2024

Assessing BI Maturity and Developing a BI Dashboard for a Small Medium Enterprise (SME) in Nairobi. Case of TAIFA Mobile

Group Members

- Sharon Kendi
- Rodrigue Irampa
- Michael Vukasu
- Sharon Nalubiri
- Racheal Nderitu

8th July 2024

Contents

Executive Summary

In the project "Assessing BI Maturity and Developing a BI Dashboard for Taifa Mobile,", a small-medium enterprise (SME) in Nairobi, where we critically evaluated the company's Business Intelligence (BI) capabilities. Initially we assessed the company at levels 1 and 2 on the Gartner BI Maturity Model. Using Microsoft Power BI, we designed and implemented a comprehensive dashboard that transformed Taifa Mobile's approach to decision-making. This tool provided real-time insights into their operational efficiencies, financial performance, and customer engagement, shifting the company from reactive to proactive management. The report details the entire process, from project objectives and BI maturity assessment to dashboard design and implementation, highlighting the significant improvement in data-driven strategies that have positioned Taifa Mobile for continued success in a competitive industry. We recommend further investments in advanced analytics, staff training, and BI practices.

1.0 Introduction

1.1 Background of the Project

The growth of businesses as well as the increasing complexities in the business environment has led to companies realizing the need to make decisions based on real time situations. This need has driven companies to seeking out Business Intelligence solutions to allow them to navigate the complexities of doing business in an extremely dynamic environment. While there are many companies that implement BI solutions at once from top to bottom, many gravitate towards BI in a more gradual manner with various departments implementing the use of BI tools to make their tasks easier in an isolated manner. For businesses that thrive in the increasingly dynamic environment, no matter the approach taken, the result is the adoption of BI in a company wide scale. This project focuses on assessing the BI maturity of TAIFA Mobile and developing a BI dashboard tailored to their needs.

1.2 Importance of Business Intelligence (BI) for SMEs

BI provides SMEs with tools to analyze data, uncover insights, and make informed decisions. Traditional databases and data storage only allow for data to be used for long term strategic decisions and are not equipped for providing insights on how a business is doing on a real time basis. Ultimately, BI enables businesses to track performance, understand market trends, and optimize processes, thus fostering growth and competitiveness.

1.3 Project Objectives and Scope

The primary objectives of the project are to evaluate the current BI capabilities of the SME, identify gaps and develop a customized BI dashboard to enhance data-driven decision-making. After the evaluation and developing a dashboard, recommendations are to be made on future BI development.

The scope of the project includes evaluating existing data sources, designing a BI dashboard and implementing the BI solution in the TAIFA Mobile.

2.0 Selection of SME

2.1 Description of the SME

TAIFA MOBILE is a telecommunications company, specializing in value-added services that cater to a diverse customer base. The company offers a variety of telecommunications services, including USSD (Unstructured Supplementary Service Data) code, bulk SMS services, short codes, voice, and Skiza tunes. These services are designed to meet the needs of both individual consumers and business clients, providing essential communication tools that facilitate a wide range of interactions from marketing campaigns to customer service inquiries.

2.2 Initial Contact and Business Understanding

The project initiation involved detailed preliminary discussions with key personnels at Taifa Mobile. Initial contact was established through a series of meetings with the accountant and the IT personnel, during which the scope and objectives of the BI project were outlined. These discussions helped in understanding Taifa Mobile's strategic goals, the challenges they face in data management, and their expectations from this BI initiative. It was during these meetings that the need for a more structured approach to data utilization was recognized as a critical requirement for supporting decision-making processes and enhancing operational efficiency.

2.3 Overview of the TAIFA Mobile, Target Market, Products/Services, and Current Business Process

- **Industry Overview**: Taifa Mobile operates in the competitive telecommunications industry in Kenya, which is characterized by rapid technological advancements and high consumer expectations. The industry demands constant innovation and responsiveness to consumer needs, factors that are pivotal in maintaining competitive advantage.
- **Target Market**: Taifa Mobile targets a broad market segment including individual consumers, small and medium enterprises, and large corporations for example, Safaricom, Airtel, APA insurance ltd, Angani ltd and may others. Their services are tailored to meet the communication

needs of each segment, providing scalable solutions from simple message broadcasting to complex customer interaction systems.

- **Products/Services**:
    - **USSD**: These are used by businesses to facilitate menu-based information services and mobile banking in real-time, which are essential in the mobile-first consumer self service and transactional-moble payments intergrations. For example the renowned *544# or *100#.
    - **Bulk SMS**: these enable businesses to send large volumes of SMS messages for marketing, transactional-Payment confirmations, security alerts, and crucial for wide-reaching communication strategies.
    - **Short Codes**: the are used for sending and receiving SMS and MMS messages, enabling communication services like customer self servive, subscription and feedback.
    - **Skiza Tunes**: Offers personalized ring back tones, providing an additional revenue stream and a unique marketing opportunity for content creators.
    - **Voice**: the Taifa Sauti is a web based software as a service (SaaS) voice infrastructure that is primed to engage the mases theough bulk calls. They can be used for pre-recorded message.
- **Current Business Processes**: The existing business processes at Taifa Mobile involve manual data collection and reporting, predominantly using spreadsheets and basic database management systems. Data is collected across various touchpoints, including customer service interactions, transaction records, and service usage metrics. However, the integration and analysis of this data are limited, leading to underutilized information and delayed response to market changes.

3.0 BI Maturity Assessment

3.1 Explanation of the Chosen BI Maturity Model

The Gartner Business Intelligence (BI) Maturity Model was selected for assessing the BI maturity of TAIFA Mobile. This model is widely recognized for its comprehensive approach to evaluating the development and integration of BI within an organization. This model divides BI maturity into 5 levels:

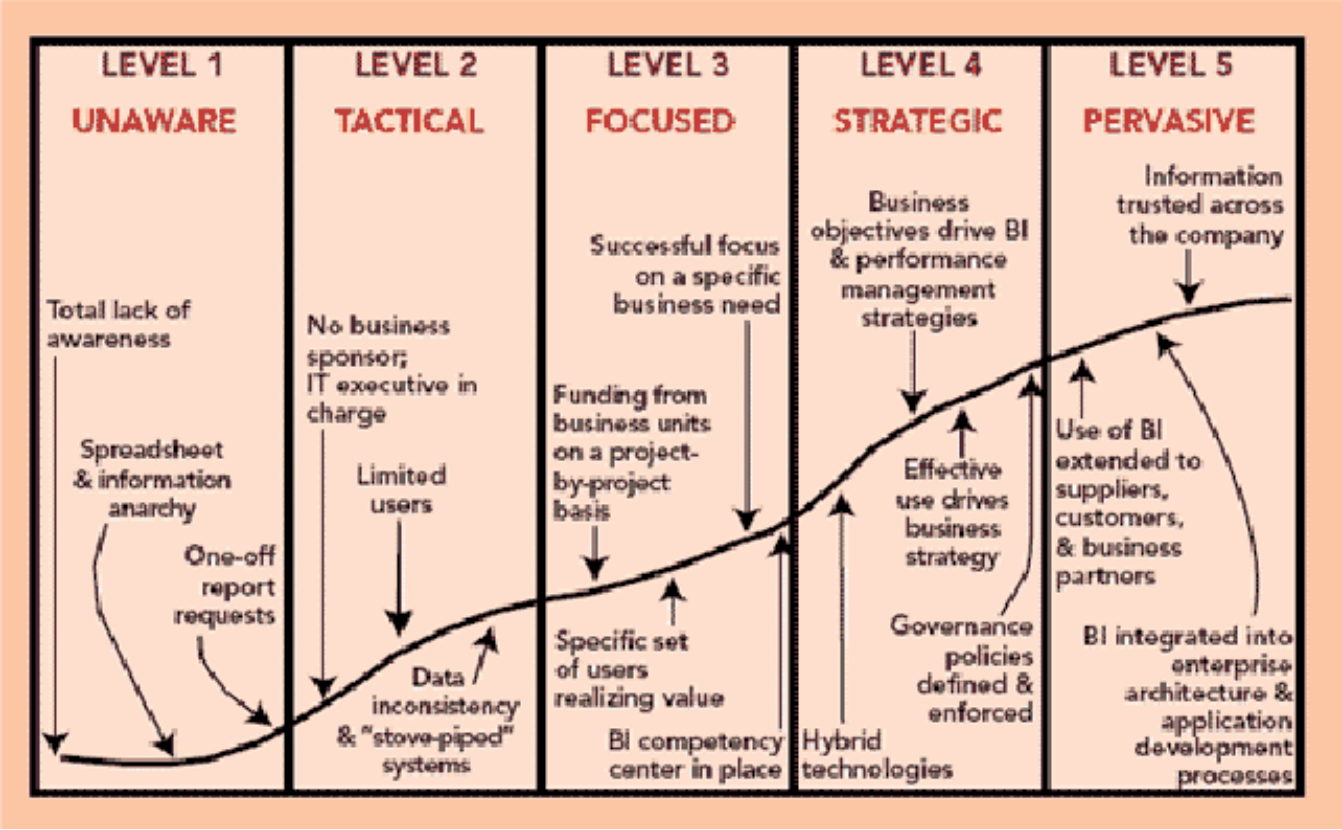


Fig 3.1: Gartner's BI maturity level.

Level 1: Unaware - No formal BI strategy, ad-hoc and manual reporting.

Level 2: Tactical - Departmental BI solutions, some automation.

Level 3: Focused - Enterprise-wide BI initiatives, consistent data.

Level 4: Strategic - Integrated and strategic BI, predictive analytics.

Level 5: Pervasive - BI ingrained in culture, continuous improvement, advanced analytics

This model evaluates several dimensions, including data management, analytics, governance, user adoption, and organizational culture. By assessing these areas, organizations can identify their current BI maturity level and areas for improvement to achieve higher maturity levels (Lloyd, 2020).

Comment: We have determined that TAIFA Mobile is now at Level 2, which is equivalent to the Tactical maturity level, using Gartner's Business Intelligence (BI) Maturity Model. This evaluation is predicated on several concerns that have been noticed and are typical of a business functioning at this level of BI maturity.

Poor Data Storage Methods:

- Data Security Risks: It has been discovered that TAIFA Mobile's security protocols are insufficient to safeguard confidential information. This includes inadequate access restrictions, shoddy encryption mechanisms, and a dearth of frequent security assessments.

- Inconsistent Data Management: Standardized procedures aren't in place for managing data. This includes sporadic data backups that might result in data loss and out-of-date or insufficient data records that could jeopardize data integrity.

- Data gaps: Without a single, central repository, several departments store data individually. Because of this fragmentation, it is challenging to obtain complete data throughout the company, which might result in inefficiencies and perhaps report inaccuracies.

3.2 Methodology Used for the Maturity Assessment

The BI maturity assessment of Taifa Mobile was conducted using a combination of 3 methods: interviews, document review, observation. These methods are explored below:

- *Interviews*: We met with key stakeholders in the company and conducted an on-site interview where we were able to gain an in-depth understanding of their business and their operations. The interviewed individuals were the company accountant and an IT personnel. These interviews provided insights into the company's current use of BI tools, data storage and management practices and the challenges faced by the company.

- *Data review:* A variety of documents, primarily excel worksheets, were collected from the company and in reviewing these documents, we gained insights into the company's current policies in data

management and inter- departmental communication. Below is a sample of an excel worksheet that was received.

Due Date	Exclusive	VAT	Total Purchases	Total Outstanding
4/19/2019	Ksh75,000.00	Ksh12,000.00	Ksh87,000.00	Ksh0.00
7/31/2019	Ksh50,000.00	Ksh0.00	Ksh50,000.00	Ksh0.00
9/30/2019	Ksh21,551.72	Ksh3,448.28	Ksh25,000.00	Ksh0.00
1/31/2020	Ksh21,551.72	Ksh3,448.28	Ksh25,000.00	Ksh0.00
3/31/2020	Ksh21,551.72	Ksh3,448.28	Ksh25,000.00	Ksh0.00
3/31/2020	Ksh5,000.00	Ksh800.00	Ksh5,800.00	Ksh0.00
3/31/2020	Ksh25,000.00	Ksh0.00	Ksh25,000.00	Ksh0.00
5/31/2020	Ksh10,167.00	Ksh0.00	Ksh10,167.00	Ksh0.00
5/31/2020	Ksh22,309.00	Ksh0.00	Ksh22,309.00	Ksh0.00
5/31/2020	Ksh21,929.82	Ksh3,070.18	Ksh25,000.00	Ksh0.00
5/31/2020	Ksh20,000.00	Ksh0.00	Ksh20,000.00	Ksh0.00
5/31/2020	Ksh20,000.00	Ksh2,800.00	Ksh22,800.00	Ksh0.00
6/30/2020	Ksh20,000.00	Ksh2,800.00	Ksh22,800.00	Ksh0.00
6/30/2020	Ksh879,824.57	Ksh123,175.44	Ksh1,003,000.01	Ksh0.00
6/30/2020	Ksh10,000.00	Ksh1,400.00	Ksh11,400.00	Ksh0.00
7/31/2020	Ksh30,000.00	Ksh0.00	Ksh30,000.00	Ksh0.00
7/31/2020	Ksh30,000.00	Ksh4,200.00	Ksh34,200.00	Ksh0.00
7/31/2020	Ksh5,000.00	Ksh700.00	Ksh5,700.00	Ksh0.00
8/31/2020	Ksh52,606.00	Ksh0.00	Ksh52,606.00	Ksh0.00
8/31/2020	Ksh70,000.00	Ksh9,800.00	Ksh79,800.00	Ksh0.00
9/30/2020	Ksh21,929.82	Ksh3,070.18	Ksh25,000.00	Ksh0.00
9/30/2020	Ksh5,000.00	Ksh700.00	Ksh5,700.00	Ksh0.00
9/30/2020	Ksh75,600.00	Ksh4,200.00	Ksh79,800.00	Ksh0.00
10/31/2020	Ksh879,385.96	Ksh123,114.04	Ksh1,002,500.00	Ksh0.00
10/31/2020	Ksh54,628.89	Ksh7,648.04	Ksh62,276.93	Ksh0.00
10/31/2020	Ksh70,000.00	Ksh9,800.00	Ksh79,800.00	Ksh0.00
10/31/2020	Ksh25,000.00	Ksh3,500.00	Ksh28,500.00	Ksh0.00
10/31/2020	Ksh40,000.00	Ksh5,600.00	Ksh45,600.00	Ksh0.00

Fig. 3.2: Supplier invoices worksheet

- *Observation:* Direct observation (during the face-to-face interview) of the data management practices in the company provided much needed clarity on the findings of the interviews and data collection tools the company uses.

