BitsAndBobs Analysis Report

Business Intelligence for the Enterprise - INFO6090

Assessment 2 - Assignment 2

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Executive Summary

The recent analysis aimed to comprehensively evaluate the performance of all ten branches across Australia for 'BitsAndBobs.' This analysis becomes particularly crucial as the company faces declining sales and operational losses. The goal was to provide actionable insights to support decision-making regarding potential office consolidations. The analysis considered sales trends, top performers, best and worst-selling items, and predictive modelling for future sales, all based on the available sales data from these branches.

The analysis unveiled a substantial variance in sales performance across the ten offices. While some offices maintained consistent performance, others exhibited declining trends. Identification of top salespersons across all branches shed light on exceptional performers. Analysis of items sold revealed trends in both highly popular items and underperforming ones. Utilizing historical data, predictive modelling for the next 12 months projected potential sales.

Considering the data-driven insights, the following recommendations are proposed:

1. Offices that consistently underperform and show a declining trend, particularly those with overlapping catchment areas, could be considered for consolidation. This strategic decision aligns with the aim of reducing operational costs and ensuring the company's sustainability.

2. Initiatives to boost sales, such as targeted marketing campaigns or staff training, should be implemented in branches experiencing declining sales.

3. The identification of best and worst-performing items provides an opportunity for inventory optimization. Removing or reevaluating poorly performing items while focusing on popular items can positively impact overall sales.

In response to the pressing issue of declining sales and the need to contemplate office consolidations, this analysis serves as a data-driven foundation to guide management decisions, it sheds light on the disparities in performance across our branches. It provides valuable insights into identifying potential areas for improvement and the necessity for strategic decisions in office consolidation to ensure the company's longevity.

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1. Introduction

'BitsAndBobs' has a legacy of providing quality products and services to its customers. However, the recent challenges faced by the company, including declining sales and operational losses, demand a comprehensive evaluation of its operations and strategic decision-making to secure the company's future. This analysis has been undertaken to provide a deep understanding of the entire business in Australia. With ten branches across the country, including the notable Newcastle site, 'BitsAndBobs' Australia operates in a diverse and competitive market. It is essential to assess the performance of each office, understand the trends, identify areas for improvement, and consider potential cost-saving measures, such as office consolidation.

The core objectives of this analysis are to:

1. Provide an overview of the recent performance of all ten offices, including trends in sales, top salespersons, and the best and worst-performing items.

2. Offer predictive insights into future sales, enabling informed financial planning.

3. Recommend strategic actions to address underperforming branches and optimize inventory.

4. Assist 'BitsAndBobs' Australia in making informed, data-driven decisions regarding potential office consolidations and operational improvements.

In this report, we present a detailed analysis of the data, including anomalies and data cleaning processes, the results of our analysis, and recommendations to guide management decisions. The analysis encompasses sales performance, top salespersons, popular and underperforming items, and predictive modelling for future sales.

The next section of this report delves into the data model and ETL process, which laid the foundation for this analysis. It details the assumptions made, data cleaning, and data preparation steps. The subsequent section presents the results of our analysis, including SQL code for top salespersons, best performing stores, best and worst-performing items, and predictive modelling. Following the analysis, we offer recommendations for management, based on the insights gained, and emphasize the importance of addressing underperforming branches, recognizing top performers, and optimizing inventory. Lastly, we present a dynamic dashboard that allows for quick comparisons between branches and includes elements of predictive analysis. This visual representation offers a concise overview of the key findings.

In conclusion, this analysis serves as a pivotal tool for 'BitsAndBobs' Australia to make informed decisions, navigate the evolving retail landscape, and secure a sustainable future in the Australian market.

2. Data Model/Data Load Process

2.1. Data model

The data model includes the following entities and attributes to support the requested analysis:

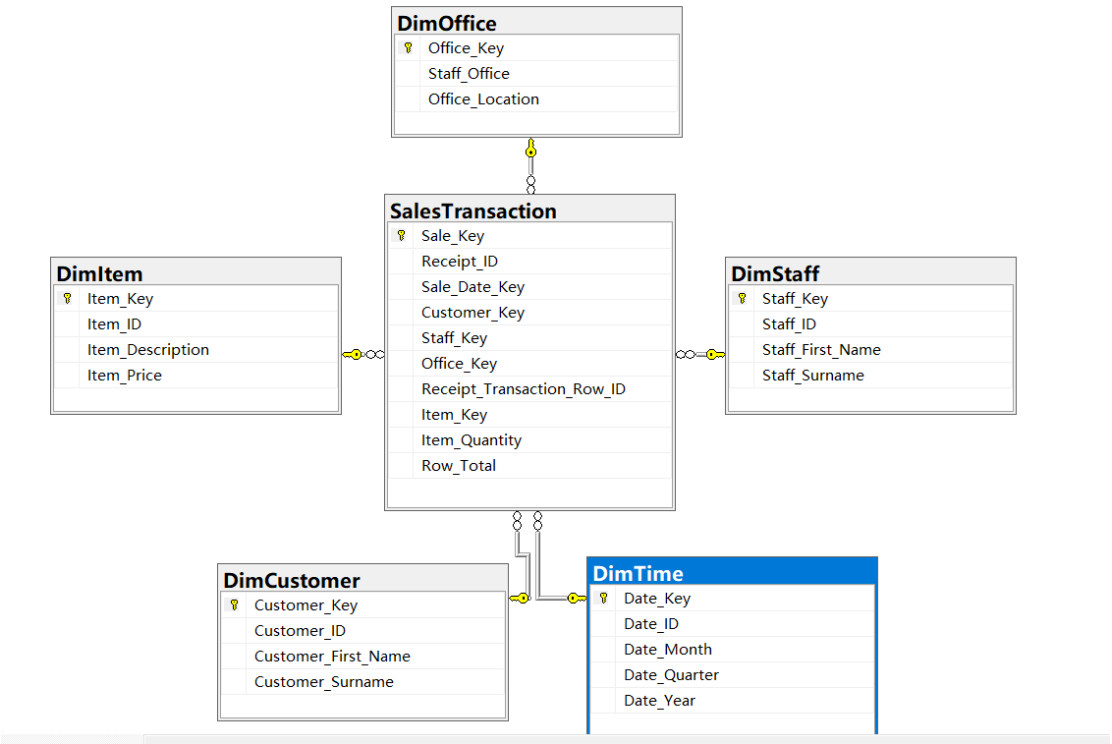


Figure 1: Database diagram

2.2. ETL Process:

2.2.1. Extraction:

Extract the provided data into a structured format.

```
USE ALLSALESDB
GO
DROP TABLE IF EXISTS SalesData;
GO
CREATE TABLE [dbo].[SalesData]
(
    [Sale_Date] date NULL,
    [Receipt_ID] int NULL,
    [Customer_ID] nvarchar(255) NULL,
    [Customer_First_Name] nvarchar(255) NULL,
    [Customer_Surname] varchar(255) NULL,
    [Staff_ID] nvarchar(255) NULL,
    [Staff_First_Name] nvarchar(255) NULL,
    [Staff_Surname] nvarchar(255) NULL,
    [Staff_Office] int NULL,
    [Office_Location] nvarchar(255) NULL,
    [Receipt_Transaction_Row_ID] int NULL,
    [Item_ID] int NULL,
    [Item_Description] [nvarchar](255) NULL,
    [Item_Quantity] [int] NULL,
    [Item_Price] decimal(10, 2) NULL,
    [Row_Total] decimal(10, 2) NULL
)
INSERT INTO [dbo].[SalesData]
    ( [Sale_Date],
    [Receipt_ID],
    [Customer_ID],
```

```
    [Customer_First_Name],
    [Customer_Surname],
    [Staff_ID],
    [Staff_First_Name],
    [Staff_Surname],
    [Staff_Office],
    [Office_Location],
    [Receipt_Transaction_Row_ID],
    [Item_ID],
    [Item_Description],
    [Item_Quantity],
    [Item_Price],
    [Row_Total]
    )
SELECT [Sale Date],
    [Receipt Id],
    [Customer ID],
    [Customer First Name],
    [Customer Surname],
    [Staff ID],
    [Staff First Name],
    [Staff Surname],
    [Staff office],
    [Office Location],
    [Reciept Transaction Row ID],
    [Item ID],
    [Item Description],
    [Item Quantity],
    [Item Price],
    [Row Total]
FROM [dbo].[SalesDataRaw]
```

