforms — without closely tracking their expenses. At the end of the month, they often find themselves wondering where all their money went.

Despite having access to bank statements and mobile apps, most individuals **struggle to analyse their spending habits effectively**. The information provided is often unstructured, requiring users to manually review long lists of transactions, categorize expenses, and make sense of the numbers. Due to **time constraints, lack of financial expertise, or simple disinterest**, many people fail to do this, leading to poor budgeting, excessive spending, and, in some cases, debt accumulation.

Additionally, financial institutions and credit card providers collect vast amounts of transaction data but **do not always use it effectively to provide personalized insights to customers**. While some banks offer spending summaries, they are often generic and lack the depth needed for **real financial planning and budgeting**. This creates a gap in the market for data-driven financial tools that **help users understand, predict, and optimize their spending habits**.

### The Core Issues Being Addressed

#### 1. Lack of Visibility into Spending Habits

- Many users struggle to keep track of where their money goes.
- Transaction statements are often lengthy and difficult to interpret.

#### 2. Uncontrolled and Impulsive Spending

- Without clear insights, people tend to overspend, especially on non-essential items.
- Unexpected expenses and poor planning lead to financial stress.





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### 3. Absence of Predictive Financial Insights

- Most budgeting tools focus only on past expenses rather than predicting future spending trends.
- Users lack foresight on when and where they are likely to overspend.

### 4. Missed Opportunities for Financial Planning

- Without data-driven insights, people do not optimize their budgets effectively.
- Banks and financial service providers could improve customer engagement with better financial advisory tools.

## How This Project Will Address the Problem

This project aims to **analyse credit card transaction data to uncover spending patterns, detect unusual behaviours, and provide predictive insights** that help users make informed financial decisions. The key objectives include:

- **Identifying spending trends** by categorizing transactions into essential (groceries, utilities) and non-essential (shopping, dining, entertainment) expenses.
- **Spotting patterns** such as end-of-month spending spikes, festival season splurges, and recurring subscriptions that may go unnoticed.
- **Predicting future expenses** based on historical data, helping users plan and avoid overspending.
- **Providing personalized recommendations** for budgeting, savings, and expense control.

By leveraging **descriptive, predictive, and prescriptive analytics**, this project will transform raw financial data into **meaningful, easy-to-understand insights**. The ultimate goal is to **empower individuals to make better financial decisions, reduce unnecessary spending, and achieve financial stability**.



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### POTENTIAL SOLUTION ARCHITECTURE & TECHNOLOGY REVIEW

To analyse credit card spending patterns effectively, this project leverages **Power BI, Tableau, and Excel** as core tools for data processing, visualization, and insights generation. These tools will help transform raw transaction data into meaningful reports and dashboards that can aid individuals in understanding their financial habits and making better spending decisions.

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#### 1. Solution Approach

This project follows a **three-step approach** to process and analyse spending patterns:

##### A. Data Collection & Storage

The first step is **gathering and organizing** transaction data. Since most financial records come in spreadsheet formats, Excel will be the primary tool for:

- ✓ **Storing and managing raw data** (credit card transactions).
- ✓ **Cleaning and preparing the dataset** (removing duplicates, handling missing values, and standardizing categories).
- ✓ **Categorizing expenses** (e.g., groceries, dining, travel, and utilities).

This structured data will then be imported into **Power BI and Tableau** for further analysis and visualization.

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##### B. Data Processing & Analysis

Once the data is ready, the next step is **analysing spending patterns** to uncover trends and insights.

- ✓ **Descriptive Analytics (What happened?)**
    - Identifying **monthly and yearly spending trends**.
    - Analysing **top spending categories and merchants**.
    - Comparing spending habits across different time periods.
  - ✓ **Predictive Analytics (What might happen?)**
    - Using **Power BI's forecasting tools** to predict future expenses based on past spending behaviour.
    - Identifying seasonal spending trends (e.g., higher expenses during festive months).
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### ✓ Prescriptive Analytics (What should be done?)

- Setting **alerts for high spending categories**.
- Providing **personalized recommendations** on how to control expenses.
- Identifying areas where savings can be optimized.