3.3 Detailed Findings of the BI Maturity Assessment

The assessment revealed that Taifa Mobile is currently at the *Tactical level* of BI maturity. This finding indicates that while there are isolated instances of BI usage, there is a lack of standardization and integration across the organization. Specific findings include:

- *Data management:* Data is collected in the form of excel worksheets but there is no consistent quality and governance. There is no centralized data repository; each department collects and stores

its own data in its preferred form.

- *Data analysis:* Basic data analysis is carried out in the form of descriptive analysis but there is a noted lack of advanced analytics such as predictive analytics.

- *Data integration:* The tools being used in the BI efforts of the company are not standardized across departments with the IT department using SQL and the Finance department using Excel. This has resulted in a lack of a unified BI strategy to guide these efforts.

3.4 Gap Analysis and Areas for Improvement

The gap analysis identified several critical areas for improvement to advance Taifa Mobile's BI maturity:

Data management: The current data management has data being stored in separate systems with inconsistent quality and governance policies. This can be improved by establishing a centralized data management system with standardized data governance policies to ensure data quality and consistency and implementing data cleansing processes and regular audits (Green, 2019).

Data analysis: The current data analysis practices are limited to descriptive analytics with advanced analytics not being carried out. This can be improved by developing advanced analytics capabilities such as predictive modeling and making use of advanced BI tools. To bring this to fruition, the company would need to invest in staff training in advanced analytics techniques and tools.

Data integration: Currently, the BI efforts of the company are fragmented with no unified strategy. To improve this, the company ought to standardize BI practices and tools across the organization, develop a centralized BI strategy that aligns with the company's objectives while ensuring collaboration and communication between departments to foster integration (Brown, 2018).

4.0 Data Identification and Analysis

4.1 Identification of Relevant Data Sources within the SME

For an effective Business Intelligence (BI) solution for Taifa Mobile, identifying and leveraging the correct data sources is really important. Since Taifa Mobile offers many services, multiple data sources were integrated and analyzed. The data is primarily stored in Excel format (xlx), which allows for easy manipulation and analysis during the initial stages of the BI project. Here's a detailed look at the relevant data sources within Taifa Mobile:

1) *Bulk SMS xlsx:* This file contains records of all sent SMS messages, including time stamps, partners, viable and non-viable contacts, and recipient numbers. Delivery status for each SMS, response rates, and engagement statistics such as replies or actions taken by recipients. Frequency and volume of messages sent, segmented by customer type or service category, which can provide insights into the effectiveness of communication strategies.
2) *Cash Flow xlsx:* This file contains detailed records of cash inflows within the organization from customer payments and cash outflows for operational expenses. This data is necessary to assess the company's short-term liquidity status, crucial for financial planning and risk management.

years	inflow	outflow	P/L
2018	180000	175867.5	4132.5
2019	1629111	1603508	25603
2020	6131048	6080501	50546.84
2021	10920204	10088950	831253.1
2022	27164912	24653634	2511278
2023	6988016	10190567	-3202550
2024	6370502	6539530	-169028

Fig 4.1: The dataset of cashflow

3) *Customer Balances xlsx:* This file contains data on customers account balances highlighting the outstanding payments, analysis of balances by customer segment and payment histories. This data allows the company to manage credit risk and ensure timely collection of payments.
4) *Customer Invoices xlsx:* This file contains information on invoices the company received from suppliers including supplier names, amounts, invoice payments, payment statuses and invoice dates. This data underscores the relationship between suppliers and the company as well as highlighting the company's expenditure.
5) *Supplier Invoices xlsx:* This file contains information on invoices the company received from suppliers including supplier names, amounts, payment statuses and invoice dates. This data underscores the relationship between suppliers and the company as well as highlighting the company's expenditure.
6) *IT xlsx:* This file contains data on the status of the company's services contracted by various partners, the number of services contracted as well as the month contracted. This allows the company to keep track of which companies contract their services most and which are their highest selling services.

4.2 Data Exploration and Analysis (EDA)

To conduct effective Exploratory Data Analysis (EDA) on datasets like bulk SMS, customer balances, customer invoices, supplier invoices, and cash flow, we need to follow a structured approach. This process helps to understand the underlying patterns, identify anomalies, and gather insights to inform further data analysis or modeling. Here are detailed steps for conducting EDA on these datasets:

i. *Data Collection*

We ensured all files are collected and accessible, including bulk SMS data, customer and supplier invoices, customer balances, cash flow statements, and IT data. We determined the limitations or biases inherent of the data in the source, and the format of the data (e.g., CSV, Excel, SQL database).

ii. *Data Cleaning*

We dentified missing data points and decide on the approach for handling them, whether it's dropping the rows/columns or missing values. We checked for and remove any duplicate records to ensure the integrity of the analysis. We converted data into appropriate formats (e.g., converting

dates into datetime format). We identified outliers and assess whether they are due to data entry errors or genuine anomalies that need further investigation.

iii. Data Integration

We checked for relationships in the datasets and combined different datasets using common identifiers (e.g., customer ID, invoice number) to create a comprehensive view. This is crucial for datasets like customer balances and invoices.

iv. Data Transformation

We ensured that all data integrated had the same level of granularity (e.g., yearly, monthly, per transaction) to maintain consistency in analysis. We transfoemed the datasets through power query design in Power bi. We eliminated the unnecessary columns and chaged the data types of different columns. We Created new features that might be useful in the analysis, such as calculating the total outstanding debt, the number of customer debtors and frequency of SMS sent per customer.

v. Exploratory Analysis

We Analyzed trends over time, such as increases in customer debts, changes in cash flow patterns, or frequency of bulk SMS usage.

vi. Visualization

- **Histograms/clusted bar/Bar plots**: we used these to visualize distributions and detect outliers.
- **Line plots**: we used these for cash flow and invoice data to detect seasonal patterns or growth trends.
- **Cards**: we used the to show the total revenue, total amount due, and the total profit/loss.
- **Slicers**: we used these to filter data dynamically within dashboards and reports
- **Pie charts**: we ued these to visualize the percentage of the outstanding debts by each customer.
- **Tree maps**: we used these to visualize the total purchases by the suppliers and customer segments.

vii. Report Insights

- **Document findings**: The dashboard offers crucial insights into the financial management of the company by highlighting customer debts and supplier dependencies. Key observations include

Safaricom PLC as the primary debtor, accounting for over 30% of total outstanding balances, which underscores a significant concentration of credit risk. Other major customers like Talash Enterprise LTD and Maridaddy Motors LTD also contribute notably to the receivables, emphasizing the need for strategic credit management and targeted collection efforts to mitigate financial exposure. On the supplier side, the heavy reliance on a single supplier for significant purchases suggests a potential risk in the supply chain. This lack of supplier diversity could leave the company vulnerable to disruptions in supply, impacting operations and potentially increasing costs. Overall, these insights underscore the importance of diversifying customer credit exposure and supplier relationships to enhance financial stability and operational resilience.

- **Recommendations for further analysis**: Based on the analysis of the outstanding balances by customer and the purchasing patterns from suppliers, we recommended that the company should focus on diversifying its supplier base to mitigate risks associated with dependency on a single supplier. This strategy will help secure the supply chain and potentially improve bargaining power and cost-efficiency. Additionally, for customers with significant outstanding balances, especially Safaricom PLC which represent a substantial portion of receivables, it's crucial to enhance credit management practices. This could involve tightening credit terms, improving follow-up processes, and possibly implementing more robust risk assessment procedures before extending credit. These measures will help safeguard the company's cash flow and reduce the risk of bad debt, thereby maintaining financial stability and operational continuity.

4.3 Key Trends, Patterns, and KPIs Relevant to the SME's Business Goals

The analysis of the selected data sources revealed several key trends, patterns, and Key Performance Indicators that are relevant to Taifa Mobile's business objectives. Some of the key trends, patterns and KPIs that were uncovered include:

1. *Bulk messaging performance*: The number of bulk messages sent has been steadily growing indicating increasing customer engagement as well as the growing demand for the company's services. The delivery rate of messages is the KPI of interest to assess the performance of bulk messaging. A higher delivery rate indicates effective message distribution to the targets and network reliability.

2. *Customer financial behavior*: While a significant portion of customers tend to delay payments, a small number of customers ultimately default on payment altogether. The average outstanding payments would be the KPI of interest whereby a lower average would indicate better credit management and quicker payment collections.
3. *Supplier relationship*: The outflow from supplier invoices has been fluctuating which reflects changes in procurement strategies over the years. The ratio of supplier invoice turnover is the KPI of interest and a higher ratio would indicate efficient payment processing and a strong relationship between the supplier and the company.
4. *Customer account balances*: a section of customers consistently maintains a high outstanding balance thus poses a credit risk. A credit risk score is the KPI of interest whereby a low score indicates better management of credit risk and reduced likelihood of bad debts.

5.0 BI Report and Dashboard Design

5.1 Design and Development of the BI Dashboard

The design and development of the BI dashboard for TAIFA Mobile involved a structured approach to ensure the dashboard meets the organization's needs and provides valuable information for decision making.

The primary objectives of the TAIFA Mobile BI dashboard are:

- Real-Time Data Insights: Provide real-time data analysis to assist in decision-making.
- Performance Tracking: Monitor key performance indicators (KPIs) across different services.
- Market Trend Analysis: Understand market trends to enhance strategic planning.
- Operational Efficiency: Optimize internal and external communication processes.

To achieve these objectives, the following key metrics will be included in the dashboard:

- Customer Engagement Metrics: Message open rates, response rates, call durations.
- Service Utilization Metrics: Number of messages sent, USSD code usage, short code interactions.
- Financial Metrics: Revenue generated per service, cost of services, profit margins.
- Operational Metrics: Internal communication efficiency, service deployment times.

Data sources will include internal databases, service usage logs, financial records, and customer feedback.

Dashboard Design

The dashboard will consist of multiple sections, each focusing on different aspects of the business. The layout will be intuitive, with clear visualizations to present the data effectively.

The purpose of the dashboard design is to provide a snapshot of overall business performance. For example, the count of sender Id by partner represented below:

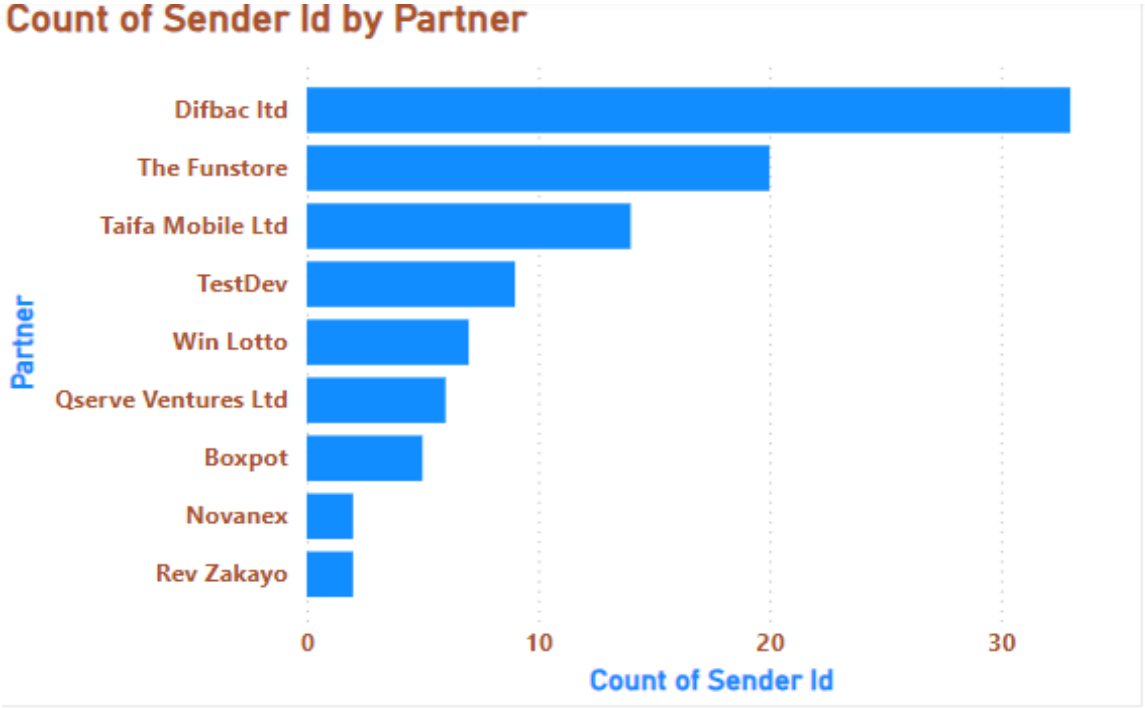


Fig 5.1: Count of Sender Id by partner.

Customer Engagement Section

Monitor how customers are interacting with TAIFA Mobile's services. For example, the message open rates, response rates, call durations, USSD interactions by Month.