2.2.2. Data Cleaning:

a. Check null value

```
SELECT * FROM dbo.SalesDataRaw WHERE [Reciept Id] IS NULL
```

Delete Null row.

```
DELETE FROM dbo.SalesDataRaw WHERE [Reciept Id] IS NULL
```

b. Detect Duplicate Staff ID

```
SELECT [Staff ID], COUNT(DISTINCT [Staff Full Name]) AS [Count]
FROM (
    SELECT [Staff ID], [Staff First Name] + ' ' + [Staff Surname] AS [Staff
Full Name]
    FROM dbo.SalesDataRaw
) AS subquery
GROUP BY [Staff ID]
```

```
--b. Detect Duplicate Staff ID
SELECT [Staff ID], COUNT(DISTINCT [Staff Full Name]) AS [Count]
FROM (
    SELECT [Staff ID], [Staff First Name] + ' ' + [Staff Surname] AS [Staff Full Name]
    FROM dbo.SalesDataRaw
) AS subquery
GROUP BY [Staff ID]
```

99 %

Results | Messages

	Staff ID	Count
1	S106	1
2	S130	1
3	S133	1
4	S161	1
5	S169	1
6	S173	1
7	S192	1
8	S200	1
9	S25	1
10	S30	1
11	S32	1
12	S44	1
13	S63	1
14	S7	1
15	S109	1
16	S122	1

Query executed successfully. LAPTOP-MS2CERJP (15.0 RTM) L

c. Check duplicate Customer per Receipt ID

```
SELECT [Receipt Id], COUNT(DISTINCT [Customer ID]) AS [Number of Customers]
FROM [dbo].[SalesDataRaw]
GROUP BY [Receipt Id]
HAVING COUNT
(DISTINCT[Customer ID]) > 1;

SELECT [Receipt Id], (SELECT DISTINCT [Customer ID]) AS [Customer ID]
FROM [dbo].[SalesDataRaw]
WHERE [Receipt Id] IN
(118551, 104312)
GROUP BY [Receipt Id], [Customer ID]
```

```
--c. Check duplicate Customer per Reciept ID
SELECT [Receipt Id], COUNT(DISTINCT [Customer ID]) AS [Number of Customers]
FROM [dbo].[SalesDataRaw]
GROUP BY [Receipt Id]
HAVING COUNT
(DISTINCT[Customer ID]) > 1;

SELECT [Receipt Id], (SELECT DISTINCT [Customer ID]) AS [Customer ID]
FROM [dbo].[SalesDataRaw]
WHERE [Receipt Id] IN
(118551, 104312)
GROUP BY [Receipt Id], [Customer ID]
```

99 %

Results | Messages

	Receipt Id	Number of Customers
1	104312	2
2	118551	2

	Receipt Id	Customer ID
1	104312	C148
2	104312	C86
3	118551	C423
4	118551	C567

Update the duplicate Customer ID in each receipt to a new ID

```
UPDATE [dbo].SalesDataRaw
SET [Receipt Id] = (SELECT MAX([Receipt Id]) FROM [dbo].SalesDataRaw) + 1
WHERE [Receipt Id] = 118551 AND [Customer ID] = 'C567'

UPDATE [dbo].SalesDataRaw
SET [Receipt Id] = (SELECT MAX([Receipt Id]) FROM [dbo].SalesDataRaw) + 1
WHERE [Receipt Id] = 104312 AND [Customer ID] = 'C86'
```

2.2.3. Loading:

b. Create the Star Schema

```
USE ALLSALESDB
GO
DROP TABLE IF EXISTS SalesTransaction;
DROP TABLE IF EXISTS DimTime;
DROP TABLE IF EXISTS DimCustomer;
DROP TABLE IF EXISTS DimStaff;
DROP TABLE IF EXISTS DimItem;
DROP TABLE IF EXISTS DimOffice;
GO
CREATE TABLE DimTime
(
    Date_Key int identity NOT NULL,
    Date_ID date NOT NULL,
```

```
    Date_Month int NULL,
    Date_Quarter int NULL,
    Date_Year int NULL,
    PRIMARY KEY (Date_Key)
)
CREATE TABLE DimCustomer
(
    Customer_Key int identity NOT NULL,
    Customer_ID nvarchar(255) NOT NULL,
    Customer_First_Name nvarchar(255) NULL,
    Customer_Surname nvarchar(255) NULL,
    PRIMARY KEY (Customer_Key)
)
CREATE TABLE DimStaff
(
    Staff_Key int identity NOT NULL,
    Staff_ID nvarchar(255) NULL,
    Staff_First_Name nvarchar(255) NULL,
    Staff_Surname nvarchar(255) NULL,
    PRIMARY KEY (Staff_Key)
)
CREATE TABLE DimOffice
(
    Office_Key int identity NOT NULL,
       Staff_Office int NOT NULL,
    Office_Location nvarchar(255) NULL,
    PRIMARY KEY (Office_Key)
)
CREATE TABLE DimItem
(
    Item_Key int identity NOT NULL,
    Item_ID int NULL,
    Item_Description nvarchar(255) NULL,
    Item_Price decimal(10,2) NULL,
    PRIMARY KEY (Item_Key)
)
CREATE TABLE SalesTransaction
(
    Sale_Key int identity NOT NULL,
    Receipt_ID int NULL,
    Sale_Date_Key int NULL,
    Customer_Key int NULL,
    Staff_Key int NULL,
    Office_Key int NULL,
    Receipt_Transaction_Row_ID int NULL,
    Item_Key int NULL,
    Item_Quantity int NULL,
    Row_Total float NOT NULL,
   PRIMARY KEY (Sale_Key),
    FOREIGN KEY (Sale_Date_Key) REFERENCES DimTime (Date_Key),
    FOREIGN KEY (Customer_Key) REFERENCES DimCustomer (Customer_Key),
    FOREIGN KEY (Staff_Key) REFERENCES DimStaff (Staff_Key),
    FOREIGN KEY (Office_Key) REFERENCES DimOffice (Office_Key),
    FOREIGN KEY (Item_Key) REFERENCES DimItem (Item_Key)
) GO
```

