Retail analytics in power bi

By

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A Report

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Abstract

The retail markets have become extensively competitive and each player in the retail market is striving for the ability to optimize the marketing serving processes, while satisfying the customer expectations. Therefore, it is important for any business/firm to manage and channelize the data to achieve the customer's delight as well as in generating the healthy profits. With regard to big retail players internationally as well as in the USA, data mining or rather big data analytics is now being at every single stage of the retail market/business process, i.e., tracking customer order placements and predicting the forecast sales of the particular product, optimizing the product sales and the offers based on consumer preferences, tracking the emerging products in the market, forecasting and predicting the sales and future demand based on the predictive simulation tools. In parallel to this, recognizing the customers' expectations and interest in specific product types based on their previous purchase actions, and working out the best technique to approach them through targeted marketing efforts and ultimately what to sell them next in what configures the core of data analytics. This project is the outcome of a descriptive research on the past, present, and future of retail industry and the application of business analytics in shaping appropriate marketing strategies with data sources, data structures, and DAX query language through dashboard in Power BI. The project aims to show on how we can use the Power BI with business oriented retail analytics data using DAX query language and its performance on presenting the dashboard to the end users. So in this project, I have created an analytical dashboard to know historic trend and business performance, and also to know which products are sold mostly, which are the top regions and managers/market performance. Additionally, I have created what if analysis for future planning on the basis of historic trend - this dashboard is created for stake holders to know business growth trend and functional areas and with the visualizations. This project represents the large dataset into visualization form to quickly see the performances of all the commodities.

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1.Introduction

1.1 Power BI

Power BI is a business analytics service provided by Microsoft. It aims to provide interactive visualizations and business intelligence capabilities to create their own reports and dashboards for the end users. Our data may be in an Excel spreadsheet, or a collection of a cloud based .Pbix file which is designed for to use with Power BI desktop. Power BI was initially released in 2014, operating system: Microsoft windows. Power BI provides cloud- based services, along with desktop interface, called Power BI Desktop. The key components of the Power BI are (I have mentioned only 3 which I have used in this project):

- Power BI desktop: designing and publishing reports and dashboards to the service.
- Power BI service: software as a service.
- Power BI mobile apps: iOS, android, and windows phones.

The objective of my project is to analyse the retail sales data of the items sold across multiple countries and stores. I have used visualization and fields tools to create the data sale analysis charts shown in this report and project.

Benefits of Retail analysis: with the help of Power BI, a retailer can even analyse, if there are any issues in its products, transportation, services.

Transactions, supply chain, buying behaviors, multi-channel sales, trends and global coverage can also be tracked with this tool to maximize profit. The sales data stored yearly could be used to improvise the business. To store the yearly sales data, products data, and services data, the retailers usually use the excel sheet or SAP tools

Instead of presenting each and every data in different layouts, I have used Power BI tools and presented all the charts information in five layouts with the complete information for the year 2015 and all the years.

By looking at this retail analysis layout, the audience who are seeing the layout will

come to an understanding what profit they have made in multiple countries. For all the charts in the top corner there are 3 symbols i.e., FILTER, HIGHLIGHT, and NONE. We can choose what option we need to demonstrate the charts regarding our requirements. Filter is like filtering the icons to what to present in all the charts and what not to show. Highlight is just like highlighting the requirements mentioned. None is like not to show which is not needed. For visual interaction there is an option called edit interact, using this option we can directly visualize and edit the data. I have created the Power BI tool for the visualization of data for the years 2015-2016. Kindly note that, I am only presenting the data of the year 2015 for few layouts.

1.2 Retail analytics

As we are all aware, the retail business sales output is the fulcrum of company's performance. To achieve the best output sales, there are many parameters, to be mastered.

1) Detailed analysis of the particular product in the area, where it must be marketed. The product demand analysis, which must be done practically by interacting with different segment people of that area.
2) Analysis of competitive brands. Evaluation of positives and negatives of our brand
   product to be marketed. Plan to make improvisation of product and give more emphasis for acceptability of the product by all segment people of society.
3) Quality of product, which is very important parameter of the product sales. To achieve quality, one should look for quality raw materials at most reasonable rate, which will help to sell product at best marketing competitive price.
4) Marketing of finished product. Selection of marketing team is very challenging. The key is to recruit the marketing team. The team efforts, right from sales manager to field salesman gets the best of product sales.
5) Production of product in relative, with demand in market is more important. If demand is more and production is less, because of shortage of raw

material or production staff, will give room for competitive brands to dilute the sales curve.