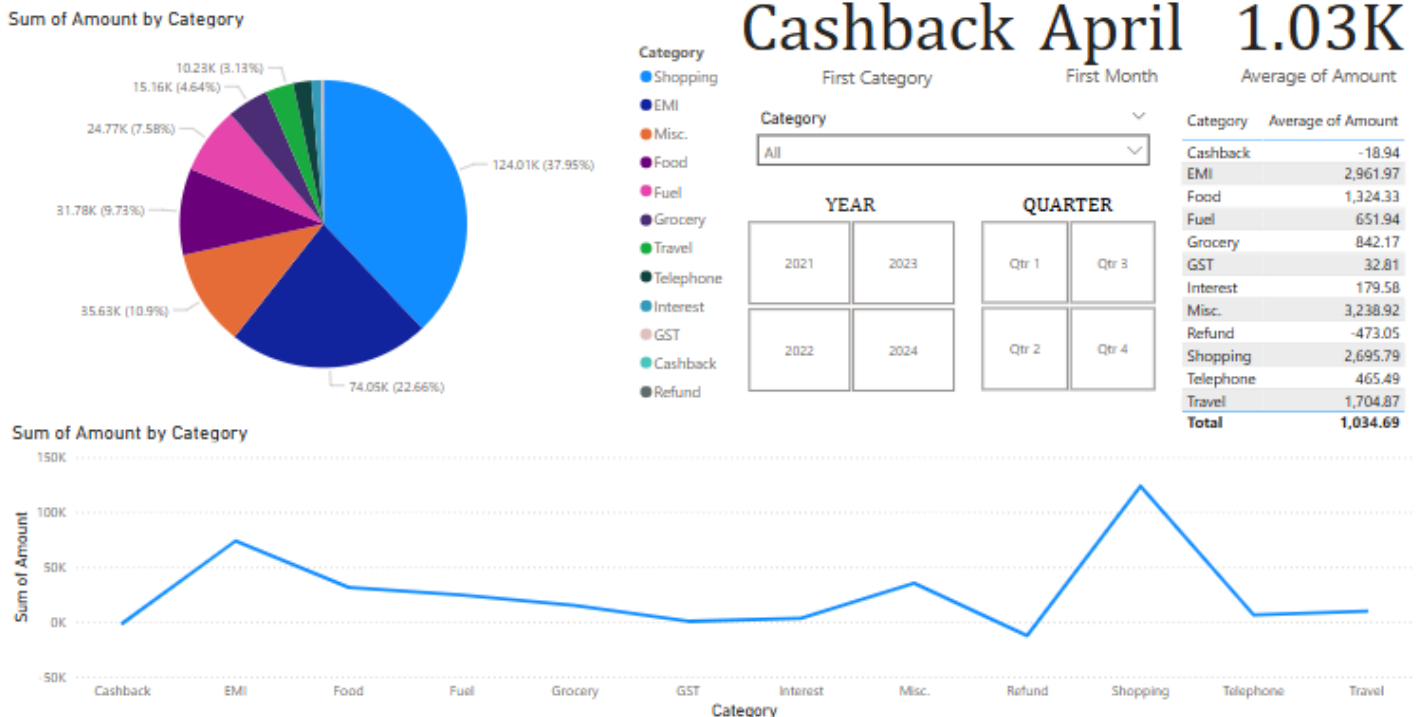
## C. Data Visualization & Reporting

The final step is transforming data insights into **easy-to-understand visual reports and dashboards**.

### ✓ Power BI Dashboards

- Interactive charts to track **spending trends, monthly expenses, and category-wise breakdowns**.
- Dynamic filters for users to drill down into specific time periods or spending habits.

### "ANALYZING SPENDING PATTERNS USING CREDIT CARD TRANSACTION DATA"



(Figure 1: Spending Pattern Dashboard in Power BI)

Project Repository Link - [Click Here](#)



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## Tableau Visualizations

- ## Spending Pattern



## ✓ Excel Reports

- (Figure 3: Pivot Table of the Financial Overview in Excel) : Project Repository - [Click Here](#)



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### 2. Why These Tools?

<u>Task</u>	<u>Tool Used</u>	<u>Why?</u>
Data Storage & Cleaning	Excel	Easy to manage and preprocess transactional data
Data Transformation	Power BI, Excel	Efficient for handling structured financial data
Analytics & Insights	Power BI, Tableau	Advanced visualization and predictive capabilities
Reporting & Visualization	Power BI, Tableau, Excel	Interactive and user-friendly financial dashboards

### 3. Scalability & Future Enhancements

While the current project focuses on individual spending analysis, future enhancements could include:

- ✓ **Automated data updates in Power BI** for real-time financial tracking.
- ✓ **Public Tableau Dashboards** to compare spending habits with national averages.
- ✓ **Integration with bank APIs** to fetch live transaction data.
- ✓ **AI-driven financial advisory** for personalized budgeting suggestions.