c. Populate the Schema tables

```
USE ALLSALESDB
GO
INSERT INTO DimTime
    (Date_ID, Date_Month, Date_Quarter, Date_Year)
SELECT DISTINCT CAST([SalesData].[Sale_Date] AS DATE),
    DATEPART(MONTH, [SalesData].[Sale_Date]),
    DATEPART(QUARTER, [SalesData].[Sale_Date]),
    DATEPART(YEAR, [SalesData].[Sale_Date])
FROM [dbo].[SalesData]
INSERT INTO DimCustomer
    (
    Customer_ID,
    Customer_First_Name,
    Customer_Surname)
SELECT DISTINCT [SalesData].[Customer_ID],
    [SalesData].[Customer_First_Name],
    [SalesData].[Customer_Surname]
FROM [dbo].[SalesData]
INSERT INTO DimStaff
    (Staff_ID, Staff_First_Name, Staff_Surname)
SELECT DISTINCT [SalesData].[Staff_ID],
    [SalesData].[Staff_First_Name],
    [SalesData].[Staff_Surname]
FROM [dbo].[SalesData]
INSERT INTO DimOffice
    (Staff_Office, Office_Location)
SELECT DISTINCT [SalesData].[Staff_Office],
    [SalesData].[Office_Location]
FROM [dbo].[SalesData]
INSERT INTO DimItem
    (Item_ID, Item_Description, Item_Price)
SELECT DISTINCT [SalesData].[Item_ID],
    [SalesData].[Item_Description],
    [SalesData].[Item_Price]
FROM [dbo].[SalesData]

INSERT INTO SalesTransaction
    (Receipt_ID,
    Sale_Date_Key,
    Customer_Key,
    Staff_Key,
    Office_Key,
    Receipt_Transaction_Row_ID,
    Item_Key,
    Item_Quantity,
    Row_Total)
SELECT DISTINCT x.[Receipt_ID],
    d.Date_Key,
    c.Customer_Key,
    s.Staff_Key,
    o.Office_Key,
    x.[Receipt_Transaction_Row_ID],
    i.Item_Key,
    x.[Item_Quantity],
    x.[Row_Total]
FROM [dbo].[SalesData] x
    LEFT JOIN DimStaff s ON s.Staff_ID = x.[Staff_ID]
    LEFT JOIN DimOffice o ON o.Staff_Office = x.[Staff_Office]
    LEFT JOIN DimCustomer c ON c.Customer_ID = x.[Customer_ID]
    LEFT JOIN DimItem i ON i.Item_ID = x.[Item_ID]
    LEFT JOIN DimTime d ON d.Date_ID = x.[Sale_Date]
```

2.3. Assumptions:

Assumption 1: Missing values in Customer and Staff information.

Reasoning: If some rows lack customer or staff information, it may indicate transactions without registered customers or staff, or it could be due to data entry errors. We will handle missing values by leaving these fields empty in the data model.

```
-- Set missing customer information to NULL
UPDATE [dbo].[SalesDataRaw]
SET [Customer First Name] = NULL,
    [Customer Surname] = NULL
WHERE [Customer ID] IS NULL;

-- Set missing staff information to NULL
UPDATE [dbo].[SalesDataRaw]
SET [Customer First Name] = NULL,
    [Staff Surname] = NULL
WHERE [Staff ID] IS NULL;
```

Assumption 2: Outliers in numerical columns.

Reasoning: Outliers may represent legitimate transactions or data entry errors. We will initially retain them in the analysis but mention their presence.

```
-- Define an outlier threshold
DECLARE @OutlierThreshold NUMERIC(18, 2) = 10000;

-- Remove rows with outliers in the Row_Total column
DELETE FROM [dbo].[SalesDataRaw]
WHERE [Row Total] > @OutlierThreshold;
```

Assumption 3: Duplicate rows.

Reasoning: Duplicate rows could result from data entry errors or system issues. We will remove duplicate rows to ensure data integrity.

```
-- Use a common table expression (CTE) to identify duplicate rows
WITH DuplicateCTE AS (
    SELECT *,
           ROW_NUMBER() OVER(PARTITION BY [Receipt ID] ORDER BY [Sale Date]) AS
RowNum
    FROM [dbo].[SalesDataRaw]
)

-- Delete duplicate rows, keeping only one occurrence
DELETE FROM DuplicateCTE
WHERE RowNum > 1;
```

Assumption 4: The Sale Date is in a consistent format.

Reasoning: We assume that the Sale Date is provided in a consistent date format. If not, it will be necessary to standardize the date format.

```
-- Convert Sale Date to a consistent format (YYYY-MM-DD)
UPDATE[dbo].[SalesDataRaw]
SET [Sale Date] = FORMAT([Sale Date], 'yyyy-MM-dd');
```

3. Analysis and prediction

3.1. Office performance

We have calculated the total sales per office location. The output show that Wagga Wagga have the highest total sales per office of 1.9 million dollars.

```
USE AllSalesDB
GO

SELECT dbo.DimOffice.Office_Location,
    CAST(
        SUM(dbo.SalesTransaction.Row_Total) AS decimal(10, 2)
    ) AS Total_Sales
FROM dbo.SalesTransaction
    INNER JOIN dbo.DimOffice ON dbo.SalesTransaction.Office_Key =
dbo.DimOffice.Office_Key
GROUP BY dbo.DimOffice.Office_Location
ORDER BY Total_Sales DESC
```

	Office_Location	Total_Sales
1	Wagga Wagga	1902270.85
2	Sydney	1309222.55
3	Melbourne	1270277.65
4	Perth	1171929.90
5	Newcastle	1167716.60
6	Darwin	1150447.25
7	Hobart	1059141.65
8	Adelaide	1054211.90
9	Brisbane	983439.45
10	Wollongong	938812.30

The chart presented illustrates the aggregate sales figures categorised by geographical location for a business entity operating within Australia. In general, the chart illustrates that the aggregate sales figures across various locations of the corporation exhibit fluctuations, which can be attributed to factors such as the city's size and population, its desirability as a residential destination, and its economic development.

3.2. Item performance

For the item performance, we have calculated the total sales per office location. The output show that Wagga Wagga have the highest total sales per office of 1.9 million dollars.

```
USE AllSalesDB
GO

SELECT Office_Location, Item_Description, Total_Items
FROM (
    SELECT Office_Location, Item_Description, Total_Items,
```

```
        ROW_NUMBER() OVER (PARTITION BY Office_Location ORDER BY Total_Items DESC)
as rn
    FROM (
        SELECT dbo.DimOffice.Office_Location, dbo.DimItem.Item_Description,
COUNT(dbo.DimItem.Item_Description) AS Total_Items
        FROM dbo.SalesTransaction
        INNER JOIN dbo.DimOffice ON dbo.SalesTransaction.Office_Key =
dbo.DimOffice.Office_Key
        INNER JOIN dbo.DimItem ON dbo.SalesTransaction.Item_Key =
dbo.DimItem.Item_Key
        GROUP BY dbo.DimOffice.Office_Location, dbo.DimItem.Item_Description
    ) subquery
) t
WHERE rn <= 3
```

	Office_Location	Item_Description	Total_Items
1	Adelaide	Drill Bit 2 mm	341
2	Adelaide	Drill Bit 8 mm	338
3	Adelaide	Drill Driver Phillips head	338
4	Brisbane	Drill Bit 7 mm	343
5	Brisbane	Mitre Saw	333
6	Brisbane	Drill Driver Flat Head	323
7	Darwin	Cordless Drill Kit	384
8	Darwin	Drill Driver Phillips head	378
9	Darwin	Drill Bit 10 mm	369
10	Hobart	Drill Bit 5 mm	379
11	Hobart	Garden Hose	346
12	Hobart	Box of Nails	338
13	Melbourne	Hacksaw	430
14	Melbourne	Drill Bit 2 mm	427
15	Melbourne	Square	421
16	Newcastle	Drill Bit 9 mm	394
17	Newcastle	Mitre Saw	386
18	Newcastle	Drill Bit 5 mm	384
19	Perth	Drill Bit 3 mm	390
20	Perth	Box of Nails	389
21	Perth	Drill Driver Hex head	388
22	Sydney	Tape Measure	436
23	Sydney	Mitre Saw	423
24	Sydney	Drill Driver Phillips head	423
25	Wagga Wagga	Drill Bit 4 mm	629
26	Wagga Wagga	Tape Measure	625
27	Wagga Wagga	Square	619
28	Wollongong	Hacksaw	305
29	Wollongong	Screwdriver Set	304
30	Wollongong	Tape Measure	302