6) After establishing the best sales of product in the market with outstanding co-ordination of above parameters. The company management must give more emphasis for the consistency product sales by research and sales development. The company which has better research and development will perform best in market.

1.3 Why should retailers care about retail analytics

There are a million tasks retailers must stick on top of the digital age, and it is not an easy job to conduct all the analysis in a single day. Today's retailers are facing a cluster of new challenges, like declining sales, aggressive competition from online stores, and changing consumer preferences. Despite these challenges, some long established retailers are managing to grow year-over-year, shredding past sales records. The winners are doing something contrasting, something which is not only helps them to survive but also succeed/flourish in this rapidly unfolding retail closure – advanced retail analytics.

1.4 What is retail data analytics

Retail data analytics is the process of collection and studying of different datasets in retail data (like sales, inventory, pricing, etc.) to invent trends, future predict results, and make finer business decisions. Data analytics permits retailers to get

more understanding into the performance of their customers, stores, products, and dealers and use that insight to grow profits.

Virtually all retailers are doing different form of data analytics even if they are only reviewing sales numbers on Excel. But there is a very big difference between an analyst firing up Excel to shift through spreadsheets and using purpose-built AI to analyze billions of data points at once. One of the reasons to use data analytics to show decision-making is to secure your decisions are based on actual truth (cold, hard numbers), not just others perception of reality. Analytics help us understand what's going on with your business with greater detail than you could do otherwise.

A retailer can use data analytics to:

- Understand the value and number of products sold in an average order
- Recognize which products sell the most, the least, and everything in-between
- Identify your most valuable customers
- Discover what your true demand was as well as past lost sales
- Determine optimal suggested order quantities and recommend purchase quantities and Allocations
- Establish the optimal price point for a specific product at any specific location

It is not a surprise, that there exists an enormous, things in industry for retail analytics solutions. Below, we will discuss some of related applications, how they will work, and what benefits we could see from using them. To productively manage and assemble their data, many businesses choose to turn to Business Intelligence tools. As, BI tools help you to structure and visualize your data.

Many retailers conduct basic BI using native features in their ERP (Enterprise Resource Planning) system, or by importing data directly into Microsoft Excel.

Slightly more advanced retailers are using dedicated BI software like:

- Power BI
- Tableau
- SAP
- QlikView
- Apache Spark

These applications support multiple data sources, appealing visualizations, and some degree of data manipulation. Importantly, all the above mentioned requires a lot of human input and are quite time-consuming to manage. This is especially true for medium to large retailers running hundreds or thousands of stores and products in different segments. Therefore, many retailers have dedicated teams of analysts in most departments to generate reports to get the details of the huge data in a clear form

2. Background

AIM and objective of this project is: The aim of the project is to create an effective software to help the Retail Analytics to maintain the records of a large data sales, handle user details. Retail analytics system deals with the maintenance of Sales and consumables in the Retail industries. This Retail analytics system is user friendly. Having high performance and no time consuming.

2.1 Scalability and performance

The scalability of Power BI High quality/elite capacity, and the scalability of backend is Direct Query or Live Connect data sources. The tool is meant to be used in capacity planning and scale evaluation scenarios when admins of Power BI capacities and backend data sources wish to test the ability of their architecture to serve a certain scale. “It has a 1 GB limit per dataset that is imported into Power BI. If you have chosen to keep the Excel experience, instead of importing the data, the limit is 250 MB for the dataset”.

2.2 Accessibility

When Power BI Dashboard is built on a specific topic with accessible dashboards and reports, the accessibility can be given to many persons in the world. For accessibility, you must share your report on the Power BI web service so everyone could see it.

2..2.1 Accessibility in Power BI

While working with Power BI, I considered the different types of users who may interact with these reports. I created reports that are easily navigated and understood by keywords and button / tabs / filters

2.2.2. To access this reports / dashboard:

To make it accessible I must publish this report from desktop to web service and mentioned users email id so they can access these reports. We can also set the limitations.

2.2.3. How to use or access dashboard:

In all pages I have created multiple tabs. If you click on any tabs, you will go directly to that page. Retail analytics dashboard is created to quickly see the performance of all the products that a company sell. This layout relationship calculations are done with DAX query language and then visualizations are created through fields and filters. This dashboard contains 5 layouts that is overview, product wise, market wise, geographic wise and what if analysis. The overview of my dashboard/report includes how the sales are done regarding different products in multiple countries and regions and how many customers are buying the products how it is transported how many managers the best profits and comparisons between quartered and month regarding sales. What if analysis to improve the future business in retail analytics. Our cerebrum attracts more to the colors and visualizations rather than written documents. Accessibility and unit testing performance is done with my dashboard. For accessibility When spotlight option is selected the other are not seen and there are

many options like drill up, drill down, colors, transparency, focus mode, show as a table etc.

