



BAKERY SALES
ANALYSIS

PROJECT
REPORT

HARSHINI P

Bakery Sales Data Analysis Project

A Communication-Centric Approach to Data Analytics

Abstract

This project demonstrates how data analysis can be applied to a small retail business — in this case, a local bakery — to extract actionable insights from day-to-day transactions. The analysis was based on a cleaned dataset of over 590 transactions and involved building a multi-page interactive dashboard in Power BI.

The technical journey included **data cleaning, feature engineering, and DAX-based calculations** to produce key performance indicators such as total sales, transaction counts, average basket size, and customer type distributions. Visualizations were designed with a **bakery-inspired theme** using warm colors and custom icons to enhance readability and engagement.

Beyond the technical skills, this project emphasizes the **soft skills that make a data analyst effective in practice**. Throughout the process, I focused on problem-solving, translating raw data into business-oriented questions such as “*What are the peak sales hours?*” or “*Which products should we promote together?*”. I also applied communication skills by presenting results in plain business language that a bakery owner could easily understand, instead of relying on technical jargon.

The results revealed clear business opportunities: coffee and croissants dominate morning sales, sandwiches generate the highest revenue, Sundays are peak sales days, and digital payments outperform cash. These findings are more than just numbers — they form a **narrative about customer behavior** and provide **strategic recommendations** such as loyalty programs for regular customers, cross-selling combos, and staffing adjustments during peak times.

In conclusion, this project highlights how **communication multiplies the impact of technical analysis**. A dashboard may contain charts and metrics, but without storytelling and clarity, its value is limited. By combining both skill sets, I was able to create a solution that is not only technically sound but also accessible, relatable, and impactful for decision-makers.

1. Introduction

In today's world, data is at the heart of decision-making. From global corporations to small family-owned businesses, organizations rely on data to understand their customers, optimize operations, and increase profitability. While we often hear about advanced analytics in large industries like finance or healthcare, even a small bakery produces valuable data that can be turned into business insights.

A bakery may seem simple — serving coffee, pastries, and sandwiches to local customers — but each transaction holds hidden stories. Every sale records what products customers prefer, when they visit most often, how they choose to pay, and whether they are first-time or loyal buyers. When analyzed carefully, this information can answer important business questions, such as:

- Which products drive the most revenue and should be prioritized in stock and marketing?
- Are there specific times of day or days of the week when demand peaks, requiring more staff?
- Do loyal customers behave differently from new customers, and how can we encourage retention?
- What product combinations are most popular, and how can they be promoted as bundles?

The starting point for this project was a cleaned dataset of bakery transactions, including details such as dates, times, items, prices, quantities, payment methods, and customer types. While the raw data provided a foundation, the challenge was to transform it into something meaningful for a bakery manager — someone who may not be interested in technical formulas or database structures but who cares deeply about customer satisfaction, staffing, and profitability.

This is where the dual role of a data analyst comes into play. On one side, there is the **technical role**: cleaning messy data, creating calculated measures, and designing an interactive dashboard in Power BI. On the other side, there is the **communication role**: asking the right business questions, presenting findings clearly, and telling a story with data that inspires action.

This project deliberately highlights both sides. The dashboard itself is a technical product, but the way it was designed and communicated reflects soft skills such as problem-solving, creativity, and storytelling. In a real-world scenario, a bakery owner may not care about DAX syntax, but they would care about knowing that **coffee drives morning sales, sandwiches are the biggest revenue generators, Sundays are peak days, and regular customers spend more than new ones**.

In short, the introduction of this project is not just about showcasing technical ability but also about **demonstrating how communication transforms raw data into business intelligence**. By bridging the gap between analysis and storytelling, this project shows the true value of a data analyst's work.

2. The Role of Soft Skills in Data Analysis

When people think of data analysis, they often imagine coding, spreadsheets, and dashboards. While these technical skills are important, they only tell half the story. The other half — the part that makes data analysis truly valuable — lies in **soft skills**. Soft skills are what transform numbers into meaning, and meaning into action. In this project, soft skills were not an afterthought but a deliberate focus.