Last 3 item sold for each location

```
-- Last 3 Items Sold by Office Location
USE AllSalesDB
GO

SELECT Office_Location, Item_Description, Total_Items
FROM (
    SELECT Office_Location, Item_Description, Total_Items,
        ROW_NUMBER() OVER (PARTITION BY Office_Location ORDER BY Total_Items ASC) as
rn
    FROM (
        SELECT dbo.DimOffice.Office_Location, dbo.DimItem.Item_Description,
COUNT(dbo.DimItem.Item_Description) AS Total_Items
        FROM dbo.SalesTransaction
        INNER JOIN dbo.DimOffice ON dbo.SalesTransaction.Office_Key =
dbo.DimOffice.Office_Key
        INNER JOIN dbo.DimItem ON dbo.SalesTransaction.Item_Key =
dbo.DimItem.Item_Key
        GROUP BY dbo.DimOffice.Office_Location, dbo.DimItem.Item_Description
    ) subquery
) t
WHERE rn <= 3
```

Last 3 item sold across

```
-- Bottom 3 items sold in all offices
USE AllSalesDB
GO

SELECT TOP 3
    dbo.DimItem.Item_ID, dbo.DimItem.Item_Description,
SUM(dbo.SalesTransaction.Item_Quantity) AS Total_Item_Sold
FROM dbo.DimItem INNER JOIN
    dbo.SalesTransaction ON dbo.DimItem.Item_Key = dbo.SalesTransaction.Item_Key
GROUP BY dbo.DimItem.Item_ID, dbo.DimItem.Item_Description
ORDER BY Total_Item_Sold
```

	Item_ID	Item_Description	Total_Item_Sold
1	23	Drill Bit 6 mm	19481
2	13	Ruler	19613
3	2	Screwdriver Set	19741

3.3. Top salespersons

3.3.1 Top salespeople-based on money earned

```
USE AllSalesDB
GO
-- Total sales per staff
USE AllSalesDB
GO
SELECT dbo.DimStaff.Staff_ID, dbo.DimStaff.Staff_First_Name,
dbo.DimStaff.Staff_Surname, CAST(SUM(dbo.SalesTransaction.Row_Total) AS decimal(10,
2)) AS Total_Sales
FROM dbo.SalesTransaction INNER JOIN
    dbo.DimStaff ON dbo.SalesTransaction.Staff_Key = dbo.DimStaff.Staff_Key
GROUP BY dbo.DimStaff.Staff_ID, dbo.DimStaff.Staff_First_Name,
dbo.DimStaff.Staff_Surname
ORDER BY Total_Sales DESC
```

	Staff_ID	Staff_First_Name	Staff_Surname	Total_Sales
1	S187	Savannah	Jones	81213.15
2	S45	Emma	Gutierrez	79066.95
3	S178	Kaitlyn	Nguyen	76289.95
4	S122	Austin	Morris	75593.90
5	S71	Danielle	Myers	75260.10
6	S193	Savannah	Garcia	73877.90
7	S106	Mia	Foster	73567.90
8	S190	Samuel	Anderson	73311.70
9	S101	Jenna	Cox	73256.55
10	S104	Jake	Cox	72692.90

3.3.2. Top salespersons based on total transactions

```
GO
SELECT dbo.DimStaff.Staff_ID,
    dbo.DimStaff.Staff_First_Name,
    dbo.DimStaff.Staff_Surname,
    COUNT(dbo.SalesTransaction.Receipt_ID) AS Total_Transaction
FROM dbo.SalesTransaction
    INNER JOIN dbo.DimStaff ON dbo.SalesTransaction.Staff_Key =
dbo.DimStaff.Staff_Key
GROUP BY dbo.DimStaff.Staff_ID,
    dbo.DimStaff.Staff_First_Name,
    dbo.DimStaff.Staff_Surname
ORDER BY Total_Transaction DESC
```

	Staff_ID	Staff_First_Name	Staff_Surname	Total_Transaction
1	S190	Samuel	Anderson	725
2	S122	Austin	Morris	690
3	S196	Devin	Brown	686
4	S45	Emma	Gutierrez	672
5	S101	Jenna	Cox	666
6	S106	Mia	Foster	665
7	S108	Isaiah	Powell	662
8	S56	Anna	Kelly	661
9	S154	Zoe	Barnes	656
10	S178	Kaitlyn	Nguyen	656

3.3.3. Top salespersons based on most goods sold

```
USE AllSalesDB
GO
-- Total item sold per staff
SELECT dbo.DimStaff.Staff_ID, dbo.DimStaff.Staff_First_Name,
dbo.DimStaff.Staff_Surname, SUM(dbo.DimItem.Item_ID) AS Total_Items_Sold
FROM dbo.SalesTransaction INNER JOIN
    dbo.DimStaff ON dbo.SalesTransaction.Staff_Key = dbo.DimStaff.Staff_Key INNER
JOIN
    dbo.DimItem ON dbo.SalesTransaction.Item_Key = dbo.DimItem.Item_Key
GROUP BY dbo.DimStaff.Staff_ID, dbo.DimStaff.Staff_First_Name,
dbo.DimStaff.Staff_Surname
ORDER BY Total_Items_Sold DESC
```

	Staff_ID	Staff_First_Name	Staff_Surname	Total_Items_Sold
1	S190	Samuel	Anderson	11283
2	S122	Austin	Morris	11179
3	S196	Devin	Brown	10656
4	S56	Anna	Kelly	10477
5	S101	Jenna	Cox	10393
6	S129	Jennifer	Smith	10329
7	S45	Emma	Gutierrez	10301
8	S106	Mia	Foster	10245
9	S95	Kaitlyn	Scott	10234
10	S111	William	Jamison	10106