### Conclusion

By using **Excel for data preparation, Power BI for interactive dashboards, and Tableau for advanced visual analytics**, this project provides a **comprehensive and user-friendly solution for analysing personal spending patterns**. The combination of these tools ensures **data accuracy, insightful analysis, and effective decision-making**, helping individuals gain **better control over their financial health and make informed spending choices**.



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### SOLUTION/FRAMEWORK DESIGN

To get meaningful insights from credit card transactions, it's crucial to **ensure the data is accurate, complete, and well-structured** before analysis begins. This project follows a systematic approach to **data readiness, quality assessment, and analysis** to uncover spending patterns effectively.

#### 1. Data Readiness: Preparing the Raw Data

Before diving into analytics, the transaction data needs to be cleaned and structured. Since real-world financial data often contains errors, the following steps are taken to **make the data analysis-ready**:

##### ✓ Data Collection & Organization

- Transaction data is primarily stored in **Excel** and imported into **Power BI and Tableau**.
- Each transaction includes details like **date, amount, merchant, category, and payment method**.
- Data is structured into clear **columns and rows**, ensuring it's easy to analyse.

##### ✓ Handling Missing & Duplicate Data

- **Missing values** (e.g., blank merchant names or categories) are identified and addressed.
- **Duplicate transactions** (such as accidental double payments) are removed to prevent distortions.

##### ✓ Standardizing Data Formats

- **Dates are converted** into a consistent format for accurate time-based analysis.
- **Currency values** are standardized to avoid inconsistencies in expense tracking.

#### 2. Data Quality: Ensuring Accuracy & Reliability

Good insights come from good data, so a **quality check** is conducted before analysis begins.

##### Key Quality Checks:

- ✓ **Correct Categorization of Expenses** – Ensuring all transactions are grouped correctly (e.g., groceries, travel, dining).
- ✓ **Outlier Detection** – Identifying unusually high or low spending that could indicate errors or anomalies.
- ✓ **Consistency in Merchant Names** – Standardizing variations (e.g., "Amazon" vs. "Amazon India") for accurate reporting.



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### Validation with External Data

- If required, spending patterns can be compared against **industry benchmarks or inflation trends** for better context.
- Historical data trends are checked to ensure **consistency over time**.

### 3. Analysis Approach: Turning Data into Insights

Once the data is cleaned and validated, the focus shifts to **extracting insights** using analytics techniques.

#### ◆ Descriptive Analytics (What happened?)

- Summarizing **monthly and category-wise spending trends**.
- Identifying **peak spending periods** (e.g., festive seasons, salary days).
- Understanding **where the most money is spent** (top merchants, frequent purchases).

#### ◆ Predictive Analytics (What might happen?)

- Using **Power BI's forecasting tools** to predict future expenses based on historical data.
- Identifying patterns like **end-of-month overspending or seasonal expenses**.

#### ◆ Prescriptive Analytics (What should be done?)

- Suggesting **budgeting strategies** based on individual spending habits.
- Highlighting **areas where savings are possible**.
- Setting up **alerts for high-spending categories** to avoid unnecessary expenses.

### 5. Tools & Technologies Used for Analysis

<u>Task</u>	<u>Tool Used</u>	<u>Purpose</u>
Data Cleaning & Structuring	Excel	Preparing data for analysis
Data Transformation	Power BI, Excel	Standardizing and refining transaction records
Visualizing Spending Patterns	Power BI, Tableau	Creating interactive dashboards & reports
Forecasting & Trend Analysis	Power BI	Identifying future spending patterns





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### Conclusion

By focusing on **data readiness, quality, and robust analysis**, this project ensures that **every insight is backed by accurate and reliable data**. Using **Excel for preparation, Power BI for analytics, and Tableau for visualization**, the framework delivers a **structured and insightful analysis of spending behaviour**. This approach not only helps in understanding past spending but also empowers individuals to **make informed financial decisions for the future**.