2.3 GUI

The GUI I have worked on the DAX query Language that is backend program of the application. Power BI interface includes, data source, theme, query language, visualizations, we can manipulate as per our requirement.

Power BI have 2 types of applications:

- Desktop - in Desktop version you can create / modify reports
- Web - you can publish your reports from Desktop to web so everyone can access your report or dashboard

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3. Problem statement

A retail company wants to optimize its sales strategy but lacks insights into key performance indicators. The goal is to analyse sales data to identify trends, patterns, and areas for improvement.

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4. Methodology

The main objective in making this dashboard is that, the reader can directly analyze what we had in last financial year. Which areas are not making sales, or which is our best product etc. Reader can take decision for business growth, and it is easy to understand business performance.

4.1 Data Source

Data taken from Kaggle

- Order ID: Unique Order ID number per Order
- Order Date: Date of order placed
- Ship Date: Date of order shipping
- Aging: Shipping Days. It is the difference between Order Date and Delivery Date.
- Ship Mode: Shipping Mode
- Product Category : Category of product
- Product: Name of ordered Product
- Sales: Per Order sales (in $)
- Quantity Ordered : Number of Items Ordered
- Discount: Per order Discount (in $)

- Profit: Per order Profit (in $)
- Shipping Cost : total cost of shipping per order (in $)
- Order Priority : priority of order
- Customer ID: ID of customer
- Customer name : name of customer
- Segment: Segment of ordered product
- City : City from where order was placed 5
- State: State from where order was placed
- Country: Country from where order was placed
- Region: Region from where order was placed
- Months: Month of Order placed

4.2. How to upload raw data into Power BI

To Create Power BI, visualize dashboard, you need to download Power bi desktop and MySQL workbench. Once you have installed, then we need to follow below process :

Collect Data from Kaggle => Import data in MYSQL => Open power BI desktop => Click on Get data =>MYSQL database => fill all the information about MYSQL => Select required database and then click on transform => Power Query editor window will

open => then from each table you have to check all data types, then you have to click on close & apply.

Now your base data is ready

4.3. Data Analysis Expressions (DAX)

Data Analysis Expressions (DAX) is a query programming language that is used throughout Microsoft Power BI for creating calculated columns, measures, and custom tables. It is a collection of functions, operators, and constants that can be used in a formula, or expression, to calculate and return one or more values.