3.4. Trend analysis

For the analysis, we will estimate the monthly grow based of average sales percentage based on the 12 months data. We assume that for each month, the sale value will be calculated through the percentage. There were some negative average values, therefore, the prediction maybe corrects in a certain degree. The prediction based purely on one year of data, thus these have limitation in predicting seasonal time series data. We recommend that there is machine learning model such as SARIMA is suitable for this type of data. The data source needs to be expanded further for at least two years for the machine learning model to detect the seasonal pattern.

```
USE AllSalesDB
GO
WITH MonthlySales AS (
    SELECT
        dbo.DimOffice.Office_Location,
        dbo.DimTime.Date_Year,
        dbo.DimTime.Date_Month,
        CAST(SUM(dbo.SalesTransaction.Row_Total) AS decimal(10,2)) AS Total_Sales
    FROM
        dbo.DimCustomer
        INNER JOIN dbo.SalesTransaction ON dbo.DimCustomer.Customer_Key =
dbo.SalesTransaction.Customer_Key
        INNER JOIN dbo.DimOffice ON dbo.SalesTransaction.Office_Key =
dbo.DimOffice.Office_Key
        INNER JOIN dbo.DimTime ON dbo.SalesTransaction.Sale_Date_Key =
dbo.DimTime.Date_Key
    GROUP BY
        dbo.DimOffice.Office_Location,
        dbo.DimTime.Date_Year,
        dbo.DimTime.Date_Month
),
MonthlySalesPercentage AS (
    SELECT
        Office_Location,
        Date_Year,
        Date_Month,
        Total_Sales,
        CAST(((Total_Sales - LAG(Total_Sales) OVER (PARTITION BY Office_Location
ORDER BY Date_Year, Date_Month)) / LAG(Total_Sales) OVER (PARTITION BY
Office_Location ORDER BY Date_Year, Date_Month)) * 100 AS decimal(10,2)) AS
Sales_Percentage
    FROM
        MonthlySales
),
AverageMonthlySalesPercentage AS (
    SELECT
        Office_Location,
        CAST(AVG(Sales_Percentage) AS decimal(10,2)) AS Avg_Sales_Percentage
    FROM
        MonthlySalesPercentage
    GROUP BY
        Office_Location
)
SELECT
    a.Office_Location,
    a.Avg_Sales_Percentage,
    CAST(b.Total_Sales * (1 + a.Avg_Sales_Percentage / 100) AS decimal(10,2)) AS
Forecast_M1,
    CAST(b.Total_Sales * (1 + 2 * a.Avg_Sales_Percentage / 100) AS decimal(10,2)) AS
Forecast_M2,
    CAST(b.Total_Sales * (1 + 3 * a.Avg_Sales_Percentage / 100) AS decimal(10,2)) AS
Forecast_M3,
    CAST(b.Total_Sales * (1 + 4 * a.Avg_Sales_Percentage / 100) AS decimal(10,2)) AS
Forecast_M4,
    CAST(b.Total_Sales * (1 + 5 * a.Avg_Sales_Percentage / 100) AS decimal(10,2)) AS
Forecast_M5,
    CAST(b.Total_Sales * (1 + 6 * a.Avg_Sales_Percentage / 100) AS decimal(10,2)) AS
Forecast_M6,
    CAST(b.Total_Sales * (1 + 7 * a.Avg_Sales_Percentage / 100) AS decimal(10,2)) AS
Forecast_M7,
    CAST(b.Total_Sales * (1 + 8 * a.Avg_Sales_Percentage / 100) AS decimal(10,2)) AS
Forecast_M8,
```

```
    CAST(b.Total_Sales * (1 + 9 * a.Avg_Sales_Percentage / 100) AS decimal(10,2)) AS
Forecast_M9,
    CAST(b.Total_Sales * (1 + 10 * a.Avg_Sales_Percentage / 100) AS decimal(10,2))
AS Forecast_M10,
    CAST(b.Total_Sales * (1 + 11 * a.Avg_Sales_Percentage / 100) AS decimal(10,2))
AS Forecast_M11,
    CAST(b.Total_Sales * (1 + 12 * a.Avg_Sales_Percentage / 100) AS decimal(10,2))
AS Forecast_M12
FROM
    AverageMonthlySalesPercentage a
    INNER JOIN MonthlySales b ON a.Office_Location = b.Office_Location
WHERE
    b.Date_Year = (SELECT MAX(Date_Year) FROM MonthlySales) AND
    b.Date_Month = (SELECT MAX(Date_Month) FROM MonthlySales WHERE Date_Year =
(SELECT MAX(Date_Year) FROM MonthlySales))
ORDER BY
    a.Office_Location;
```

	Office_Location	Avg_Sales_Percentage	Forecast_M1	Forecast_M2	Forecast_M3	Forecast_M4	Forecast_M5	Forecast_M6	Forecast_M7	Forecast_M8	Forecast_M9	Forecast_M10	Forecast_M11	Forecast_M12
1	Adelaide	2.74	76515.10	78555.70	80596.30	82636.91	84677.51	86718.11	88758.71	90799.31	92839.91	94880.51	96921.11	98961.72
2	Brisbane	1.68	91562.18	93075.01	94587.84	96100.67	97613.50	99126.32	100639.15	102151.98	103664.81	105177.64	106690.47	108203.30
3	Darwin	3.06	107515.18	110707.46	113899.74	117092.02	120284.30	123476.58	126668.87	129861.15	133053.43	136245.71	139437.99	142630.27
4	Hobart	-0.75	86340.30	85687.86	85035.41	84382.97	83730.52	83078.08	82425.63	81773.19	81120.74	80468.29	79815.85	79163.40
5	Melbourne	1.78	115893.58	117920.41	119947.23	121974.06	124000.89	126027.72	128054.55	130081.38	132108.20	134135.03	136161.86	138188.69
6	Newcastle	0.13	95957.08	96081.66	96206.25	96330.83	96455.41	96579.99	96704.58	96829.16	96953.74	97078.32	97202.90	97327.49
7	Perth	-1.26	91283.40	90118.55	88953.71	87788.86	86624.01	85459.16	84294.31	83129.47	81964.62	80799.77	79634.92	78470.07
8	Sydney	0.59	109459.52	110101.55	110743.57	111385.59	112027.62	112669.64	113311.66	113953.69	114595.71	115237.73	115879.76	116521.78
9	Wagga Wagga	-1.64	141213.73	138859.21	136504.69	134150.17	131795.65	129441.13	127086.61	124732.10	122377.58	120023.06	117668.54	115314.02
10	Wollongong	2.69	72653.48	74556.67	76459.85	78363.03	80266.22	82169.40	84072.58	85975.76	87878.95	89782.13	91685.31	93588.50

Table Monthly future forecast

4. Business Recommendations

Rationale to close worst performance office

We will try to make quantification based on all key metric listed below:

Key metric	Formulas	Ratio	Quantitative based
Total sale per total employee by location	Total sale / number of staff group by location	50%	50000-55000: 1 score 55000-60000: 2 score 60000-65000: 3 score >65000: 4 score
Total sale value per customer by location	Total sale / number of customer group by location	20%	1500-2000: 1 score 2000-2500: 2 score 2500-3000: 3 score >3000: 1 score
Average growth rate of sale by month by location	Sum of growth rate of each month/12 group by location	30%	-500%-0%: 1 score 0%-10%: 2 score 10%-20%: 3 score 20%-30%: 4 score

4.1. Sale value per staff

The utilisation of sales per total employee as a metric from the inherent inaccuracy of using total sales value alone to evaluate performance based on overall sales. The overall sales figures do not provide a full measure of productivity or efficiency at a given site. However, evaluating the ratio

of total sales to total employees can offer insights into the operational dynamics and managerial effectiveness in achieving sales targets at each location. The efficacy of any site cannot be accurately assessed only based on overall sales. For instance, larger offices such as Wagga Wagga, Sydney, and Melbourne have the best sales figures, whereas smaller offices like Adelaide or Wollongong demonstrate comparatively lower sales performance. It is evident that larger offices possess a greater number of staff members in comparison to smaller offices. Hence, the most efficient approach for comprehending the operational efficiency of each office is to apply the calculation of average sales per employee based on location.

	Office_Location	Number_of_Staff	Total_Sales	Average_Sales_Per_Staff
1	Adelaide	16	1054211.90	65888.24
2	Wollongong	15	938812.30	62587.49
3	Hobart	17	1059141.65	62302.45
4	Darwin	19	1150447.25	60549.86
5	Sydney	22	1309222.55	59510.12
6	Wagga Wagga	32	1902270.85	59445.96
7	Perth	20	1171929.90	58596.50
8	Newcastle	20	1167716.60	58385.83
9	Brisbane	17	983439.45	57849.38
10	Melbourne	22	1270277.65	57739.89

4.2. Sale value/ customer

Same methodology with the way we address employee. The reason we use sale per total customer is because sale value is inaccurate when we use sale total to address performance based on total sales. Total sales cannot show the potential of each location while total sales per total sale can show how each location achieves the sales target by approach potential customer.