1. Problem-Solving

At its core, data analysis is about solving problems. A bakery owner doesn't care about raw data or advanced formulas — they care about knowing what products to bake more of, when to hire extra staff, and how to keep customers coming back. My first step was to translate technical data points into **business-oriented questions** such as:

- “*What are the top-selling items and what does that mean for inventory planning?*”
- “*Do new and regular customers behave differently?*”
- “*Are weekends truly more profitable, or is that just a perception?*”

By framing the right problems, I ensured that my analysis stayed relevant to real business decisions.

2. Storytelling with Data

Numbers on their own are not enough. Storytelling is what makes data stick. Instead of saying “*Coffee sold 500 units,*” I told a story: “*Coffee is the anchor product for the bakery, especially in the mornings. Customers often buy coffee with a sandwich or croissant, making it the perfect product for bundling promotions.*”

This shift in language takes dry statistics and turns them into insights that managers can remember, discuss, and act on.

3. Audience Adaptation

One of the most valuable soft skills is knowing how to communicate differently depending on the audience. A technical peer might want to know the exact DAX formula I used to calculate Average Basket Size, but a bakery owner only needs to hear: “*On average, customers buy about two items per visit.*” By stripping away technical jargon and tailoring the explanation, I made sure the message was accessible to non-technical decision-makers.

4. Communication Clarity

Communication is not only about words but also about **visual design**. I chose a warm, bakery-inspired color palette — browns, caramels, creams, and soft reds — and used simple icons for coffee, sandwiches, and pastries. These design choices were not cosmetic; they made the dashboard more **intuitive and welcoming**, allowing stakeholders to immediately connect with the data without feeling overwhelmed.

5. Creativity & Empathy

Creativity played a major role in how I designed the dashboard and framed the findings. I imagined myself in the shoes of a bakery owner — someone busy managing staff, ovens, and customers, who only has a few minutes to glance at a dashboard. This perspective pushed me to keep visuals simple, emphasize the most important KPIs at the top, and provide filters for quick exploration. Empathy, combined with creativity, helped ensure the dashboard was a tool, not a burden.

6. Collaboration & Listening

Although this was an individual project, I approached it as though I were working with stakeholders. I practiced **active listening** by anticipating their questions: “*Which days are busiest?*” or “*Which products should I promote?*”. By proactively answering those questions in the dashboard, I demonstrated collaborative thinking.

7. Critical Thinking

Finally, soft skills include questioning assumptions. For example, it might be easy to assume weekends are always the busiest. Instead, I validated this with data, showing that **Sundays were indeed peak sales days**, but weekday mornings also showed high demand. This kind of critical thinking prevents over-reliance on intuition and strengthens decision-making.

3. Technical Process

While communication and storytelling were central to this project, they were built upon a foundation of technical work. The **technical process** ensured that the data was clean, reliable, and structured in a way that allowed meaningful insights to be discovered and communicated effectively.

1. Dataset Overview

The dataset, named **bakery_transactions_cleaned**, contained more than **590 transaction records**. Each row represented a single transaction and included the following attributes:

- **Transaction ID** – unique identifier for each transaction.
- **Date and Time** – the timestamp of the purchase.
- **Day of Week** – weekday information extracted from the date.
- **Item** – product purchased (e.g., coffee, sandwich, croissant, donut).
- **Quantity** – number of items purchased in the transaction.
- **Price** – unit price of each item.
- **Total Amount** – final cost of the transaction.
- **Payment Method** – how the customer paid (cash, card, online).
- **Customer Type** – whether the customer was new or a returning regular.

This structure made it possible to analyze sales trends across time, product categories, customer types, and payment methods.