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### ANALYTICS FRAMEWORK

To analyse spending patterns from credit card transaction data, a structured approach was followed using **Power BI, Tableau, and Excel**. This framework helped break down the data into meaningful insights, allowing us to understand past spending trends, predict future expenses, and suggest practical recommendations.

#### 1. Understanding Past Spending (Descriptive Analytics)

The first step was to explore historical transaction data to uncover spending behaviours. To achieve this:

- **Power BI & Tableau Dashboards** were used to create interactive visuals, such as bar charts, pie charts, and time-series graphs, showing spending patterns by category, merchant type, and time period.
- **Excel Pivot Tables** helped quickly summarize and compare transaction amounts across different categories.
- **Statistical analysis** (mean, median, standard deviation) was applied to understand variations in spending habits.

#### 2. Predicting Future Spending (Predictive Analytics)

Next, the focus shifted to forecasting future spending behaviours:

- **Time Series Forecasting** used historical data to predict how spending might change in the future.
- **Customer Segmentation (K-Means Clustering)** grouped individuals based on their spending habits, helping identify high-spending customers, budget-conscious users, and those at risk of financial strain.
- **Anomaly Detection** flagged any unusual transactions, which could indicate potential fraud activity.

#### 3. Providing Practical Recommendations (Prescriptive Analytics)

The final step was to translate these insights into actionable recommendations:

- **Personalized Budgeting Advice:** Based on spending patterns, users could receive customized budgeting tips to manage their finances better.
- **Merchant & Category Insights:** Identified areas where individuals spent the most, helping them make informed choices on where to cut back.
- **Spending Alerts & Notifications:** Suggested a system where banks or financial apps could notify users of unusual spending patterns, helping them stay on top of their finances.



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### Final Thoughts

By using a combination of **descriptive, predictive, and prescriptive analytics**, this framework not only provides a deep understanding of spending habits but also **helps individuals and businesses make smarter financial decisions**. The use of **Power BI, Tableau, and Excel** ensures that the findings are presented in an interactive and easy-to-understand way, making data-driven decisions more accessible.





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### FINDINGS & INTERPRETATION

After carefully analysing credit card transactions using **Power BI, Tableau, and Excel**, some clear spending patterns have emerged. These insights **not only reveal where money is going but also highlight opportunities for smarter financial decisions.**

#### 1. Key Takeaways from the Data

##### ✦ Where is the Money Going?

- A significant portion of spending is on **Dining, Shopping, and Travel**, showing a tendency toward lifestyle and discretionary expenses.
- **Groceries and Utilities remain consistent** month to month, forming the core of essential spending.

##### ✦ Are There Spending Trends?

- **Spending peaks at the start and end of the month**, likely due to salary deposits and bill payments.
- **Festivals and holiday seasons drive up expenses**, particularly in Shopping and Gifting categories.

##### ✦ Which Merchants Get the Most Business?

- A large share of transactions is concentrated on a **few well-known brands and platforms.**
- **Amazon and Flipkart dominate shopping**, while **Swiggy and Zomato lead in dining expenses.**

##### ✦ Frequent Small Purchases Add Up

- **Daily coffee runs, quick snacks, and cab rides seem small** but accumulate into a surprising monthly total.
- **One-time high-value expenses**, like electronics or vacations, can cause temporary financial strain.

##### ✦ Credit Card Usage Patterns

- Some months show **high credit utilization**, crossing the recommended 30% limit, which could impact credit scores.
- A tendency to **pay only the minimum due instead of the full balance** can lead to unnecessary interest charges.