	Office_Location	Number_of_Customer	Total_Sales	Average_Sales_Per_Customer
1	Wagga Wagga	600	1902270.85	3170.45
2	Sydney	584	1309222.55	2241.82
3	Melbourne	581	1270277.65	2186.36
4	Newcastle	574	1167716.60	2034.35
5	Perth	577	1171929.90	2031.07
6	Darwin	581	1150447.25	1980.12
7	Adelaide	559	1054211.90	1885.89
8	Hobart	571	1059141.65	1854.89
9	Brisbane	564	983439.45	1743.69
10	Wollongong	556	938812.30	1688.51

4.3. Average growth rate of sale by month by location

Average growth rate is used to identify the overall efficiency in each location. By calculating using formula: growth rate = ((sale volume this month – sale volume previous month)/ sales volume previous month) * 100 then we can use average function to calculate the results

	Office_Location	Average_Growth_Rate
1	Adelaide	2.74
2	Brisbane	1.68
3	Darwin	3.06
4	Hobart	-0.75
5	Melbourne	1.78
6	Newcastle	0.13
7	Perth	-1.26
8	Sydney	0.59
9	Wagga Wagga	-1.64
10	Wollongong	2.69

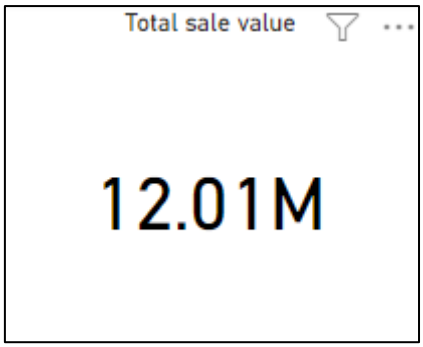
4.4. Rationale to close worst-performing office

The table shows the total score of the offices in each city. The office with the highest total score is Hobart, Australia, with a score of 3.3. The office with the lowest total score is Newcastle, Adelaide, Perth, and Wollongong, with a score of 2.7. After analysing key metrics, we have four bad performances in the office. However, we would like to recommend our company close the Wollongong office which has lowest sale value of the year.

	Office_Location	Total_Score
1	Adelaide	2.7
2	Brisbane	3.0
3	Darwin	3.0
4	Hobart	3.3
5	Melbourne	3.0
6	Newcastle	2.7
7	Perth	2.7
8	Sydney	3.0
9	Wagga Wagga	3.3
10	Wollongong	2.7

5. Dashboard

5.1. Total sale value

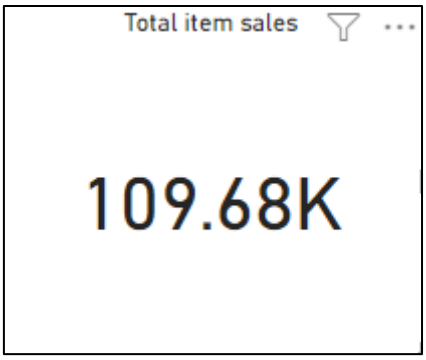


As the Chief Executive Officer (CEO), comprehending the total selling value is a vital aspect that is crucial for gaining a comprehensive understanding of the whole landscape of the organisation. Regularly monitoring sales figures daily enables the Chief Executive Officer (CEO) to gain insights into the company's performance over time.

5.2. Total customer

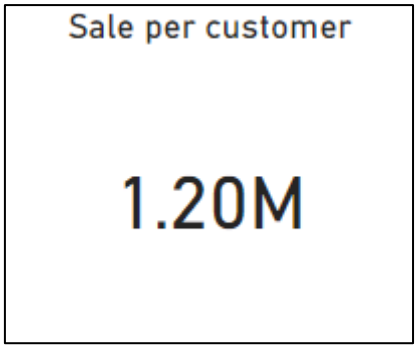
A customer refers to an entity, either an individual or a business, that engages in the acquisition of goods or services from another enterprise. Customers play a crucial role in generating income, as they serve as the driving force behind financial gains. The absence of these entities renders businesses incapable of both survival and prosperity. Therefore, CEO need to know overall landscape of the business base on number of customers by total.

5.3. Total item sales



Based on overall sales, the CEO needs to know the status of their item sales. The CEO needs to be aware of the current item sales number because it indicates the company's capacity to clear its stock. The corporation must launch a campaign, offer a discount, or bundle products if overall sales growth is slowing down to push sales targets towards customers.

5.4. Sale per customer

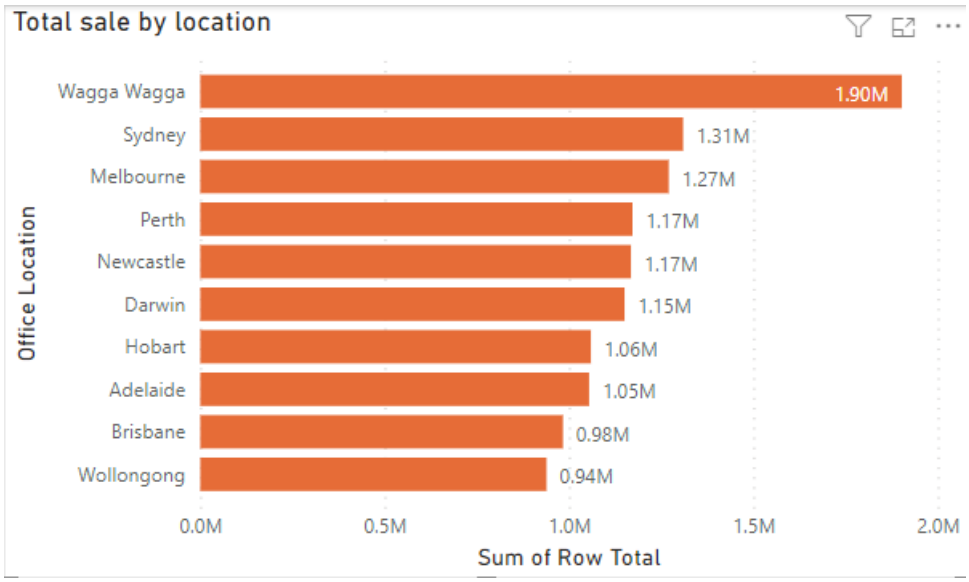


The statistic of Average Sales per client is a significant indicator that provides aspects, valuable insights into several aspects such as client spending patterns, profitability, and the attractiveness of products. The observation of higher average sales statistics may suggest the effective use of strategies such as upselling or cross-selling, a diverse range of appealing products, and a well-executed pricing strategy. This statistic has a direct impact on the financial performance of the organisation, g it crucial for revenue forecasting and business strategy development. Furthermore, the monitoring of fluctuations in mean sales figures can serve to discern client inclinations and market patterns, hence bolstering endeavours aimed at improving product assortment, pricing strategies, and promotional activities.