2. Data Cleaning and Preparation

Before analysis, the dataset needed to be prepared for Power BI. This step is critical because **dirty data leads to misleading insights**. The key tasks included:

- **Date & Time Formatting:**
Converted the Date and Time fields into Power BI's standard datetime format, which allowed grouping by hours, days, weeks, and months.
- **Feature Engineering:**
Created new columns to support deeper analysis:
 - **Hour of Day** (extracted from Time) → helped identify peak sales hours.
 - **Month Name** (from Date) → revealed seasonal trends.
 - **Weekend vs Weekday** → simplified time-based comparisons.
 - **Customer Type** (New vs Regular) → segmented customer behavior.
- **Handling Missing Values:**
Checked for blank fields in Price, Quantity, and Payment Method. Since this was a cleaned dataset, very few missing values were found, but verification was essential.
- **Data Consistency:**
Ensured that prices and amounts were numeric (removing any text characters like "\$") and verified that Total Amount = Price × Quantity.

3. Data Modeling in Power BI

With the cleaned dataset, I built a simple but effective **data model** in Power BI.

- Created relationships between the Date table (calendar dimension) and the main transactions table.
- Established hierarchies for **Year** → **Month** → **Week** → **Day**, enabling drill-downs.
- Categorized Items into **Product Types** (e.g., Beverages, Pastries, Savories) for easier grouping.

This model ensured the dashboard was flexible, letting users slice data by time, product, or customer segment.

4. DAX Measures and Calculations

The true power of Power BI comes from DAX (Data Analysis Expressions). I wrote several measures to calculate KPIs that were not directly available in the raw data:

- **Total Sales** = SUM(bakery_transactions_cleaned[TotalAmount])
- **Total Transactions** = DISTINCTCOUNT(bakery_transactions_cleaned[TransactionID])
- **Average Basket Size** = AVERAGE(bakery_transactions_cleaned[Quantity])
- **Average Transaction Value** = DIVIDE([Total Sales], [Total Transactions])
- **New Customers %** = COUNTROWS(FILTER(bakery_transactions_cleaned, [CustomerType] = "New")) / COUNTROWS(bakery_transactions_cleaned)
- **Regular Customers %** = COUNTROWS(FILTER(bakery_transactions_cleaned, [CustomerType] = "Regular")) / COUNTROWS(bakery_transactions_cleaned)

These measures provided the foundation for key insights like customer loyalty, spending patterns, and transaction volumes.

5. Dashboard Design and Layout

I built a **multi-page dashboard**, each focusing on different aspects of the analysis:

- **Page 1: Sales Overview**
 - KPIs: Total Sales, Total Transactions, Avg Transaction Value.
 - Line chart of sales over time.
 - Day of Week sales chart.
- **Page 2: Customer Insights**
 - Pie chart: New vs Regular customers.
 - Comparison of Avg Basket Size and Avg Spend between customer groups.
 - Trendline of customer types over time.
- **Page 3: Product Performance**
 - Bar chart of top 10 selling items.
 - Basket analysis (frequently purchased combinations).
 - Revenue by product category.
- **Page 4: Time Trends**
 - Heatmap of sales by Hour vs Day.
 - Weekend vs Weekday performance.
 - Seasonal/holiday highlights.
- **Page 5: Payment Methods**
 - Share of revenue by payment type.
 - Transaction count comparison (cash vs card vs online).

The dashboard was interactive, with **slicers** for date ranges, customer type, and product category, allowing users to filter and explore insights dynamically.

6. Design Choices for Communication

Technical dashboards can sometimes be overwhelming, so I used design to support clarity:

- **Bakery-Inspired Theme:** Dark brown (#5D4037), caramel (#D7A86E), cream (#FFF3E0), olive green (#8D9440), and soft red (#D84315).
- **Icons & Illustrations:** Added simple visuals of coffee, croissants, and donuts to make charts relatable.
- **Consistency:** Each page had a logical flow, starting with KPIs, followed by detailed visuals, ending with insights.

4. Insights from the Dashboard

The dashboard brought together data from multiple perspectives — sales, customers, products, time, and payments — and transformed raw numbers into clear, actionable insights. Below, I detail the key findings and what they mean in practical terms for a bakery business.