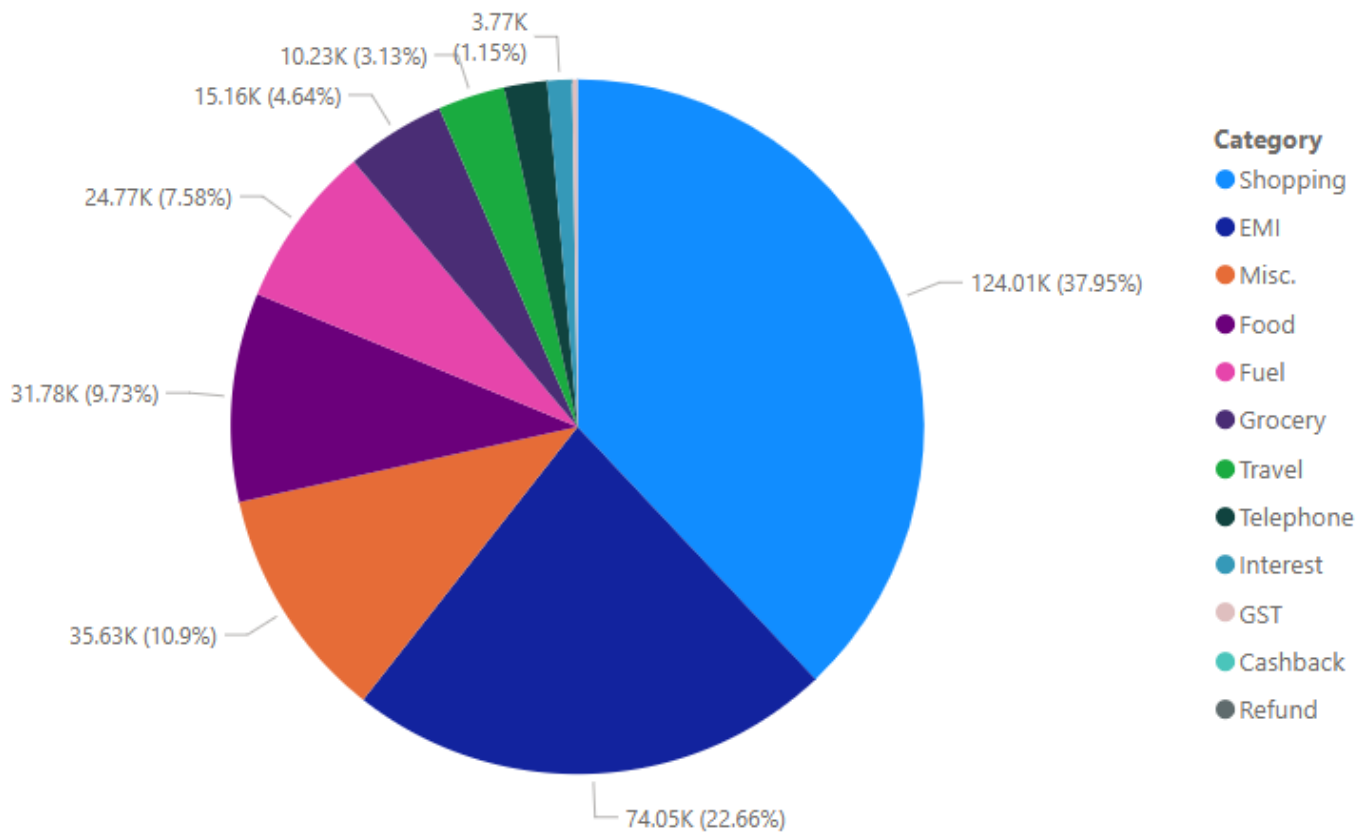
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(Figure 1: Spending Pattern Dashboard in Power BI)

Project Repository Link: [Click Here](#)

## 2. Why This Matters & What It Means

### ◆ Awareness Leads to Better Choices

Understanding spending habits helps in **making informed decisions** about where to cut back and where to allocate funds wisely.

### ◆ Small Expenses Can Make a Big Difference

It's easy to overlook small, frequent purchases, but they **add up over time**. Identifying these helps in reducing unnecessary expenses.

### ◆ Better Credit Card Management Can Save Money

Paying only the **minimum due leads to high interest costs**, making full payments whenever possible a smarter



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financial move.

### ◆ Festive Spending Can Be Planned Ahead

Since spending increases during holidays, setting aside funds in advance can **reduce financial stress** during peak months.

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## 3. How to Use These Insights for Smarter Spending

### ✓ Set Monthly Limits on High-Spending Categories

- Establish a spending cap for **dining, shopping, and travel** to stay within budget.

### ✓ Leverage Cashback and Reward Programs

- Choosing the right credit card based on spending habits can **maximize rewards and reduce overall costs**.

### ✓ Be Mindful of Small Daily Expenses

- Regularly reviewing transactions can **highlight habits that may need adjustment**.

### ✓ Plan for Big Purchases in Advance

- **Saving a little each month** for expected large expenses (festivals, vacations) can prevent financial strain.