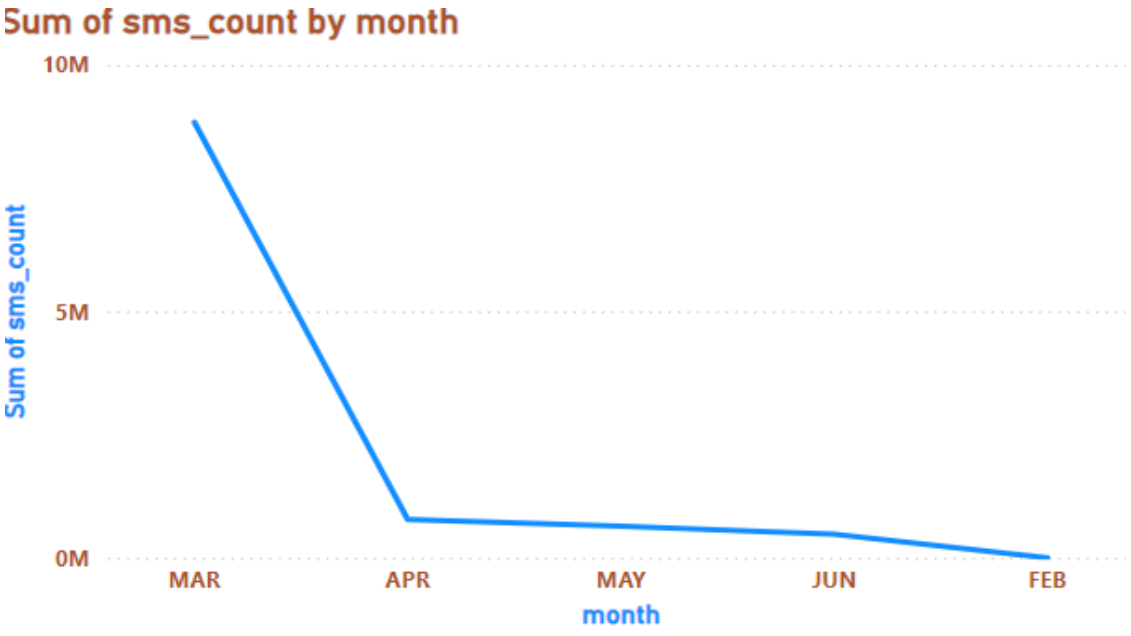


Fig 5.2: Summation of sms counted monthly.

Financial Performance Section

Track the financial health of the company. Like the revenue per service, cost per service, profit margins.

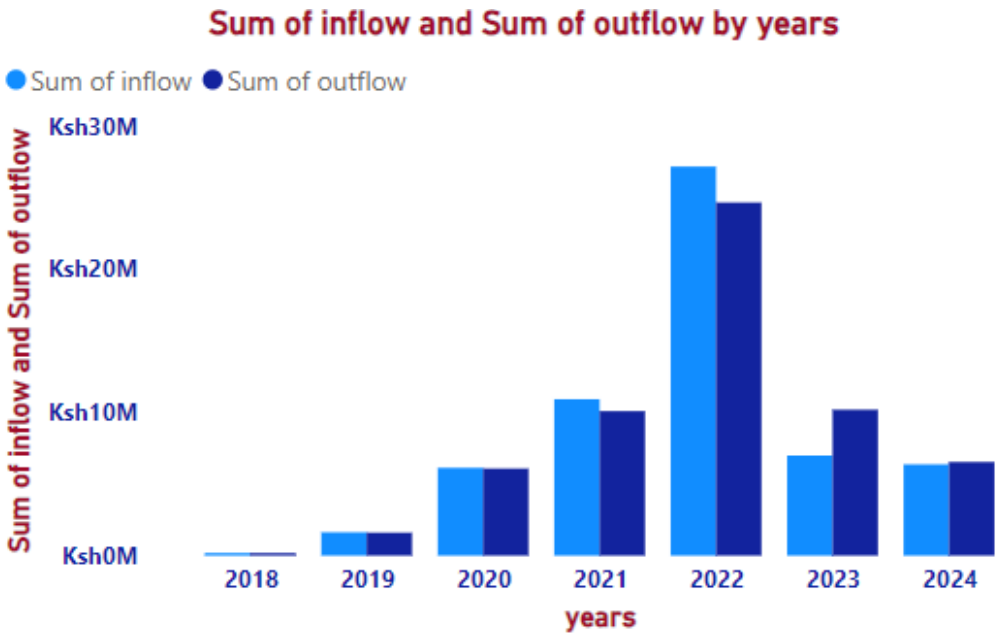


Fig 5.3: Summation of the yearly distribution of the inflow and outflow.

Profit and loss assessment

Fig 5.4*:* Summation of profit and loss yearly.

Development Process

The development of the BI dashboard will follow these steps:

- *Data Integration*: Collect data from various sources including internal databases, service usage logs, and financial records. Clean and preprocess the data to ensure consistency and accuracy.
- *Dashboard Design:* Design the layout of the dashboard using a wireframing tool. Select appropriate visualizations for each metric to ensure clarity and ease of understanding.
- *Implementation*: Develop the dashboard using a BI tool such as Tableau, Power BI, or a similar platform. Integrate data sources into the BI tool and create visualizations. Ensure real-time data updates to provide the most current insights.
- *Testing and Validation:* Test the dashboard with sample data to ensure it functions as expected. Validate the accuracy of the data and the insights provided.
- *Deployment and Training*: Deploy the dashboard within TAIFA Mobile's environment. Conduct training sessions for key stakeholders to ensure they can effectively use the dashboard.

5.2 Description of the Chosen BI Tools and Technologies

The following BI tools and technologies have been chosen for the construction of the TAIFA Mobile BI dashboard based on their capabilities, usability, and fit for the needs of the business:

Microsoft Power BI

With an interface that's easy enough for end users to use, Microsoft Power BI is a business analytics solution that offers interactive visualizations and business intelligence features.

- Simple integration with other Microsoft services, such as Excel, Azure, and SQL Server, is part of the Microsoft ecosystem.
- Custom Visuals: Offers a large selection of custom visuals to modify the dashboard to meet certain requirements.
- Data connectivity refers to the ability to connect to many data sources, such as cloud-based sources, online services, and databases.
- Users may ask natural language inquiries about their data and get visual replies in the form of natural language queries.
- Cooperation: Facilitates teamwork by allowing access to common dashboards and reports.

Why Selected: Power BI is chosen because of its robust connection with the Microsoft ecosystem, which TAIFA Mobile most certainly already uses. It is a flexible tool for a range of user requirements because of its features for natural language processing and flexibility to build unique visualizations.

years	Sum of inflow	Sum of outflow	Sum of P/L
2018	Ksh180,000.00	Ksh175,867.50	Ksh4,132.50
2019	Ksh1,629,111.00	Ksh1,603,508.00	Ksh25,603.00
2020	Ksh6,131,047.76	Ksh6,080,500.92	Ksh50,546.84
2021	Ksh10,920,203.50	Ksh10,088,950.40	Ksh831,253.10
2022	Ksh27,164,911.85	Ksh24,653,633.90	Ksh2,511,277.95
2023	Ksh6,988,016.30	Ksh10,190,566.60	-Ksh3,202,550.30
2024	Ksh6,370,502.05	Ksh6,539,530.05	-Ksh169,028.00
Total	**Ksh59,383,792.46**	**Ksh59,332,557.37**	**Ksh51,235.09**

Fig 5.5: The overall dashboard for the Cashflow.

Integration of BI Tools and Technologies

The chosen tools will be integrated as follows to create a simple BI solution for TAIFA Mobile:

- *Data Collection and Storage*: Data was collected from various sources and stored in Excel sheets. We used Ms Excel for data cleaning, and the advanced analysis by Power BI.
- *Dashboard Development:* Power BI will be used to create interactive dashboards, ensuring that data is always up to date.
- *Deployment and Collaboration:* Dashboards created in Power BI will be shared with stakeholders for collaboration.

Regular updates and maintenance will be performed to ensure the dashboards reflect the latest data and insights. By leveraging these BI tools and technologies, TAIFA Mobile will be able to achieve comprehensive, real-time insights into their business operations, enabling data-driven decision-making and fostering growth and competitiveness.

5.3 Dashboard Features and Functionalities

The BI dashboard for TAIFA Mobile will include a range of features and functionalities designed to provide comprehensive, real-time insights into the company's operations. These features will be categorized into different sections of the dashboard to facilitate easy navigation and usability.

Real-Time Data Updates: Automatically refreshes data to provide the most current insights. Displays key performance indicators such as total revenue, total messages sent, total USSD sessions, and customer satisfaction scores.

Interactive Filters: Users can filter data by date range, service type, and other criteria to customize the view. Click on any metric to see more detailed information and underlying data.

Functionalities:

- Segment Analysis: Allows users to segment data by demographics, geographic regions, or other attributes.
- Trend Identification: Highlights trends in customer engagement metrics, aiding in the development of targeted marketing strategies.

Financial Performance Section: Includes revenue per service, cost per service, and profit margins.

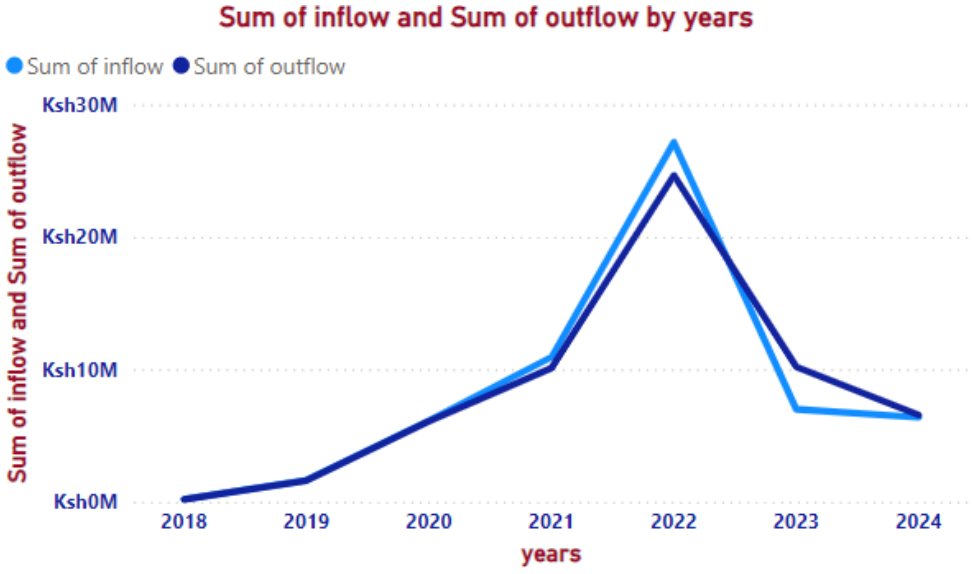


Fig 5.6: Line graph for cashflow as an example

Functionalities:

- Profitability Analysis: Users can analyze the profitability of each service by comparing revenue and cost data.
- Forecasting Tools: Includes basic forecasting capabilities to predict future financial performance based on historical data.

Operational Efficiency Section

Operational Metrics: Includes internal communication efficiency, service deployment times, and error rates.

Functionalities:

- Project Management: Provides tools for tracking service deployment projects and identifying bottlenecks.
- Efficiency Monitoring: Helps identify areas where internal processes can be improved for greater **efficiency.**

Additional Functionalities

- Role-Based Access: Ensures that only authorized users can access sensitive data and dashboard features.
- Customizable Views: Allows users to save custom views and dashboards based on their specific needs.

Collaboration Tools:

- Annotations: Users can add notes and comments to specific data points or visualizations for collaboration.
- Sharing Options: Dashboards can be shared with team members or stakeholders through links or embedded within other applications.

Export and Reporting:

- Export Data: Users can export data and visualizations in various formats (e.g., PDF, Excel) for offline analysis.

- Automated Reporting: Schedule regular reports to be generated and sent to stakeholders automatically.

Responsive Design:

- Mobile Access: The dashboard is designed to be accessible on mobile devices, ensuring that users can access data on the go.
- Adaptive Layout: Adjusts the layout and visualizations based on the screen size for optimal viewing experience.

5.4 Considerations for Implementation

Implementing a BI dashboard for TAIFA Mobile involves several critical considerations to ensure its successful deployment and adoption. These considerations span technical, organizational, and user-centric aspects to guarantee a smooth and effective implementation process.

Data Management and Integration

- *Data Quality and Consistency:*

Data Cleaning: Ensure data from various sources is cleaned and standardized to maintain consistency.

Data Validation: Implement validation rules to prevent errors and inconsistencies in the data.

- *Data Integration:*

Unified Data Source: Consolidate data from different sources (e.g., internal databases, external services) into a central repository.

ETL Processes: Set up Extract, Transform, Load (ETL) processes to integrate data seamlessly into the BI tools.

Real-Time Data: Implement real-time data integration where possible to provide up-to-date insights.

Technical Infrastructure

- *Security and Privacy:*

Data Security: Implement robust security measures to protect sensitive data, including encryption, access controls, and regular audits.

Compliance: Ensure that the BI implementation complies with relevant data protection regulations (e.g., GDPR, CCPA).

- *Performance Optimization:*

Optimization: Optimize database queries and dashboard design to ensure fast load times and smooth user experience.

Monitoring: Set up monitoring tools to track system performance and identify potential bottlenecks.

User Adoption and Training

- *User Involvement:*

Stakeholder Engagement: Involve key stakeholders throughout the implementation process to ensure their needs and feedback are considered.

Pilot Testing: Conduct pilot testing with a select group of users to gather feedback and make necessary adjustments before full rollout.

- *Training Programs:*

Comprehensive Training: Provide training sessions for users to familiarize them with the BI tools and dashboard functionalities.