1. Sales Trends

From the “Sales Overview” dashboard page:

- **Weekly Patterns:** Sales volumes were consistently higher on **Sundays**, making it the busiest day of the week. Conversely, **Tuesdays showed the lowest activity**, suggesting that midweek demand was softer.
- **Daily Patterns:** When broken down by time of day, **mornings (8–11 AM)** were the clear sales peak. This pattern reflects customers stopping by for coffee and breakfast items before work or during late-morning breaks.
- **Monthly Trends:** While sales were relatively steady overall, **December showed a noticeable uplift in pastry sales**, suggesting holiday-related demand.

Business Interpretation:

- Staffing should be increased on **Sunday mornings**, especially in coffee and pastry sections, to meet peak demand.
- **Midweek promotions** (e.g., “Tuesday Treat Discounts”) could help lift sales on slower days.
- Seasonal marketing around holidays could focus on sweet pastries and festive bundles.

2. Customer Insights

From the “Customer Analysis” page:

- **Customer Breakdown:** About **72% of transactions came from regular customers**, while **28% were new customers**.
- **Spending Behavior:** Regular customers had a **higher average spend per transaction (\$5.62)** compared to new customers (\$3.34).
- **Basket Size:** Regular customers also purchased slightly more items per transaction, indicating loyalty-driven behavior (buying coffee plus food, rather than a single product).

Business Interpretation:

- **Retention is more valuable than acquisition.** The bakery already has strong repeat business, so investing in **loyalty rewards programs** (e.g., free drink after 10 purchases) could strengthen customer relationships.
- **Targeted campaigns** for new customers (like “First-time buyer discount”) can encourage them to return and join the loyal base.
- Customer data suggests that **upselling works best with regulars** — they are more open to buying multiple items in one visit.

3. Product Performance

From the “Product Insights” page:

- **Top Sellers by Quantity:** Coffee dominated sales volume, followed by croissants, sandwiches, and donuts.
- **Top Sellers by Revenue:** Sandwiches generated the highest revenue despite lower volume, showing they were priced higher and contributed strongly to profitability.
- **Basket Analysis:** Coffee was frequently paired with sandwiches or pastries, especially croissants. This shows strong **cross-selling opportunities** between beverages and food.

Business Interpretation:

- Coffee should be treated as a “**traffic driver**” **product** — keep it competitively priced to bring customers in.
- Promote **bundle deals** like “Coffee + Croissant” or “Coffee + Sandwich” to maximize revenue per transaction.
- Since sandwiches bring in high revenue, highlight them in displays and menus, possibly introducing **premium sandwich options**.
- Monitor donut and pastry sales during **holidays and weekends**, as they spike seasonally — ideal for limited-time festive promotions.

4. Time-Based Analysis

From the “Time Trends” page:

- **Hour-by-Hour:** The **8–11 AM window** accounted for almost 40% of daily sales, confirming mornings as the critical sales period.
- **Day of Week:** Weekends outperformed weekdays, but the difference was most dramatic on Sundays.
- **Weekday Patterns:** Interestingly, **Fridays showed a small evening sales bump**, possibly linked to people treating themselves at the end of the workweek.

Business Interpretation:

- Focus advertising efforts on **morning commuters** (e.g., quick coffee + snack combos, loyalty perks for morning customers).
- Position **Sunday as a “family day”** with promotions that encourage group orders (e.g., “Sunday Brunch Box” for families).
- Take advantage of **Friday evenings** by experimenting with pastry discounts or snack bundles for end-of-week shoppers.

5. Payment Insights

From the “Payment Methods” page:

- **Online Payments** (digital wallets, apps) accounted for the largest share of revenue (\$1,276).
- **Card Payments** were also strong, while **cash accounted for the least** at just \$905.50.
- The trend suggests that **customers prefer cashless convenience**.

Business Interpretation:

- The bakery should continue to **promote digital and card payment options**, as they align with customer preferences.
- Offering **mobile pre-ordering** (via apps or QR codes) could make digital payments even more attractive.

- Since cash usage is declining, the bakery could simplify operations by encouraging digital-only promotions.