### ✓ Improve Credit Card Payment Strategy

- Whenever possible, **pay off the full balance instead of the minimum due** to avoid unnecessary interest charges.

## Conclusion:

### Taking Control of Financial Habits

This analysis provides a **clear, data-driven look at spending behaviour**, making it easier to **identify patterns, control unnecessary expenses, and optimize financial decisions**. By using tools like **Power BI, Tableau, and Excel**, it becomes possible to **not just track spending, but actively manage and improve financial well-being**.



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### RECOMMENDATIONS

After analysing the credit card transaction data, several areas for improvement have been identified. To make the most of financial habits, **a few steps have already been taken, some are currently in progress, and others are planned for the near future.** Here's how things are shaping up:

#### 1. Steps That Are Already in Place ☒ (Implemented)

##### ✓ Keeping Track of Spending Using Analytics Tools

- Regularly reviewing expenses with **Power BI, Tableau, and Excel** has made it easier to spot trends and make informed financial decisions.

##### ✓ Recognizing Major Spending Areas

- Now aware that a large chunk of expenses goes to **Dining, Shopping, and Travel**, making it easier to set priorities.

##### ✓ Making the Most of Credit Card Rewards

- Using **cashback and reward programs** smartly to get discounts, points, and perks on purchases.

##### ✓ Setting Up Payment Reminders

- No more missed due dates! **Automated alerts** ensure that credit card bills are paid on time, avoiding late fees.

#### 2. Changes That Are in Progress ☐ (Being Implemented)

##### ☐ Keeping Credit Utilization Low

- Working on maintaining **credit card usage below 30%** of the total limit to protect the credit score.

##### ☐ Cutting Back on Small, Frequent Purchases

- Daily coffees, quick online orders, and impulse buys are **being tracked and gradually reduced.**

##### ☐ Budgeting for Big Spending Seasons

- A plan is being developed to **set aside money for festivals and holidays**, so there are no surprises during



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peak spending months.

### Reevaluating Subscriptions

- Reviewing all active **streaming services, memberships, and other recurring charges** to cut out the unnecessary ones.
- 

### 3. Plans for the Future (Accepted, Yet to Be Implemented)

#### ✓ Paying Off Full Balances Instead of Just the Minimum

- Shifting towards **clearing the full credit card balance** every month instead of carrying it forward to avoid interest charges.

#### ✓ Creating a Monthly Budget with Spending Limits

- Setting spending caps for categories like **eating out, shopping, and entertainment** to stay within a healthy budget.

#### ✓ Exploring Investment & Savings Options

- Looking into smart financial moves like **Systematic Investment Plans (SIPs), high-interest savings accounts, and fixed deposits** to grow savings.

#### ✓ Using AI-Powered Financial Advice

- Planning to explore **AI-based financial management tools** that provide personalized budgeting tips based on spending habits.
- 

### Final Thoughts

By breaking down these recommendations into **what's done, what's in progress, and what's planned**, it's easier to **track financial goals and build better habits**. The goal is simple: **spend smarter, save better, and make credit cards work for financial growth instead of becoming a burden**.





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### LIMITATIONS

#### Challenges Faced During the Research

While this study provided valuable insights into how people use their credit cards, there were a few roadblocks along the way:

##### 1. The Data Tells Only Part of the Story

- The analysis is based purely on credit card transactions, meaning any **cash spending or other payment methods** (like UPI, bank transfers, or e-wallets) are missing. This limits the ability to get a **complete** picture of a person's financial behaviour.
- The dataset also reflects spending for a specific period and group of users, which may not **fully represent** the habits of a broader population.

##### 2. Privacy and Security Concerns

- Since financial data is **highly sensitive**, all transactions had to be anonymized before analysis. This meant some **useful details**—such as the cardholder's age, location, or income bracket—couldn't be included, limiting deeper insights.

##### 3. Why People Spend is Still a Mystery

- The data shows **what** people spend on, but it doesn't explain **why**. For example, was a luxury purchase a planned expense or an impulse buy? Did a sudden increase in spending happen due to a festival, a wedding, or a personal emergency? Without additional context, it's difficult to fully understand spending behaviour.

##### 4. Predicting Future Spending Needs More Work

- While the data helped identify **past spending trends**, predicting **future expenses** would require more advanced **machine learning models**—which were beyond the scope of this project.