Ongoing Support: Offer ongoing support and resources (e.g., documentation, helpdesk) to assist users as they adapt to the new system.

- *User-Friendly Design:*

Intuitive Interface: Design the dashboard with an intuitive and user-friendly interface to minimize the learning curve.

Customization: Allow users to customize their views and reports to meet their specific needs.

Organizational Change Management

- *Change Management Plan:*

Communication Strategy: Develop a communication strategy to inform and update employees about the BI implementation and its benefits.

Change Champions: Identify and empower change champions within the organization to advocate for the BI initiative and assist their peers.

- *Cultural Adaptation:*

Promote Data-Driven Culture: Encourage a culture that values data-driven decision-making by showcasing the benefits of the BI dashboard.

Feedback Mechanism: Establish mechanisms for continuous feedback and improvement to ensure the system evolves with user needs.

Dashboard Development and Iteration

- *Agile Development:*

Incremental Development: Adopt an agile approach to dashboard development, delivering features incrementally and iterating based on user feedback.

Prototyping: Develop prototypes of the dashboard to validate design choices and gather early feedback from users.

- *Feature Prioritization:*

Prioritize Key Features: Prioritize the development of key features that address the most critical business needs and provide immediate value.

Future Enhancements: Plan for future enhancements and iterations to continuously improve the dashboard based on evolving requirements.

Evaluation and Continuous Improvement

- *Performance Metrics:*

Define Metrics: Establish metrics to evaluate the success and impact of the BI dashboard (e.g., user adoption rate, data accuracy, decision-making efficiency).

Regular Reviews: Conduct regular reviews of the BI system's performance and user feedback to identify areas for improvement.

- *Continuous Improvement:*

Iterative Updates: Implement iterative updates and enhancements to the dashboard based on user feedback and changing business needs.

Stay Current: Keep up to date with the latest BI trends and technologies to ensure the system remains cutting-edge and effective.

6.0 Implementation Plan

6.1 Steps for Implementing the BI Dashboard in the SME

Preparation: Involved gathering requirements from the company, defining the project objectives and identifying the key users of the dashboard. Our team was able to gather the company requirements by interviewing key stakeholders in the company and thus gaining an understanding of their needs. Some of the requirements pushed by the company were; the BI tool should be compatible with their system, all the analytics that they are currently performing on Excel and SQL should be transferable to the BI tool we introduce and the visualizations ought to be clear and easy to understand. Using this information, we polished our objectives for this project to ensure that all the company requirements were met even while accomplishing all our goals. As the two departments that were able to provide data were the Finance and IT departments, we had to ensure that the BI dashboard that we developed would be easily understandable to the employees in these two departments.

Data integration: Involves identifying and cataloging the various data sources in the company and integrating this data into Power BI. Our team had conducted a BI maturity assessment on the company and found it to be at level 2 on the Gartner model. This indicated that the departments in the company lacked a unified approach to BI and rather any BI efforts were conducted departmentally with no interdepartmental efforts made. We had to get around this and integrate all the data we received from the two departments into the dashboard. We identified key points in the two departments' data that would allow the integration of their data before ultimately going into dashboard development.

Dashboard development: In this step, the dashboard is designed and built in Power BI while incorporating feedback from the company. Using the data, we had identified to be key in the integration of the two departments' data, we embarked on dashboard designing and development. All the data provided by the company had already been converted to Excel files thus loading the files onto Power BI was a simple matter. The design process involved making mock-ups and presenting these to the company to receive feedback on the design they liked most. With this feedback, we started developing the dashboard while ensuring that many functionalities such as drilling down and applying of filters would be easily used.

Testing: Tests are conducted to ensure data accuracy and dashboard performance is up to par. After we finished designing and developing the dashboard, we conducted thorough testing of the dashboard to ensure that we had met all the company requirements while maintaining the effective working of the dashboard.

Several tiles had to be re-arranged at this stage to ensure presentability while still maintaining effective communication. We ensured that all statistical summaries that we conducted on the data was necessary and of the right dataset.

Deployment: The dashboard is presented to the stakeholders for implementation. After conducting several tests and ensuring proper functioning of the dashboard, we presented the dashboard to the company. We had to explain how the dashboard worked, from loading data onto it to the information communicated by each tile. This involved a step by step explanation of the visualizations we developed and the meaning behind the summary statistics on the dashboard such as various counts and means.

Training: The company employees who will make use of the platform are trained on using Power BI to get started on using the dashboard. After presenting the dashboard to the company, training would have to be conducted on the use of Power BI on the company employees. Other than the overview on Power BI and the training on the dashboard that we conducted, a training session on Power BI has been scheduled. As part of the training, our team developed a user manual on Power BI to give the stakeholders a point of reference for any queries they might have on the dashboard while they familiarize themselves on its use.

6.2 Training and Support for SME Staff

The company employees ought to be familiarized with both the use of the dashboard as well as the use of Power BI. Some of the topics to be covered would include:

- Basic navigation and use of Power BI
- Importing and exporting data onto the platform.
- Loading data into power BI from a wide range of resources such as CSV and XLS files.
- Transforming data using Data Analysis Expressions (DAX) and Power Query Languages.
- Creating relationships between the data
- Applying filters and drilling down into data.
- Generating insights from the dashboard.
- Visualizing data in Power BI using built-in tools.

- Sharing and collaborating with the Power BI server

6.3 Recommendations for Ongoing Use and Maintenance

While using the platform, certain considerations when adhered to will better user experience and prolong the platform's relevancy. Some of these considerations are:

Regular data refresh: Data refreshing ought to be performed regularly or scheduled in order to ensure the dashboard is displaying the most up-to-date information. If a refresh has been scheduled, it ought to be monitored to prevent using out of date information to perform analysis and make decisions.

Performance monitoring: Continuously monitor dashboard performance and optimize data models and queries as needed to maintain optimal performance. The queries and models developed were based on already ongoing processes and further adjustments would have to be made with changes in the company operations or after identifying points that could be optimized.

User feedback: Collect user feedback to identify gaps that need filling or improvements that can be made on the platform to make the needed adjustments to the dashboard to enhance user experience. The company would have to conduct surveys on their employees' use of the dashboard in order to identify points that could be improved upon based on their activities.

Documentation updates: Keep user documentation up to date by regularly updating user manuals and guides and incorporating new features to the dashboard. Power BI is a Microsoft application and any updates made on user documentation would be communicated. Keeping abreast of these updates would allow the company to make the utmost use of the application.

7.0 User Documentation/Manual

7.1 Detailed User Guide for the BI Dashboard

Overview of the Dashboard and its Purpose

The BI dashboard for TAIFA Mobile has been designed and built to provide insight into various aspects of their operation including cash flow, bulk messaging, service provision, customer invoices and supplier invoices. The dashboard has been built with an aim to facilitate data driven decisions being made with regards to company operations and strategy by offering real-time visualizations and analysis.

Dashboard Access Instructions

Open your preferred browser and navigate to the Power BI service at Power BI or download and install the Power BI mobile app.

Enter your Power BI account credentials (contact your administrator to set one up in case you lack one).

Dashboard Navigation

The navigation pane is located on the left side of the window. It allows access to reports and dashboards.

The central section of the window is the reports area that displays the selected visualization.

The right side is the filters pane where users can apply filters to customize their views.

Using Filters

To apply a filter, the desired filter criteria can be chosen from the filters pane on the right side and applied to the visualization.

To clear filters, deselect applied filters from the filters pane after clicking ‘Clear Filters’ button on the same pane.

Drill- Down

Click on a data point in a visualization and use the ‘Drill Down’ button on the visualization toolbar to navigate through hierarchical data.

Click on the ‘Drill Up’ button to return to higher levels.

Sign in to the Power BI service

Article • 03/12/2024

APPLIES TO: ✔ Power BI service for ***business users*** ✔ Power BI service for designers & developers ✘ Power BI Desktop ✘ Requires Pro or Premium license

Power BI accounts

Before you can sign in to Power BI, you need an account. There are two ways to get a Power BI account. Your organization can purchase Power BI licenses for its employees or individuals can sign up for free trials or personal licenses. This article covers the first scenario.

Sign in for the first time

After you have an account set up, you can sign in and get started in the Power BI service. Use the steps here for general guidance. The exact screens may vary from what you see here, depending on your version of Microsoft software, browser version, and how your admin set up your license and tenant.

Step 1: Open the Power BI service

The Power BI service runs in a browser.

- If you receive an email from a colleague, with a link to a dashboard or report, select the link to **Open this report** or **Open this dashboard**.

Drill mode in the Power BI service

Article • 12/25/2023

APPLIES TO: ✔ Power BI service for *business users* ✔ Power BI service for designers & developers ⊗ Power BI Desktop ✔ Requires Pro or Premium license

This article shows you how to use the *drill mode* in the Microsoft Power BI service. You can explore in-depth details about your data by using the drill-down, drill-up, and expand features on your visual. To learn how to create a hierarchy, read hierarchies in Power BI

Drill mode requirements

To use the drill mode, the Power BI visual must have an explicit or implicit hierarchy. Report designers often add explicit date hierarchies to reports. Those hierarchies are marked with the hierarchy icon. A common date hierarchy is one that contains fields for the year, quarter, month, and day. A report might have implicit hierarchies too. These informal hierarchies don't have the icon. But the relationship, and therefore a drill path, exists. For example, you might have a visual that shows the number of medals won in a sports competition. The drill path in this example is the sport, which has specific unique types of the sport, and the events. By default, the visual shows the medal count by sport, like gymnastics, skiing, and aquatics. Then, you can select one of the visual elements, like a bar, line, or bubble, to display the individual sports. For example, selecting the aquatics element shows you data for swimming, diving, and water polo. Then, selecting the diving element opens the next level in the hierarchy and shows you details for springboard, platform, and synchronized diving events.

You can tell if a visual has a hierarchy by hovering over it. If the drill control options appear in the action bar, your visual has a hierarchy.

Drill down and up

The following example is a bar chart that has a hierarchy made up of category, manufacturer, segment, and product. The bar chart shows the total number of units sold in the year 2014 by category. Category is the top level of the hierarchy. The chart is filtered by the categories Rural and Urban.

7.2 Instructions for Accessing and Using the Dashboard

Use the navigation pane to browse different reports and click on a report to open it in the reports area.

Click on individual tiles to view detailed data and use filters and drill-down features to customize data view.

To export data to Excel, click on the 'More Options' (three dots) button on a visualization and select ‘Export data’ after which choose the format as ‘Excel’.

To export data to pdf, navigate to the 'File' menu in the Power BI service and select ‘Export to PDF’.

7.3 Troubleshooting Tips and FAQs

Here are some to thee troubleshooting tips, more have been included in the appendix.

1. Dashboard Not Loading or Slow Performance

- **Issue:** If the dashboard is not loading or takes too long to load.
- **Solution:** Ensure you have a stable internet connection. Clear your browser cache and cookies, then reload the dashboard. Make sure you are using a compatible browser (e.g., Google Chrome, Mozilla Firefox). Close unnecessary applications to free up system resources.

2. Data Not Updating

- **Issue:** If the data on the dashboard is not current or does not reflect the latest updates.
- **Solution:** Click the refresh button on the dashboard to manually update the data. Check the data refresh schedule and ensure it is set up correctly. Verify that the data sources are connected and the data pipelines are functioning properly.

3. Access Denied or Permission Issues

- **Issue:** If your users are unable to access certain parts of the dashboard or specific data.
- **Solution:** Verify that the user has the correct role and permissions assigned. Check the access control settings to ensure the user has the necessary permissions. Ensure the user is logged in with the correct credentials.

8.0 Feedback and Evaluation

8.1 Summary of Feedback Collected from the SME

After presenting the newly developed BI dashboard to Taifa Mobile, comprehensive feedback was collected from the company's staff. The feedback highlighted various aspects of the dashboard that were well-received, as well as areas where improvements could be beneficial:

1. **Improved Visualization**: Users at Taifa Mobile reported a significant enhancement in their ability to comprehend the dashboard's visual outputs compared to previous data presentation methods. The use of clear, intuitive graphics has notably improved their speed and efficiency in understanding key metrics and insights.
2. **User-Friendly Interface**: The dashboard was praised for its interactive features, which have made it easier for users to navigate and find specific information. This has facilitated a more user-centric approach to data exploration, allowing staff to efficiently drill down to the details that matter most.
3. **Mobile Accessibility**: Feedback included requests for enhanced mobile accessibility, allowing users to access the dashboard effectively while on the move. This feature is especially important for staff who need to make decisions remotely or when traveling.
4. **Data Integrity and Accuracy**: Concerns were raised about the consistency and correctness of the data displayed. Users stressed the need for routine checks and updates to ensure data reliability, which is crucial for making informed decisions.
5. **Seamless Integration**: Staff hoped that the dashboard would seamlessly integrate data from various sources without disrupting existing documentation and reports.
6. **Training Needs**: There was a significant call for tailored training sessions, particularly for IT staff who would be managing the technical backend of the dashboard. Additionally, other employees also sought more comprehensive training to fully utilize the dashboard in their specific roles and responsibilities.

8.2 Analysis of the Feedback and Suggested Improvements

The feedback from Taifa Mobile has provided valuable insights into how the BI dashboard is perceived and will be utilized within the company. Based on this feedback, the following plan has been devised to address the issues and enhance the dashboard's functionality:

1. **Comprehensive Training Programs**: Organize detailed training sessions that are customized for both IT staff and other employees. This will ensure that IT personnel are equipped to manage and troubleshoot the dashboard, while other staff members are trained to use the dashboard effectively for their specific operational needs.
2. **Dashboard Customization**: Investigate solutions that allow users to modify certain aspects of the dashboard. This could include adjustable settings for layouts, filters, and perhaps even controlled data visualization options to cater to personal preferences and departmental requirements.
3. **Enhanced Mobile Functionality**: Prioritize the development of a mobile-friendly version of the dashboard. This should focus on responsive design and seamless functionality on various devices, ensuring that all staff can access critical business intelligence tools anytime and anywhere.
4. **Feedback Collection and Updates**: Implement a systematic approach to collect ongoing user feedback, perhaps through regular surveys or a digital suggestion box integrated within the dashboard. Use this feedback to continually refine and update the dashboard.
5. **Strict Data Validation Routines**: Establish rigorous data validation protocols to ensure data accuracy and integrity. This could involve routine data audits, real-time error checking, and automatic updates to keep the data reliable and up-to-date.