5.5. Alternative component for decision making.

5.5.1. Sale value per location

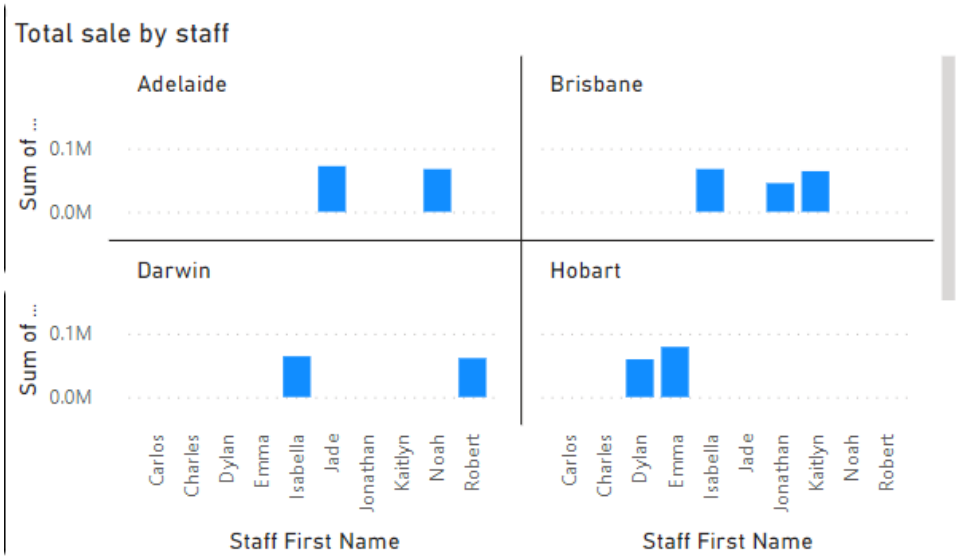
Sales Key Performance Indicators (KPIs) serve the purpose of consolidating unprocessed data into essential business metrics. These metrics are employed to evaluate the performance of an individual, department, or organisation in relation to their objectives, hence assessing the effectiveness of their endeavours. Key Performance Indicators (KPIs) have the potential to be linked to financial data, deal-related metrics, or indicators of individual or team progress.

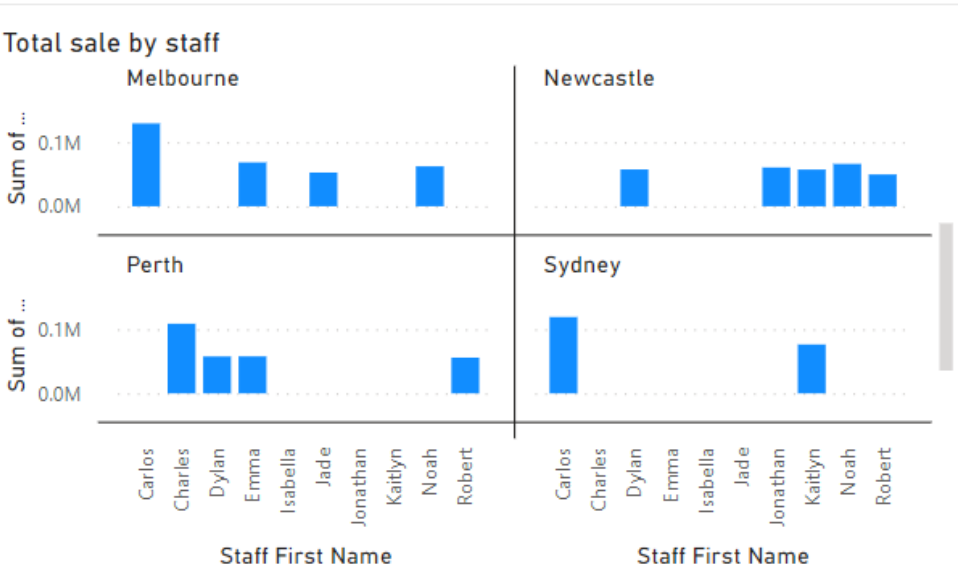


The graph illustrates the aggregate sales value across several locations in Australia. Sydney is the geographical area that exhibits the highest aggregate selling value, with Melbourne, Brisbane, and

Perth thereafter ranking in descending order. Wagga Wagga is identified as the geographical area with the highest aggregate sales value. Several potential explanations exist for this observed tendency. Sydney, Melbourne, Brisbane, and Perth are prominent urban centres characterised by substantial population sizes. Consequently, the presence of a substantial number of prospective buyers and sellers inside these urban areas contributes to the escalation of residential property prices. Furthermore, these cities are situated in highly sought-after regions, offering convenient proximity to employment opportunities, educational institutions, and many other facilities. This characteristic renders these locations desirable for residential purposes, thereby leading to an increase in the market value of properties. Moreover, it is noteworthy that these cities have together witnessed substantial economic expansion in recent times. This has led to an increase in incomes and wealth, which has also contributed to the rising sale value of homes. On the other hand, Wagga Wagga is characterised by its smaller size and comparatively lower population. Additionally, it is situated in a secluded region. Consequently, the limited number of prospective buyers and sellers in Wagga Wagga diminishes the city's appeal to homebuyers in comparison to larger metropolitan regions. Consequently, there has been a decline in the market value of residential properties in Wagga Wagga. In general, the graph illustrates the spatial variability in the total sales value of residential properties in Australia. Major urban regions tend to exhibit the highest total sale values, whereas smaller cities and regional areas tend to have the lowest total sale values.