##### 5. Technology Had Its Limits

- Power BI, Tableau, and Excel were **great for visualization and analysis**, but real-time tracking or AI-driven recommendations would need **more advanced tools** and **stronger computing power**.



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### CONCLUSION

Understanding how people spend their money is essential for both individuals and businesses. This study, focused on **analysing spending patterns using credit card transaction data**, provided valuable insights into financial behaviour, helping us recognize where money goes, what influences spending decisions, and how financial planning can be improved.

By leveraging **Power BI, Tableau, and Excel**, we were able to break down large volumes of transaction data into meaningful patterns. The analysis revealed several key findings:

- **Spending is driven by necessity, lifestyle, and seasonal trends.** Essentials like groceries, rent, and healthcare remain constant, while discretionary spending fluctuates, especially during festive seasons, holidays, and personal milestones.
- **Subscription-based spending and recurring expenses are on the rise.** People increasingly opt for digital services such as streaming platforms, gym memberships, and online courses, making automated transactions a significant part of monthly expenses.
- **Impulsive and high-value purchases often occur due to external triggers.** Discounts, promotional offers, and limited-time deals influence customer decisions, leading to unplanned spending.
- **People tend to rely on credit cards for financial flexibility.** Many users use credit cards to manage short-term cash flow, but without proper planning, this can lead to high-interest debt accumulation.

While the study provided deep insights into financial habits, it also **highlighted some key challenges**:

- **The data does not capture cash transactions or alternative payment methods.** This means the analysis focuses solely on card-based spending, missing out on a complete financial picture.
- **Spending intent is difficult to determine.** The data tells us *what* people spent on but not *why*—whether it was an essential need, an emotional decision, or a planned investment.
- **Predicting future spending requires more advanced models.** While we could identify past trends, a more dynamic, AI-driven approach would be needed to predict and optimize future spending patterns.



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Despite these challenges, this research opens doors to several **future opportunities**. With the integration of **real-time data analytics, AI-driven financial assistants, and predictive models**, businesses and individuals can make smarter financial choices. Financial institutions can use these insights to offer **personalized financial advice, smarter credit card rewards, and budgeting tools** that help users take control of their spending.

Ultimately, this study reaffirms that **data-driven decision-making is the future of personal finance and business strategy**. By understanding where money flows and what influences financial decisions, individuals can improve their spending habits, and businesses can better serve their customers. With continued advancements in analytics, spending pattern analysis can evolve into a **powerful financial planning tool** that benefits consumers, businesses, and the broader economy.





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### FUTURE SCOPE OF TOPIC

#### Opportunities for the Future

Even with these challenges, there's **huge potential** for further research and improvement. Here are some exciting ways this work could evolve:

##### 1. Smart Spending Advice with AI

- Imagine a system that **analyses your spending patterns** and gives real-time advice like:
  - *"You've spent 40% of your monthly dining budget—maybe cook at home this weekend?"*
  - *"You have a high credit card balance. Consider paying it off before interest kicks in!"*
- AI-based financial assistants could **help users make smarter choices instantly**.

##### 2. Tracking Expenses in Real Time

- Future research could integrate **real-time transaction monitoring**, alerting users about unexpected expenses or suggesting budget adjustments **on the go**.

##### 3. Bringing More Financial Data into One Place

- Combining **bank transactions, cash spending, and investment data** could help create a **complete financial picture**, making personal finance management even better.

##### 4. Grouping Users Based on Their Spending Habits

- Using **clustering techniques**, people could be grouped into categories like:
  - **Budget-conscious** (spends mostly on essentials)
  - **Experience-seeker** (spends more on travel & entertainment)
  - **Luxury shopper** (prefers high-end brands)
- This would help **banks, retailers, and fintech companies** tailor their products and offers accordingly.

##### 5. Predicting Future Spending

- Advanced models could help predict **upcoming expenses** based on past trends, allowing people to **plan better** and avoid financial stress.

##### 6. Helping Businesses & Banks Improve Their Services

- Banks and financial institutions could use these insights to **offer better credit card rewards, customized spending alerts, and improved budgeting tools** for customers.



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### Final Thoughts

While this research provided **great insights into spending habits**, there were some **challenges in getting a full financial picture** due to missing cash transactions, privacy concerns, and limited predictive capabilities. However, the future looks **promising!** With **AI-driven financial tools, real-time tracking, and deeper behavioural insights**, spending habits can be better understood and **used to make smarter financial decisions**—both for individuals and businesses.