9.0 Future Recommendations

9.1 Recommendations for Further Development of the SME's BI Capabilities

1. *Incorporate more departments into using BI* – The scope of the use of BI can be widened beyond the Finance department and the IT department which were the two departments whose data we managed to get. This will allow for data-driven decisions to be made across the whole company with department specific dashboards being a possible future endeavor. Incorporating a more centralized data governance policy would bolster the company's growth as they would be in place to analyze the performance of each department in real-time and make adjustments as needed.
2. *Gather more data from users* – use surveys and even interviews to gather more data from users which will enhance the richness of data available for analysis allowing use of machine learning and predictive analysis. There was a lack of feedback from users which has resulted in minimal improvements being made on the services offered by the company throughout its operation period. In order to cater to an ever-changing range of users of different demographic groups, the company would need to engage more with their clients in order to better adapt their services for their use.
3. *Real-Time Data Processing*: Implement stream analytics to process data in real-time, particularly useful for USSD and SMS services where immediate data processing can enhance customer interactions and service delivery. Additionally, develop an event-driven BI system that triggers alerts and automated actions based on specific data events, such as spikes in customer complaints.
4. *Staff Training and Development:* Implement ongoing training programs to keep staff updated with the latest BI technologies and best practices. This ensures that the BI system is used effectively across the organization.
5. *Data Quality Management:* Invest in tools and processes to continuously monitor and improve the quality of data. Regular audits and cleansing routines can help maintain the accuracy and usability of BI insights.

Recommendations for Financial and operational data of the SME's BI analysis to improve the company's financial health and operational resilience:

1. **Enhance Credit Management:** Implement stricter credit control measures to manage the significant receivables, especially from major customers like Safaricom PLC. Consider more

stringent credit terms or incentives for early payment to improve cash flow. Regularly review credit policies to ensure they align with current market conditions and customer payment behaviors.

2. **Diversify Customer Base:** Reduce dependency on a few major customers by expanding the customer base. This diversification can mitigate risks associated with large unpaid balances and ensure more stable revenue streams. Engage in marketing and outreach programs to attract new customers from different sectors or geographic locations.
3. **Strengthen Supplier Relationships and Diversification:** While maintaining good relations with the current major supplier, seek to diversify suppliers to reduce dependency risks. This can involve sourcing alternative suppliers for critical inputs or negotiating with additional suppliers to ensure competitive pricing and reliability.
4. **Improve Financial Reporting and Monitoring:** Enhance financial data analysis capabilities to monitor and report on financial health more accurately and timely. This includes regular reviews of outstanding debts, supplier performance, and overall financial metrics. Use advanced analytics to predict trends and potential issues in accounts receivable and supply chain management.
5. **Regular Risk Assessments:** Conduct regular risk assessments focusing on financial exposures, supplier risks, and operational vulnerabilities to proactively address potential challenges. Establish a risk management framework that includes regular updates and training for key personnel on risk mitigation strategies.

9.2 Suggested Additional BI Tools and Techniques

Additional BI Tools and Techniques for Enhancing Taifa Mobile's Data Analysis Capabilities are given as follows below;

1. Advanced Analytics Tools

- **Azure Machine Learning** can be incorporated to build machine learning models that would be used on the platform. These models could range from classification models to predictive models and in the long run, they would simplify whilst broadening the data analysis process.

- **Tableau:** Use Tableau to enhance visual analytics, allowing users to explore data through intuitive interfaces and generate insights that can inform strategic decisions and operational improvements.

2. Predictive Analytics

- **IBM SPSS:** IBM SPSS can be used for statistical analysis and predictive modeling. This can help Taifa Mobile predict customer churn, forecast sales, and understand trends.

- **R and Python with Libraries (like scikit-learn):** Use R or Python for more customizable predictive analytics solutions. Python and R scripts can be incorporated onto the platform to perform advanced statistical analysis. This would especially be useful for predictive analysis as both python and R have statistical capabilities

10. Conclusion

10.1 Summary of the Project Outcomes

The "Assessing BI Maturity and Developing a BI Dashboard for Taifa Mobile" project has substantially upgraded the financial oversight capabilities at Taifa Mobile. By introducing an advanced Microsoft Power BI dashboard, the project provided pivotal insights into financial metrics such as cash flow trends, customer payment behaviors, and revenue generation patterns. These capabilities allowed for a more granular and timely understanding of the company's financial health, facilitating proactive financial management and decision-making.

With the BI tools in place, Taifa Mobile is equipped to identify revenue opportunities, optimize cost management, and monitor financial performance in real-time. This strategic enhancement will improve the financial stability and provide the company with a framework to respond to financial challenges swiftly and effectively. As Taifa Mobile continues to grow and adapt to market demands, maintaining and expanding upon these BI capabilities will be crucial. It will enable the company not only to sustain its current financial health but also to explore new opportunities for revenue generation and cost efficiency, ensuring long-term financial sustainability and competitive advantage in the telecommunications industry. This project has not just enhanced Taifa Mobile's operational capabilities; it has set a new standard for how the company leverages technology to drive strategic growth and customer satisfaction.

10.2 Final Thoughts and Reflections on the Project

Reflecting on the project, it's clear that the endeavor has been transformative for the company. This project was not just about deploying a new tool; it was a strategic initiative that fostered a significant shift towards a data-driven culture within Taifa Mobile. The successful integration of a comprehensive BI dashboard using Microsoft Power BI marked a pivotal step in how the company leverages technology to inform business decisions, optimize operations, and enhance customer interactions.

One of the most significant outcomes of this project has been the shift from reactive to proactive management practices, enabled by real-time data access and analytics. This change has manifested in more decision-making processes, where insights derived from the BI system lead to quicker and more informed decisions. Financially, the company has seen tangible benefits, with improved monitoring of cash flows

and more effective management of customer and supplier relationships contributing to a healthier bottom line.

However, the journey does not end here. The initial success of the BI dashboard has set the stage for ongoing development and refinement. Continuously evolving the BI capabilities to include predictive analytics and deeper integrations with other business systems will be essential to staying ahead in a competitive market. The project also underscored the importance of staff engagement and training in maximizing the value of new BI tools. As Taifa Mobile continues to expand its BI infrastructure, ongoing education and support will be crucial for all users, ensuring that the full potential of these tools is realized.

In conclusion, the BI maturity project for Taifa Mobile has been a profound learning experience and a demonstration of the power of data in transforming business operations. It serves as a compelling case study of how targeted technological enhancements can result in substantial business improvements and set the foundation for future growth and innovation

11.0 References

Brown, R. (2018). "Integrating BI Tools Across Departments." *Information Systems Management*, 32(4), 257-270.

Davis, L. (2020). "Challenges in BI Adoption and Implementation." *Global Business Review*, 15(3), 278-293.

Gartner, Inc. (2022). "Gartner BI Maturity Model." Retrieved from Gartner Website.

Green, T. (2019). "Developing Advanced Analytics Capabilities." *Analytics Today*, 20(3), 66-79.

Lloyd, A. (2020). "Evaluating BI Maturity: A Comprehensive Guide." *Journal of Business Analytics*, 34(2), 123-135.

Microsoft Corporation. (2021). *Power BI Documentation*. Retrieved from Microsoft Power BI Documentation.

Microsoft Corporation. (2021). *Power BI Security*. Retrieved from Power BI Security.

Power BI Team. (2020). "Getting Started with Power BI: A Practical Guide for Beginners." *BI Practitioners Journal*, 29(3), 144-160.

Sharda, R., Delen, D., & Turban, E. (2020). *Business Intelligence and Analytics: Systems for Decision Support* (11th ed.). Pearson.

12.0 Appendices

Interview Dialogue

Rachel: “How long have you been in operation?”

Md. Anne: “We have been in the marketplace since 2018”

Kendi: “What services do you provide/offer?”

Md. Anne: “short codes, bulk SMS campaigns, sender ID, skiza and USSD services”

Rachel: “How do you keep your data?”

Md. Anne: “We keep data on excel sheets and databases”

Rodrigue: "How do you currently use data in your decision-making process?"

Md. Anne: "We primarily rely on Excel spreadsheets for data analysis. While it works for basic needs, it lacks advanced analytics capabilities and integration with other data sources."

Michael: “What data do you collect from your customers after they have contracted your services?”

Sharon: “How do you collect and handle feedback from customers”

Md. Anne: “We have not engaged in collection of feedback because most feedback if via phone calls.**”**

Kandie: “We do not currently collect much data from customers after we have delivered the services.”

Sharon: “Do you have plans to scale your company operations to other countries?”

Md. Anne: “We do not have such plans at the moment.”

Interview Transcript:

Business Understanding

1. **Company Overview**:
    - Can you provide a detailed overview of your services related to short codes, bulk SMS, and USSD?
    - Who are your main customers (e.g., businesses, individual consumers)?
2. **Current Processes**:
    - Can you describe the processes involved in setting up and managing short codes, bulk SMS campaigns, and USSD services?
    - How do you track and measure the performance of these services?
3. **Data Sources**:
    - What types of data do you collect from your mobile services (e.g., usage data, customer engagement, response rates)?
    - How do you store and manage this data (e.g., databases, cloud services)?

BI Practices and Maturity

1. **Current BI Tools**:
    - Are you currently using any BI tools or platforms to analyze data from your mobile services? If so, which ones?
    - How do you currently generate reports and insights from your data?
2. **Data Management**:
    - How do you ensure the quality and accuracy of the data collected from your mobile services?
    - What challenges do you face in managing and integrating data from different sources?
3. **Reporting and Analytics**:
    - What types of reports do you generate to track the performance of your services (e.g., engagement metrics, campaign effectiveness)?
    - Who are the primary users of these reports within your organization?
4. **Advanced Analytics**:
    - Are you using any advanced analytics techniques to analyze data from your mobile services (e.g., predictive analytics, customer segmentation)?

- If not, are there any plans or interests in adopting these techniques?

BI Needs and Challenges

1. **Challenges**:
   - What are the main challenges you face in analyzing and reporting data from your mobile services?
   - Are there any specific pain points or areas where you feel improvements are needed?
2. **Decision-Making**:
   - How is data currently used in decision-making processes related to your mobile services?
   - Are there any gaps in the data or insights you have that hinder effective decision-making?
3. **Future Goals**:
   - What are your future goals for BI and analytics within your company?
   - How do you envision a BI dashboard helping you achieve these goals?

Implementation and Adoption

1. **Technology Infrastructure**:
   - Can you describe your current technology infrastructure for managing mobile services (e.g., servers, databases, software)?
   - Are there any limitations or constraints we should be aware of when designing the BI dashboard?
2. **User Training and Adoption**:
   - How do you plan to train staff on using the new BI dashboard?
   - What are your expectations for user adoption and engagement with the new tools?

Final Questions

1. **Feedback and Collaboration**:
   - How would you like us to communicate our findings and progress throughout the project?

User manuals that were provided.

Sign in to the Power BI service

Article • 03/12/2024

APPLIES TO: ✅ Power BI service for ***business users*** ✅ Power BI service for designers & developers ⊗ Power BI Desktop ⊗ Requires Pro or Premium license

Power BI accounts

Before you can sign in to Power BI, you need an account. There are two ways to get a Power BI account. Your organization can purchase Power BI licenses for its employees or individuals can sign up for free trials or personal licenses. This article covers the first scenario.

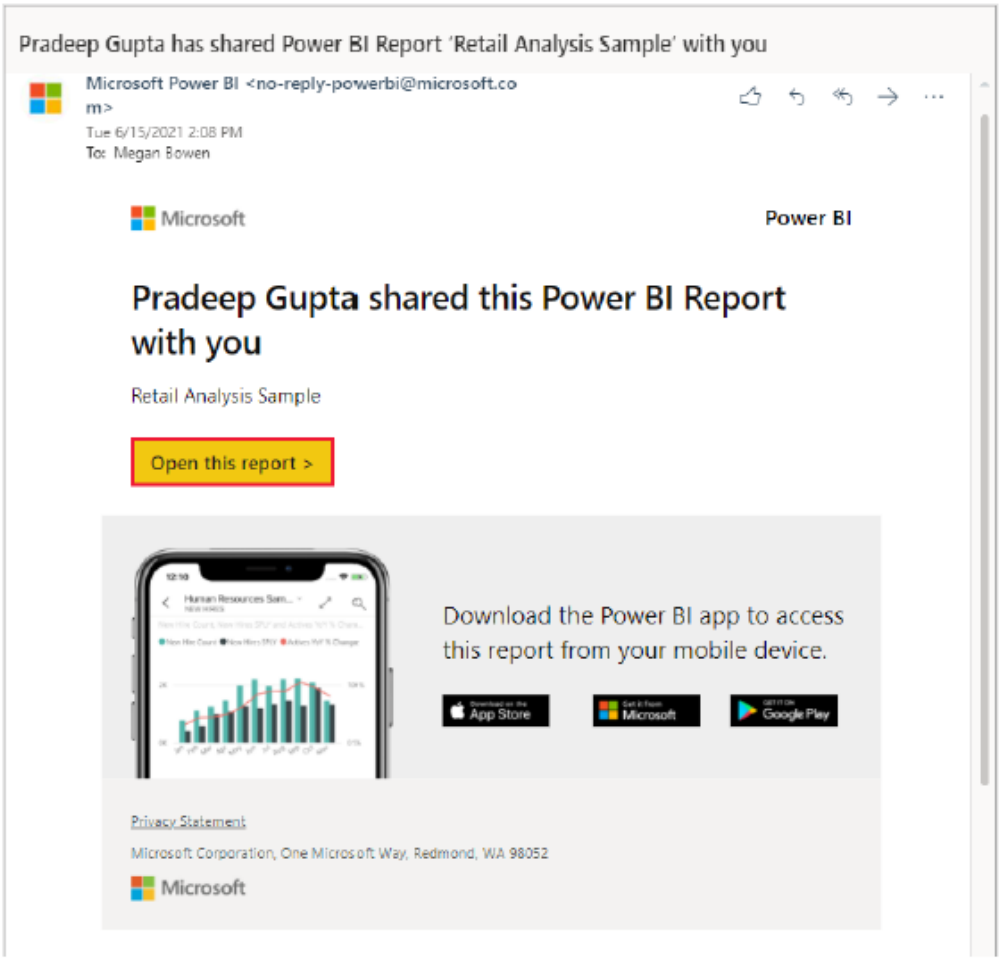
Sign in for the first time

After you have an account set up, you can sign in and get started in the Power BI service. Use the steps here for general guidance. The exact screens may vary from what you see here, depending on your version of Microsoft software, browser version, and how your admin set up your license and tenant.