6. Holistic View

The combination of all these insights paints a clear picture:

- The bakery thrives on **morning coffee traffic** and **weekend sales**, especially Sundays.
- **Regular customers are the backbone** of revenue, but new customers remain a growth opportunity.
- **Bundles and cross-selling** have strong potential to increase average transaction values.
- Digital transformation is already underway, with **cashless payments dominating**.

Strategic Takeaway:

This dashboard is not just about reporting past sales — it provides a **decision-support tool**. By combining time trends, customer insights, and product performance, the bakery can make smarter choices about inventory, staffing, marketing, and digital adoption.

5. Reflection on Soft Skills

Looking back on this project, what stands out most is not the formulas or the dashboard design, but how much of the work depended on **soft skills**. These are the skills that often go unnoticed, yet they determine whether technical analysis becomes a pile of numbers or a story that drives business action.

1. Problem-Solving Mindset

From the very beginning, I had to approach the dataset with a **problem-solving mindset**. Instead of just analyzing sales, I asked myself: “*What questions would a bakery owner care about?*”. That shift transformed the project from a technical exercise into a business-oriented analysis. Soft skills helped me filter through the noise and focus on questions like: “*What products bring the most value?*” and “*When do customers spend the most?*”.

2. Storytelling and Narratives

One of the most valuable lessons was learning how to **weave a narrative around numbers**. A chart showing “*Coffee = 500 units sold*” is not very powerful on its own. But when reframed as: “*Coffee is the anchor product that brings customers in during the morning rush, often paired with sandwiches and croissants, making it the backbone of daily sales,*” it becomes a story that guides business decisions. I learned that **data storytelling is as important as data calculation**.

3. Communication and Simplicity

I also reflected on how easy it is for analysts to get trapped in **technical language**. DAX formulas, averages, and aggregations make sense to me as an analyst, but they may confuse a bakery owner. I practiced simplifying my findings into business-friendly language, avoiding jargon, and using **visual storytelling (icons, colors, and bakery-themed design)** to make results intuitive. This was a reminder that **clarity is more powerful than complexity**.

4. Empathy and User-Centered Design

A major reflection was on **empathy** — putting myself in the shoes of the dashboard’s end-user. I imagined a bakery manager with limited time, juggling staff, ovens, and customers. Would they want to decode complex charts? No. They’d want **key numbers upfront, clean visuals, and actionable takeaways**. By designing with empathy, I created something practical rather than overwhelming.

5. Critical Thinking and Avoiding Assumptions

Another important soft skill was **critical thinking**. It’s easy to assume weekends are busiest or that cash is the main payment method, but assumptions can mislead decisions. By questioning these assumptions and letting the data validate or challenge them, I avoided biased conclusions. For example, the data showed Sundays were the busiest — but also revealed **Friday evenings had a hidden sales bump**, something that might have been overlooked without deeper questioning.

6. Adaptability and Flexibility

Finally, I reflected on adaptability. At times, the dashboard design or a DAX formula didn’t work as planned. Instead of being stuck, I adapted — trying different chart types, reorganizing pages, or rewriting measures. This adaptability mirrors real-world projects where data is rarely perfect and analysts must adjust both technically and communicatively.

◆ Personal Takeaway:

This project reinforced my belief that **soft skills are not secondary to technical skills — they are equal partners**. Without problem-solving, storytelling, empathy, and communication, my dashboard would have been just another set of visuals. With them, it became a **decision-support tool** tailored to a real business context.

I now see soft skills as the invisible bridge between **data and decisions**, and this project gave me the chance to practice building that bridge.

6. Conclusion

This project demonstrated that data analysis is not just about crunching numbers — it is about **making data useful**.

By combining technical expertise with communication skills, I built a dashboard that not only highlights sales patterns but also tells a story about how a bakery can improve operations, marketing, and customer engagement.

The key takeaway is simple: **soft skills multiply the impact of technical skills**. A technically perfect analysis has little value if it cannot be understood by the people making decisions.

Next Steps:

- Extend the analysis with **predictive modeling** to forecast demand.
- Use clustering to identify customer segments for personalized offers.
- Integrate the dashboard with real-time data for ongoing business decisions.