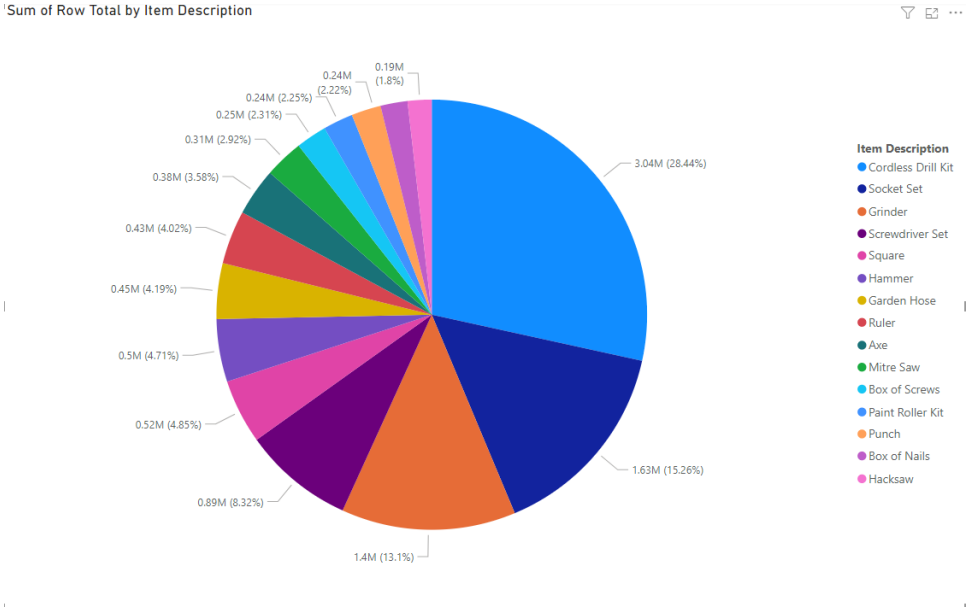
5.5.2. Sale value per staff by location





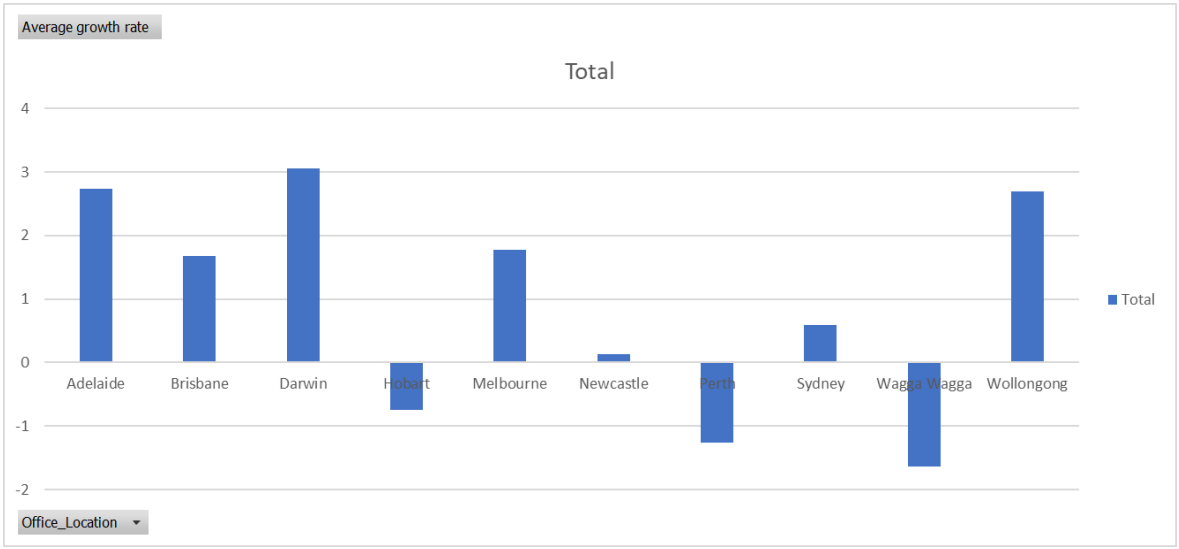
The provided chart illustrates the aggregate sales figures attributed to the personnel within a certain organisation. In this representation, each bar corresponds to an individual staff member, with the vertical dimension of the bar indicating the aggregate value of sales attributed to that staff member. The observed disparity in sales effectiveness may be attributed to numerous factors, including the level of expertise and experience possessed by the staff member, the geographical area they are assigned to, as well as the characteristics and preferences of their customer base. There is also a possibility that certain staff workers exhibit varying levels of motivation towards sales. The chart can serve as a valuable tool for the organisation in discerning its highest achievers and directing coaching and development initiatives towards staff members who are encountering difficulties in attaining their sales objectives.

5.5.3. Item description



The presented pie chart illustrates the distribution of sales across various categories of tools. The Cordless Drill Kit has the greatest sales percentage at 28.44%, followed by the Square at 15.26%, the Hammer at 13.1%, the Screwdriver Set at 8.32%, the Grinder at 4.85%, the Socket Set at 4.71%, the Items Details Summary at 4.19%, the 0.89M at 3.58%, the 0.52M at 2.92%, and the 0.38M at 2.22%. According to the pie chart, it can be observed that the three most popular instruments, namely the Cordless Drill Kit, Square, and Hammer, collectively contribute to more than half of the total sales, amounting to 56.8%. This implies that these tools are highly sought-after and widely favoured. In general, the pie chart offers a comprehensive depiction of the sales performance across several tool categories. Businesses can utilise this tool to ascertain the tools that are highly sought-after and popular among consumers, as well as to monitor the patterns and fluctuations in sales over a period.

5.5.4. Trend Analysis and prediction



There exist several potential justifications for the observed disparity in mean growth rates across different geographical areas. Initially, certain sites may possess a greater appeal to clients in comparison to others. Sydney, being an urban centre of significant scale, exhibits characteristics such as a substantial populace and a robust economic framework. This characteristic renders it an appealing location for conducting company activities, hence potentially resulting in increased rates of sales expansion. Furthermore, certain geographical areas may exhibit a higher degree of rivalry compared to others. Sydney is home to numerous enterprises offering comparable products or services. This competition may pose challenges in attaining significant sales growth. Moreover, certain geographical areas may exhibit a higher degree of cyclical patterns compared to others. The economy of Newcastle is significantly dependent on the mining industry. If the mining industry has a positive performance, it is likely that the economy of Newcastle will also thrive, resulting in a substantial increase in sales growth. Nevertheless, in the event of a downturn in the mining industry, the economic performance of Newcastle is likely to be adversely affected, resulting in a decline in sales growth. In general, the data illustrates that the mean increase in sales across separate locations exhibits variation due to multiple factors. When making decisions on the expansion of their activities, businesses should consider these aspects.

	Office_Location	Avg_Sales_Percentage	Forecast_M1	Forecast_M2	Forecast_M3	Forecast_M4	Forecast_M5	Forecast_M6	Forecast_M7	Forecast_M8	Forecast_M9	Forecast_M10	Forecast_M11	Forecast_M12
1	Adelaide	2.74	76515.10	78555.70	80596.30	82636.91	84677.51	86718.11	88758.71	90799.31	92839.91	94880.51	96921.11	98961.72
2	Brisbane	1.68	91562.18	93075.01	94587.84	96100.67	97613.50	99126.32	100639.15	102151.98	103664.81	105177.64	106690.47	108203.30
3	Darwin	3.06	107515.18	110707.46	113899.74	117092.02	120284.30	123476.58	126668.87	129861.15	133053.43	136245.71	139437.99	142630.27
4	Hobart	-0.75	86340.30	85687.86	85035.41	84382.97	83730.52	83078.08	82425.63	81773.19	81120.74	80468.29	79815.85	79163.40
5	Melbourne	1.78	115893.58	117920.41	119947.23	121974.06	124000.89	126027.72	128054.55	130081.38	132108.20	134135.03	136161.86	138188.69
6	Newcastle	0.13	95957.08	96081.66	96206.25	96330.83	96455.41	96579.99	96704.58	96829.16	96953.74	97078.32	97202.90	97327.49
7	Perth	-1.26	91283.40	90118.55	88953.71	87788.86	86624.01	85459.16	84294.31	83129.47	81964.62	80799.77	79634.92	78470.07
8	Sydney	0.59	109459.52	110101.55	110743.57	111385.59	112027.62	112669.64	113311.66	113953.69	114595.71	115237.73	115879.76	116521.78
9	Wagga Wagga	-1.64	141213.73	138859.21	136504.69	134150.17	131795.65	129441.13	127086.61	124732.10	122377.58	120023.06	117668.54	115314.02
10	Wollongong	2.69	72653.48	74556.67	76459.85	78363.03	80266.22	82169.40	84072.58	85975.76	87878.95	89782.13	91685.31	93588.50

6. Conclusion

The comprehensive analysis of 'BitsAndBobs' Australia's operations has shed light on crucial aspects of the business and provided insights to guide strategic decisions. As we conclude this report, several key takeaways and recommendations emerge:

The Performance Evaluation underlines the need for a strategic approach to address underperforming offices Recognizing and rewarding these top performers is essential to maintain their motivation and productivity. Removing or reevaluating underperforming items, while emphasizing popular ones, can positively influence overall sales and reduce inventory carrying costs. This predictive tool provides insight into potential sales trajectories. projecting for the next 12 months, enables better financial planning and inventory management.

According to this data analysis. It is advisable to consider consolidation strategy. Performance Improvement Initiatives, Inventory Optimization, leading to a more efficient use of resources and an increase in overall sales.

In conclusion, this analysis serves as a critical foundation for data-driven decision-making at 'BitsAndBobs' Australia. The insights derived from this analysis provide a roadmap for addressing the challenges faced by the company. By acting on these recommendations and making informed decisions 'BitsAndBobs' Australia can secure its future in the Australian retail landscape. The goal is to ensure a cost-effective and sustainable path forward in a competitive market.

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