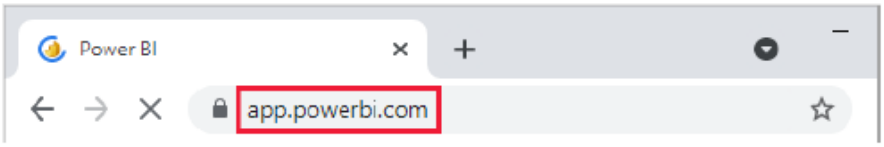
Step 1: Open the Power BI service

The Power BI service runs in a browser.

- If you receive an email from a colleague, with a link to a dashboard or report, select the link to **Open this report** or **Open this dashboard**.



- Otherwise, open your favorite browser and type app.powerbi.com.



Step 2: Type your email address

1. The first time you sign in, Microsoft checks to see if you already have a Microsoft 365 account. Enter your email address.

2. Enter your Microsoft 365 account password. It's the same email and password that you use for other Microsoft products, like Outlook and Office. Depending on how your account is set up, you might be prompted to enter a code sent to your email or mobile device.

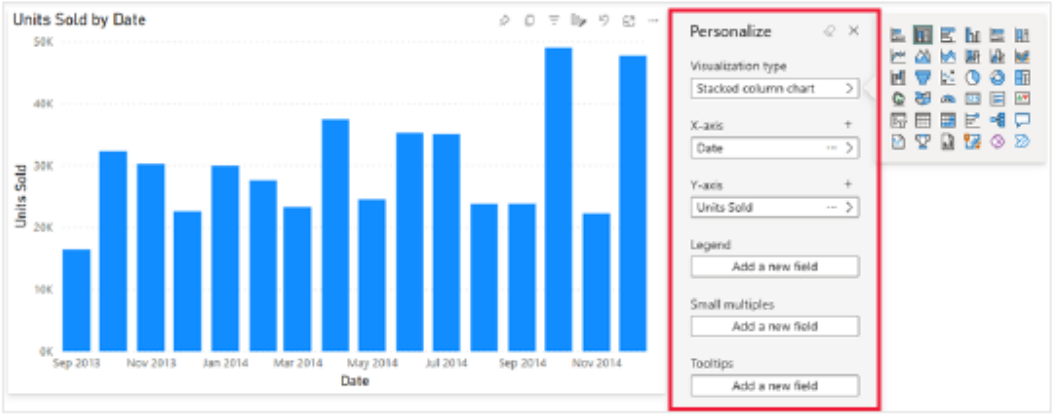
Personalize visuals in a report

Article • 06/12/2024

APPLIES TO: ✔ Power BI service for *business users* ✘ Power BI service for designers & developers ✘ Power BI Desktop ✔ Requires Pro or Premium license

It's hard to make one visual that satisfies everyone's requirements. So, when a colleague shares a report with you, you might want to make changes to the visuals—without having to ask your colleague to make the changes for you.

Maybe you'd like to swap what's on the axis, change the visual type, or add something to the tooltip. With the **Personalize this visual** feature, make the changes yourself and when you have the visual the way you want it, save it as a bookmark to come back to. You don't even need edit permission for the report.



What you can change

This feature helps you gain further insights through ad-hoc exploration of visuals on a Power BI report. The following are some of the modifications that you can make. The available options vary by visual type.

- Change the visualization type.
- Swap out a measure or dimension.
- Add or remove a legend.
- Compare two or more measures.
- Change aggregations, and more.

Not only does this feature allow for new exploration capabilities, it also includes ways for you to capture and share your changes:

- Capture your changes.

Visualization types in Power BI

Article • 06/05/2024

APPLIES TO: ✔ Power BI Desktop ✔ Power BI service

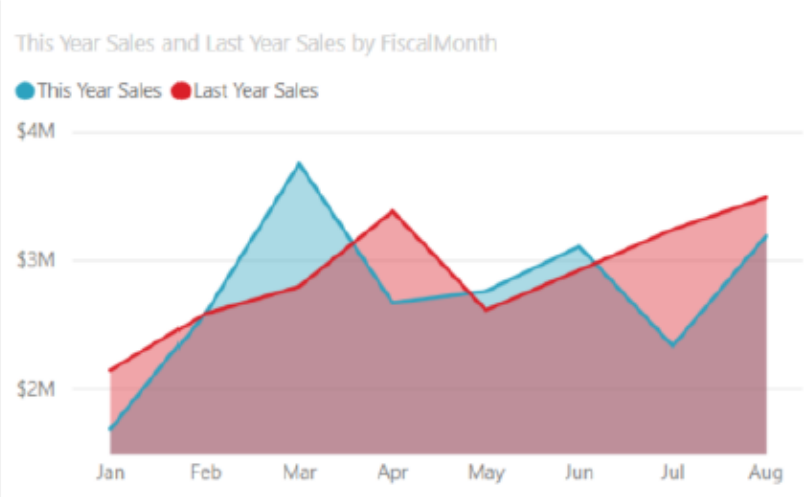
A visualization is an image created from data. Visualizations are also called "visuals." Some examples of visuals are: pie chart, line chart, map, and KPI. This article lists visualizations available in Power BI. We add new visualizations. Stay tuned!

And check out the Microsoft AppSource, where you find a growing list of Power BI visuals you can download and use in your own dashboards and reports. Feeling creative? Learn how to create and add your own visuals to this community site.

Visualizations in Power BI

All of these visualizations can be added to Power BI reports, specified in Q&A, and pinned to dashboards.

Area charts: Basic (Layered) and Stacked



The basic area chart is based on the line chart with the area between the axis and line filled in. Area charts emphasize the magnitude of change over time, and can be used to draw attention to the total value across a trend. For example, data that represents profit over time can be plotted in an area chart to emphasize the total profit. On the other hand, stacked area charts display the cumulative total of multiple data series stacked on top of each other, showing how each series contributes to the total.

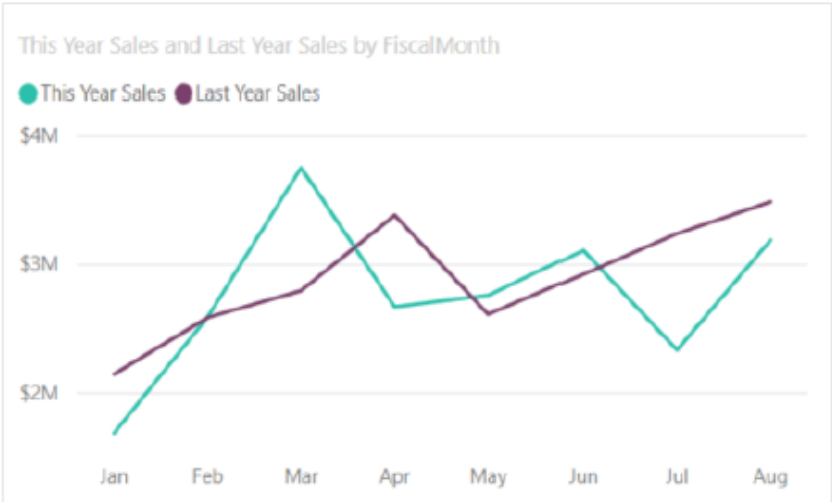
A Key Performance Indicator (KPI) is a visual cue that communicates the amount of progress made toward a measurable goal.

KPIs are a great choice:

- To measure progress (what am I ahead or behind on?).
- To measure distance to a metric (how far ahead or behind am I?).

For more information, see KPIs in Power BI.

Line charts



Line charts emphasize the overall shape of an entire series of values, usually over time.

Maps

Drill mode in the Power BI service

Article • 12/25/2023

APPLIES TO: ✔ Power BI service for *business users* ✔ Power BI service for designers & developers ⊗ Power BI Desktop ✔ Requires Pro or Premium license

This article shows you how to use the *drill mode* in the Microsoft Power BI service. You can explore in-depth details about your data by using the drill-down, drill-up, and expand features on your visual. To learn how to create a hierarchy, read hierarchies in Power BI

Drill mode requirements

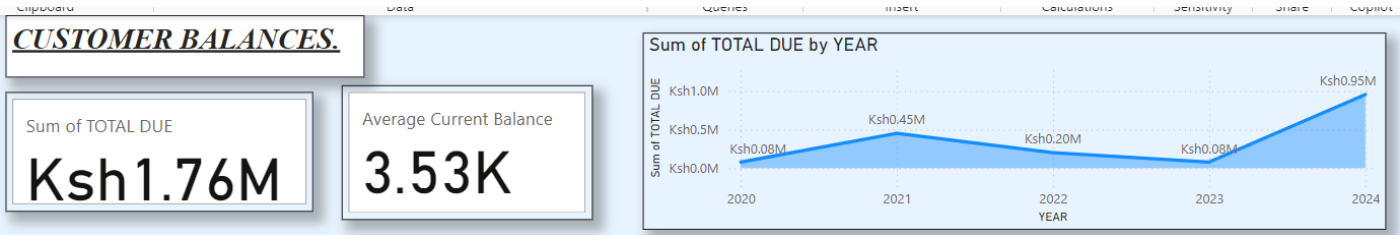
To use the drill mode, the Power BI visual must have an explicit or implicit hierarchy. Report designers often add explicit date hierarchies to reports. Those hierarchies are marked with the hierarchy icon. A common date hierarchy is one that contains fields for the year, quarter, month, and day. A report might have implicit hierarchies too. These informal hierarchies don't have the icon. But the relationship, and therefore a drill path, exists. For example, you might have a visual that shows the number of medals won in a sports competition. The drill path in this example is the sport, which has specific unique types of the sport, and the events. By default, the visual shows the medal count by sport, like gymnastics, skiing, and aquatics. Then, you can select one of the visual elements, like a bar, line, or bubble, to display the individual sports. For example, selecting the aquatics element shows you data for swimming, diving, and water polo. Then, selecting the diving element opens the next level in the hierarchy and shows you details for springboard, platform, and synchronized diving events.

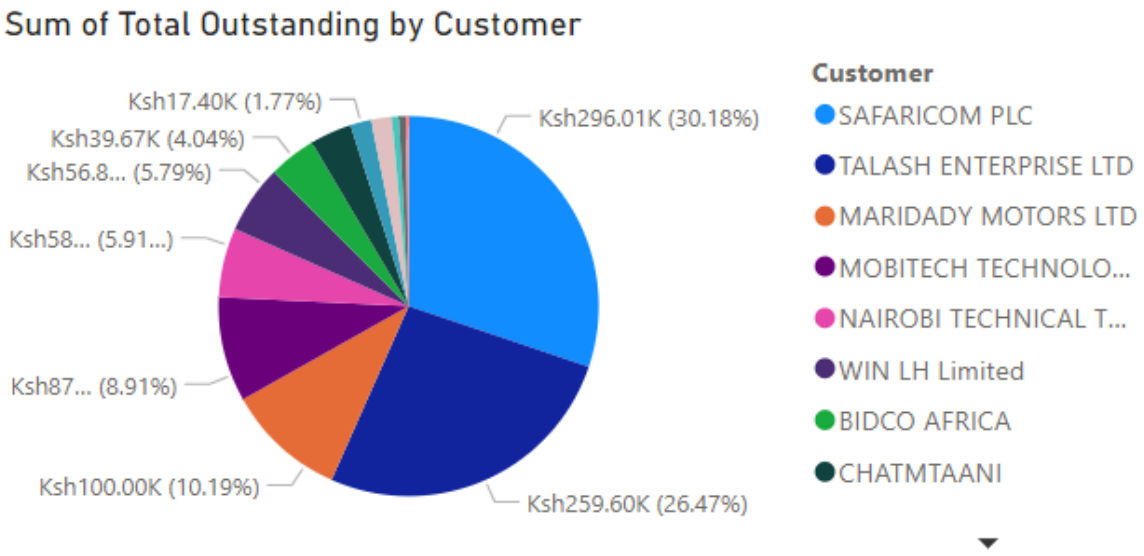
You can tell if a visual has a hierarchy by hovering over it. If the drill control options appear in the action bar, your visual has a hierarchy.