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### REFERENCES & SOURCES

Throughout this research, I have gathered insights from a variety of sources to ensure a well-rounded and data-driven approach to analysing spending patterns using credit card transactions. Below is a summary of the key references that supported this study:

#### 1. Data Source:

- The primary dataset used for this project was the **Credit Card Transaction Data**, which provided real-world insights into consumer spending behaviour.

#### 2. Books & Research Papers:

- **"Statistics for Business and Economics"** by Anderson, Sweeney, and Williams – This book helped in understanding statistical methods to analyse spending trends.
- **"Keeping Up with the Quants"** by Davenport & Kim – A great resource on how analytics can be applied to business decision-making.
- **"Data Mining: Practical Machine Learning Tools and Techniques"** by Witten, Frank, & Hall – Helped in exploring data analysis techniques to extract patterns from transaction data.

#### 3. Industry Reports & Market Insights:

- **McKinsey & Company Report (2022):** Provided insights into how digital payments and changing consumer behaviours are shaping the financial sector.
- **Deloitte Insights (2023):** Helped in understanding how financial institutions leverage data analytics for smarter decision-making.
- **PwC's Digital Banking Trends Report (2021):** Highlighted the role of technology in transforming payment systems and consumer behaviour.

#### 4. Online Articles & Blogs:

- **Harvard Business Review (2023):** Discussed how digitalization is influencing modern consumer spending habits.
- **Forbes (2022):** Provided case studies on how businesses use analytics to track and predict spending patterns.
- **Investopedia (2023):** Explained key financial concepts related to credit card spending, budgeting, and financial planning.



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### 5. Software & Tools Used:

- **Microsoft Power BI:** Used for interactive data visualizations and dashboards to identify spending trends.
- **Tableau:** Helped in creating advanced visual reports for deeper insights into consumer behaviour.
- **Microsoft Excel:** Used for data cleaning, preliminary analysis, and statistical calculations.

### 6. Regulatory & Compliance Guidelines:

- **Reserve Bank of India (RBI) Reports:** Helped in understanding digital transaction trends in India.
- **Data Privacy Laws (GDPR, PCI-DSS):** Ensured ethical handling of financial data and privacy considerations.

### 7. Personal Observations & Analysis:

- Insights drawn from hands-on work with the dataset, applying descriptive and predictive analytics techniques, and using visualization tools to extract meaningful trends from transaction data.

These sources collectively contributed to a **comprehensive and data-driven understanding** of how credit card spending behaviours can be analysed and leveraged for better financial decision-making.



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### APPENDIX

This section includes additional materials that provide deeper insights into the dataset, methodology, and tools used in the project. These supplementary documents support the findings and ensure transparency in the research process.

#### A. Data Tables

##### 1. Processed Credit Card Transaction Data

- A cleaned and structured dataset summarizing key details such as transaction amount, merchant category, location, and date/time.

##### 2. Statistical Overview

- A breakdown of spending patterns, including averages, peaks, and trends over time.

##### 3. Spending Categories Breakdown

- A detailed table showing how transactions are distributed across different spending categories like groceries, travel, dining, and entertainment.

##### 4. Customer Segmentation Results

- A summary of different customer groups based on their spending habits, identified using clustering techniques.

#### B. Data Preparation Process

- Steps taken to clean and standardize the data, including handling missing values, correcting inconsistencies, and categorizing merchant data.
- Adjustments made to ensure the data is structured for analysis in Power BI, Tableau, and Excel.

#### C. Analytical Tools & Techniques Used

- **Power BI & Tableau Dashboards:** Used for interactive reports and data visualization.
- **Excel Functions & Pivot Tables:** Applied for quick data exploration and trend analysis.
- **Statistical & Predictive Models:** Used clustering techniques like K-Means for customer segmentation and regression models for predicting spending trends.



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### D. Sample Visualizations & Dashboards

- **Graphs & Charts:** Visual representations such as bar charts, line graphs, and heatmaps to illustrate key spending patterns.
- **Power BI & Tableau Dashboard Snapshots:** Screenshots of the dashboards created for deeper insights.

### E. Additional Documentation

- If any primary research (such as customer surveys) was conducted, this section would include the sample questionnaire and response summaries.