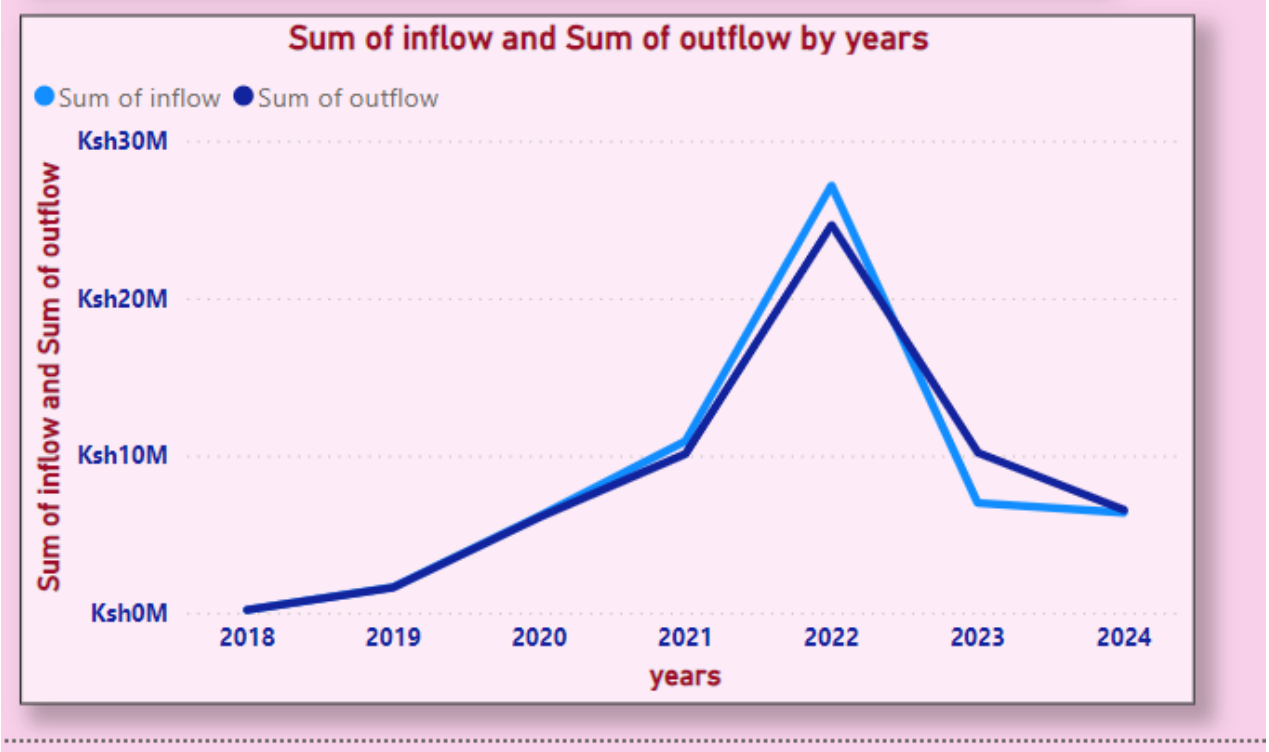
Drill down and up

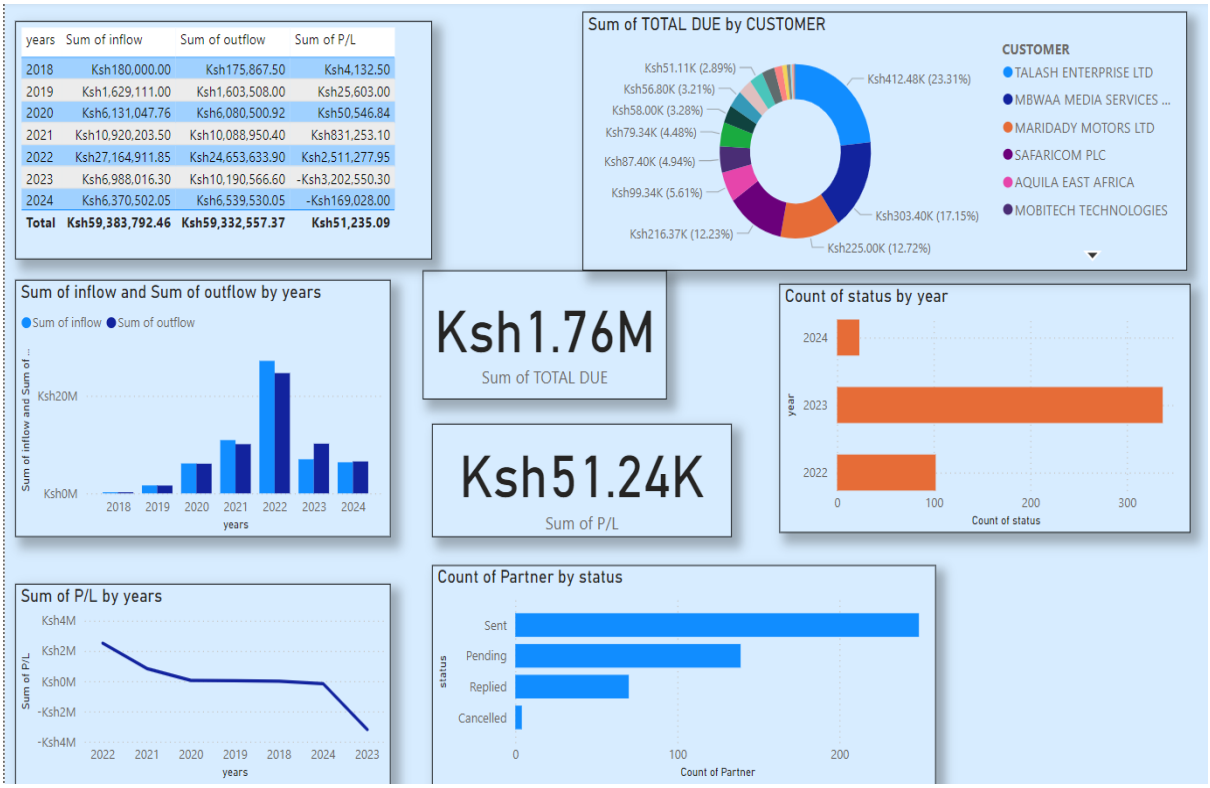
The following example is a bar chart that has a hierarchy made up of category, manufacturer, segment, and product. The bar chart shows the total number of units sold in the year 2014 by category. Category is the top level of the hierarchy. The chart is filtered by the categories Rural and Urban.

Dashboards


CUSTOMER BALANCES.
Sum of TOTAL DUE
Ksh1.76M
Average Current Balance
3.53K
Sum of TOTAL DUE by YEAR
Sum of TOTAL DUE
Ksh1.0M
Ksh0.5M
Ksh0.0M
Ksh0.08M
Ksh0.45M
Ksh0.20M
Ksh0.08M
Ksh0.95M
2020
2021
2022
2023
2024
YEAR


Sum of Total Outstanding by Customer
Ksh17.40K (1.77%)
Ksh296.01K (30.18%)
Ksh39.67K (4.04%)
Ksh56.8... (5.79%)
Ksh58... (5.91...)
Ksh87... (8.91%)
Ksh100.00K (10.19%)
Ksh259.60K (26.47%)
Customer
SAFARICOM PLC
TALASH ENTERPRISE LTD
MARIDADY MOTORS LTD
MOBITECH TECHNOLO...
NAIROBI TECHNICAL T...
WIN LH Limited
BIDCO AFRICA
CHATMTAANI

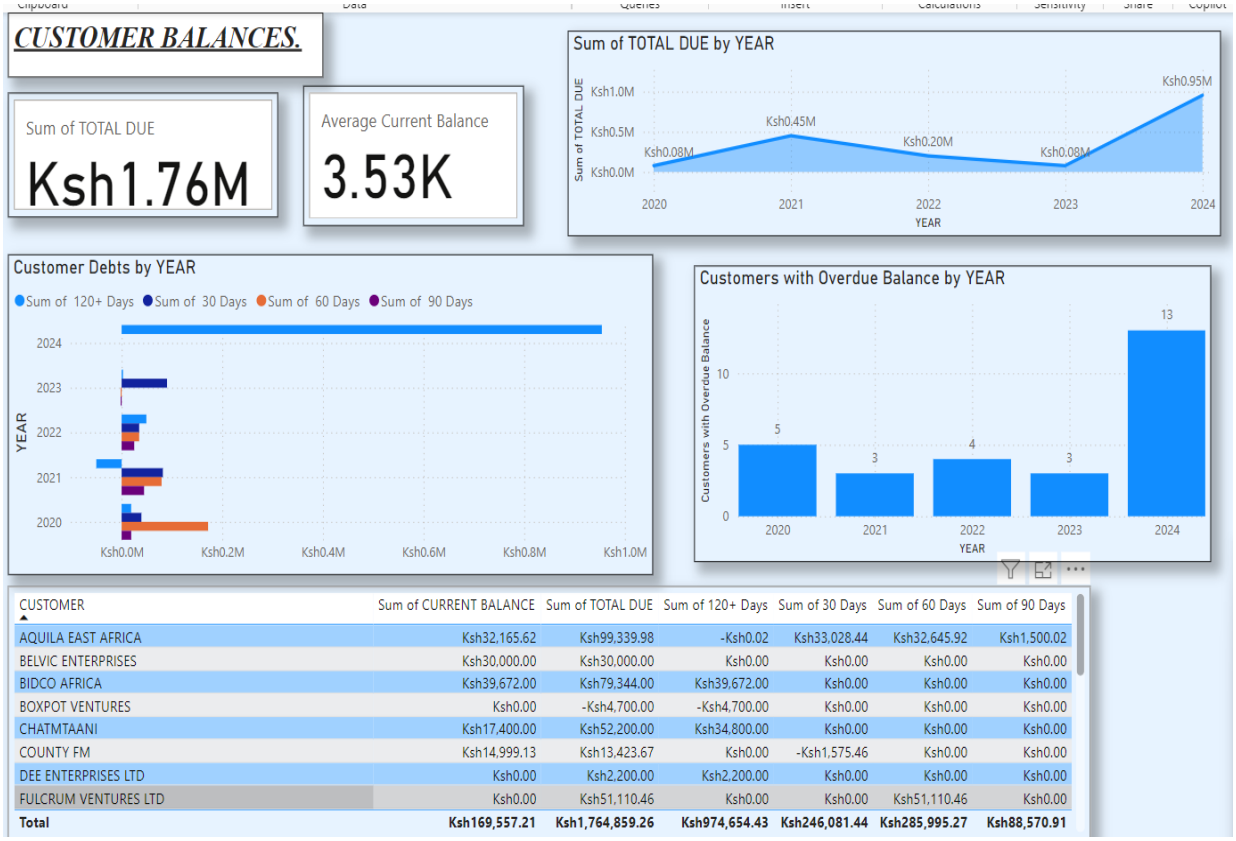




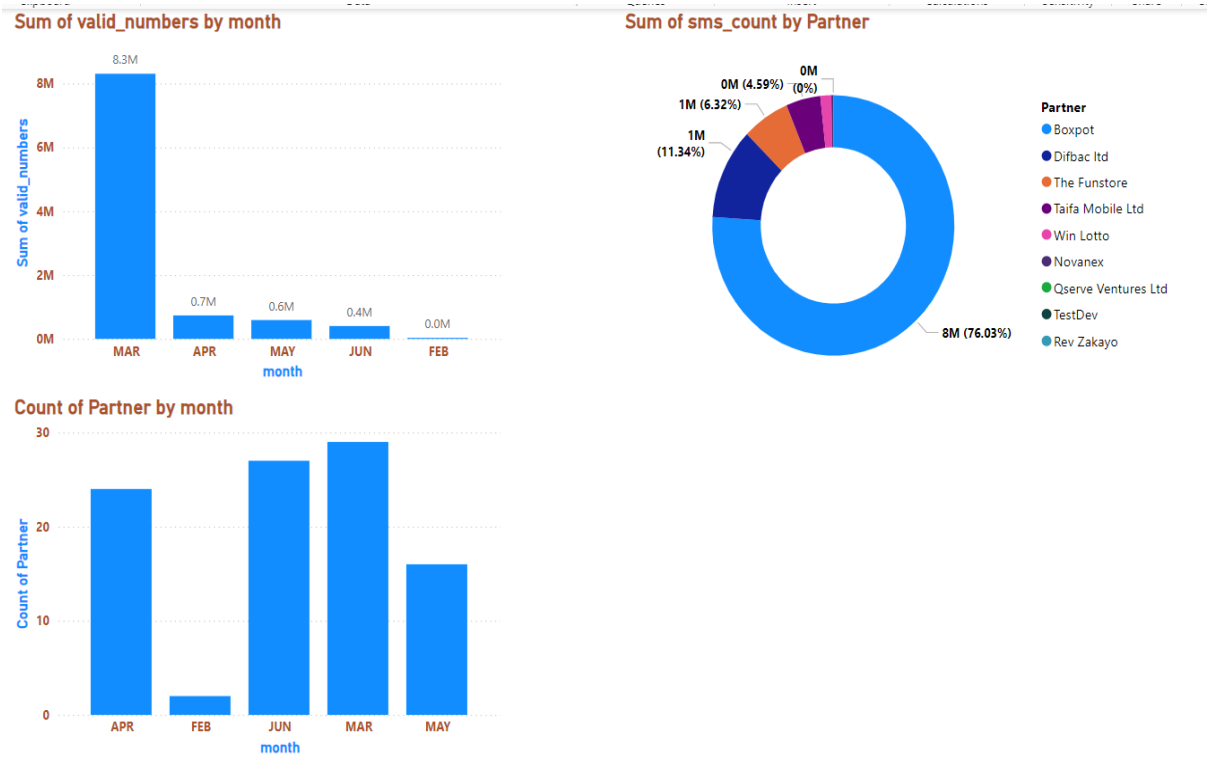
years	Sum of inflow	Sum of outflow	Sum of P/L
2018	Ksh180,000.00	Ksh175,867.50	Ksh4,132.50
2019	Ksh1,629,111.00	Ksh1,603,508.00	Ksh25,603.00
2020	Ksh6,131,047.76	Ksh6,080,500.92	Ksh50,546.84
2021	Ksh10,920,203.50	Ksh10,088,950.40	Ksh831,253.10
2022	Ksh27,164,911.85	Ksh24,653,633.90	Ksh2,511,277.95
2023	Ksh6,988,016.30	Ksh10,190,566.60	-Ksh3,202,550.30
2024	Ksh6,370,502.05	Ksh6,539,530.05	-Ksh169,028.00
Total	**Ksh59,383,792.46**	**Ksh59,332,557.37**	**Ksh51,235.09**

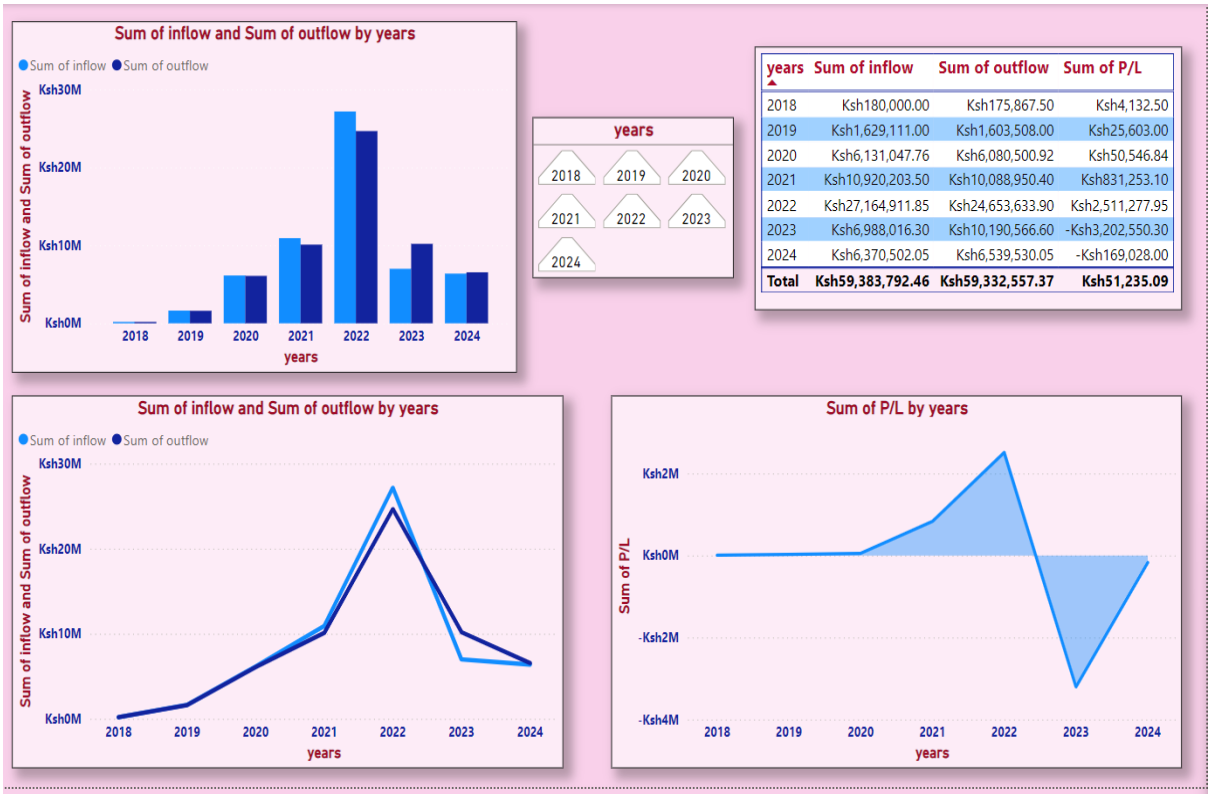
Ksh1.76M
Sum of TOTAL DUE

Ksh51.24K
Sum of P/L

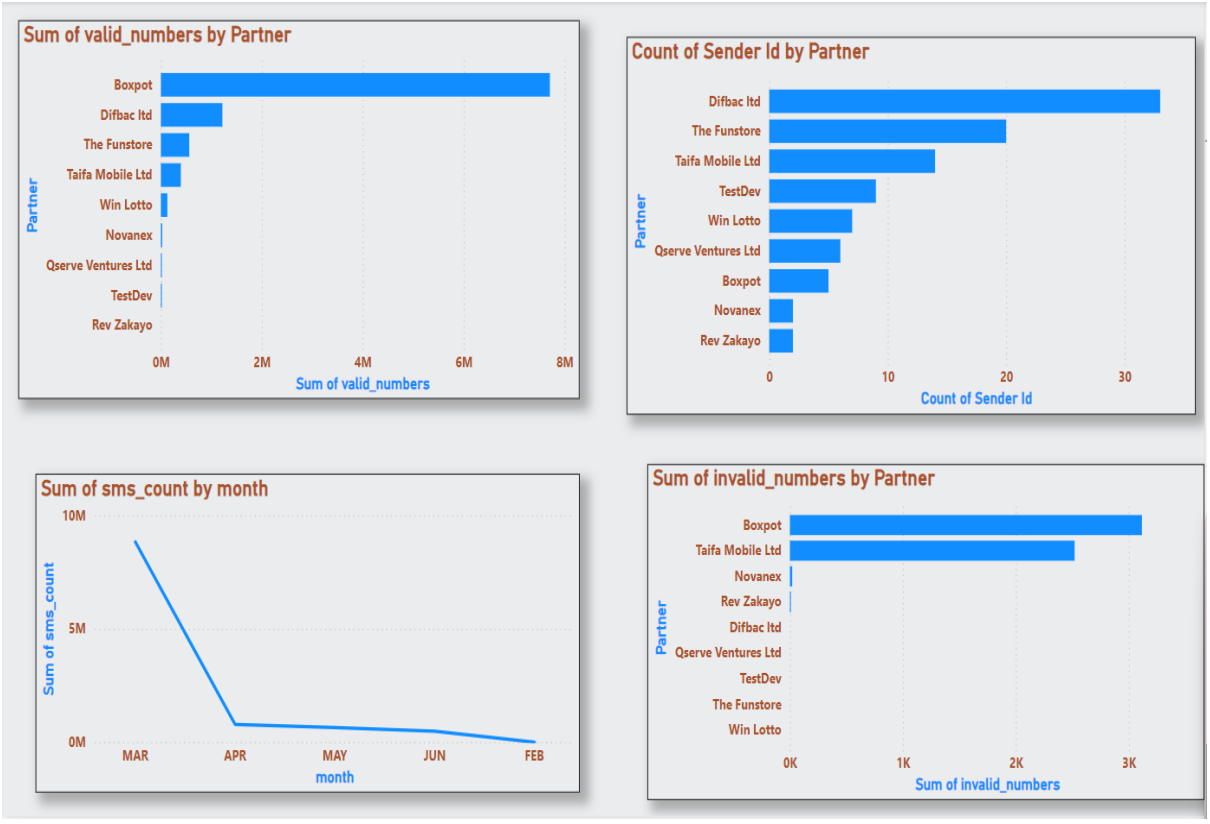


CUSTOMER	Sum of CURRENT BALANCE	Sum of TOTAL DUE	Sum of 120+ Days	Sum of 30 Days	Sum of 60 Days	Sum of 90 Days
AQUILA EAST AFRICA	Ksh32,165.62	Ksh99,339.98	-Ksh0.02	Ksh33,028.44	Ksh32,645.92	Ksh1,500.02
BELVIC ENTERPRISES	Ksh30,000.00	Ksh30,000.00	Ksh0.00	Ksh0.00	Ksh0.00	Ksh0.00
BIDCO AFRICA	Ksh39,672.00	Ksh79,344.00	Ksh39,672.00	Ksh0.00	Ksh0.00	Ksh0.00
BOXPOT VENTURES	Ksh0.00	-Ksh4,700.00	-Ksh4,700.00	Ksh0.00	Ksh0.00	Ksh0.00
CHATMTAANI	Ksh17,400.00	Ksh52,200.00	Ksh34,800.00	Ksh0.00	Ksh0.00	Ksh0.00
COUNTY FM	Ksh14,999.13	Ksh13,423.67	Ksh0.00	-Ksh1,575.46	Ksh0.00	Ksh0.00
DEE ENTERPRISES LTD	Ksh0.00	Ksh2,200.00	Ksh2,200.00	Ksh0.00	Ksh0.00	Ksh0.00
FULCRUM VENTURES LTD	Ksh0.00	Ksh51,110.46	Ksh0.00	Ksh0.00	Ksh51,110.46	Ksh0.00
Total	**Ksh169,557.21**	**Ksh1,764,859.26**	**Ksh974,654.43**	**Ksh246,081.44**	**Ksh285,995.27**	**Ksh88,570.91**





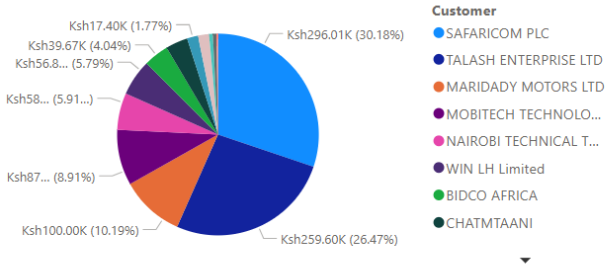
years	Sum of inflow	Sum of outflow	Sum of P/L
2018	Ksh180,000.00	Ksh175,867.50	Ksh4,132.50
2019	Ksh1,629,111.00	Ksh1,603,508.00	Ksh25,603.00
2020	Ksh6,131,047.76	Ksh6,080,500.92	Ksh50,546.84
2021	Ksh10,920,203.50	Ksh10,088,950.40	Ksh831,253.10
2022	Ksh27,164,911.85	Ksh24,653,633.90	Ksh2,511,277.95
2023	Ksh6,988,016.30	Ksh10,190,566.60	-Ksh3,202,550.30
2024	Ksh6,370,502.05	Ksh6,539,530.05	-Ksh169,028.00
Total	**Ksh59,383,792.46**	**Ksh59,332,557.37**	**Ksh51,235.09**



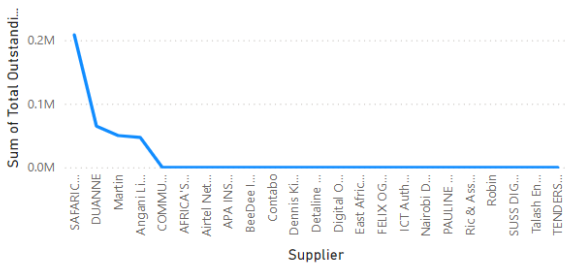
Customer	Sum of Total Outstanding
SAFARICOM PLC	Ksh296,013.05
TALASH ENTERPRISE LTD	Ksh259,600.00
MARIDADY MOTORS LTD	Ksh100,000.00
MOBITECH TECHNOLOGIES	Ksh87,400.00
NAIROBI TECHNICAL TRAINING INSTITUTE	Ksh58,000.00
WIN LH Limited	Ksh56,800.00
BIDCO AFRICA	Ksh39,672.00
CHATMTAANI	Ksh34,800.00
BELVIC ENTERPRISES	Ksh17,400.00
WEST MEDIA LTD	Ksh17,400.00
INUA TEC TECHNOLOGY	Ksh5,800.00
Total	**Ksh980,885.12**

Sum of Total Purchases by Supplier

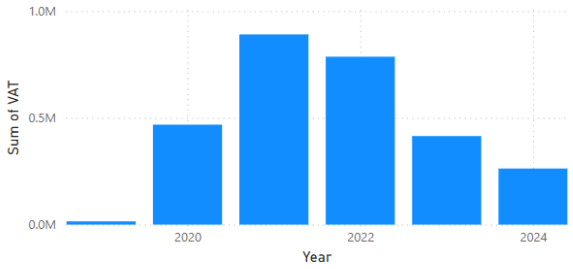
Sum of Total Outstanding by Customer



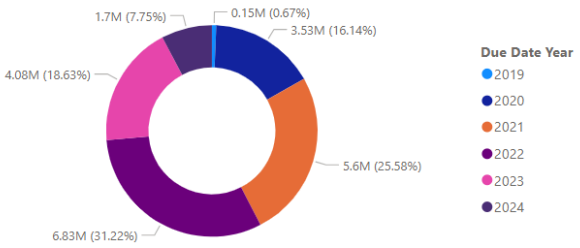
Sum of Total Outstanding by Supplier



Sum of VAT by Year



Sum of Exclusive by Year



More Troubleshooting Tips for BI Dashboard User Guide

Here are some common issues you might encounter with the BI dashboard and their solutions:

Visualization Issues

- **Issue:** If your charts and graphs are not displaying correctly or are missing.
- **Solution:** Check the chart settings to ensure the correct data fields are selected. Ensure the data source contains all necessary fields and data points for the visualization. Ensure browser settings allow for proper display of visual elements (e.g., enable JavaScript).

Exporting Data or Reports

- **Issue:** If you are unable to export data or reports from the dashboard.
- **Solution:** Verify that the dashboard supports exporting in the desired format (e.g., PDF, Excel). Check the export settings and ensure they are configured correctly. Disable any pop-up blockers that might be preventing the export process.

Login Issues

- **Issue:** If you are unable to log in to the dashboard.
- **Solution:** Ensure you are using the correct username and password. Use the password reset option if you have forgotten your password. Confirm that your account is active and not locked or suspended.

Customization Issues

- **Issue:** If you are unable to customize the dashboard as needed.
- **Solution:** Check the available customization options and ensure you are following the correct process. Confirm that you have the necessary permissions to make customizations. Refer to the user guide for detailed instructions on customizing the dashboard.