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5. Architecture

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6.Result

6.1 Power BI pages

Fig 1. Key Insights of the Power BI dashboard

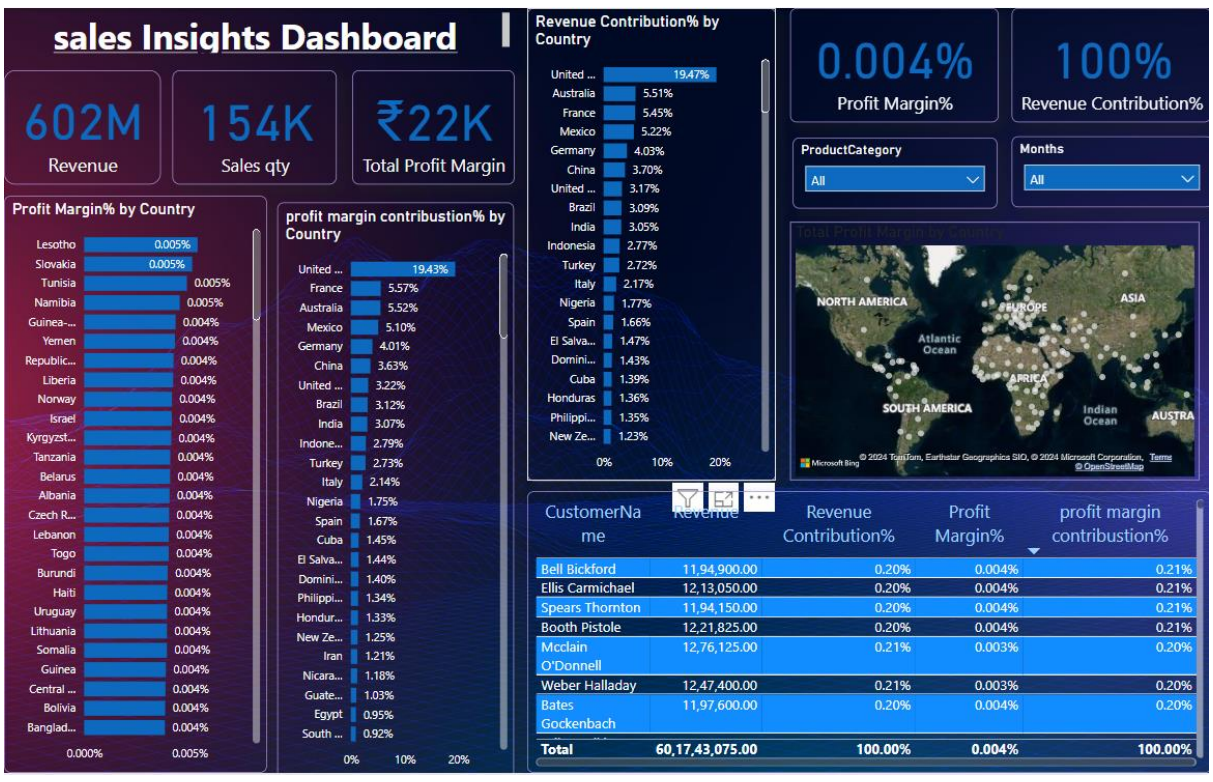

Fig 2. Profit analysis power BI dashboard

From fig 1 and 2 , In this dashboard we can see company has generated Total revenue in 1 year ₹602M, Total profit margin ₹22K, Profit Margin% 0.004%, sales Qty ₹154K. In Electronic category company has generated total revenue ₹30M by selling a total of 8211 and earned a profit of ₹1K

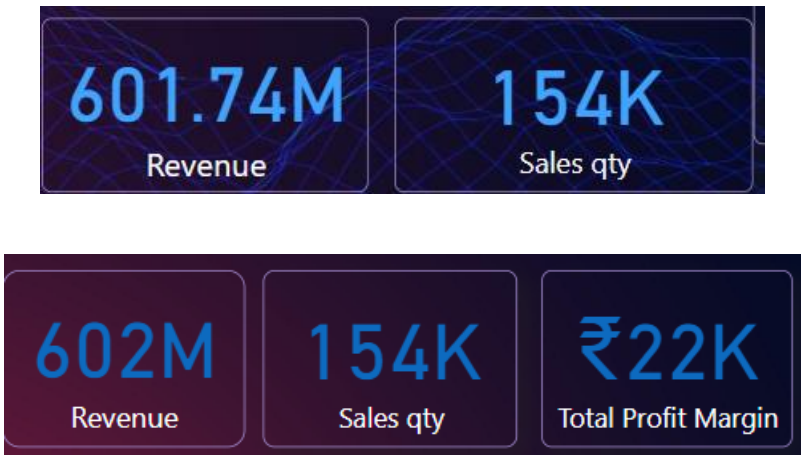

Fig 3. Two Cards to represents key performance like: Total sales | Total quantity | Total Profit margin

We can go to that with the help of direct click on mentioned tab. I have given PrductCategory and month filter to check Product Category and months vies visualization .

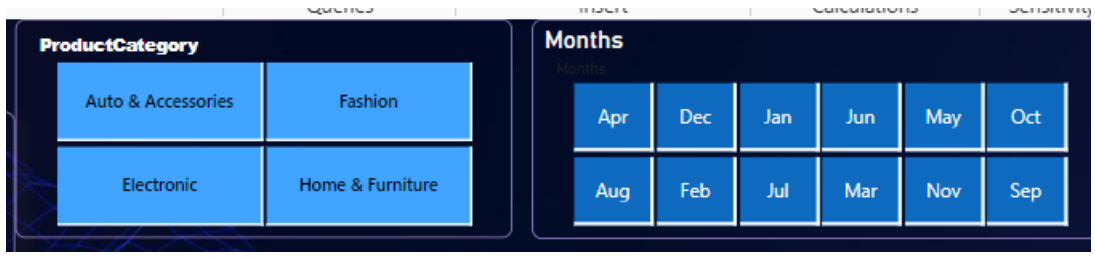

Fig 4. Tabs For Multiple Pages:

As in the above picture we are seeing multiple tabs productcategory , months , what if analysis with the year 2015. When we click on these tabs it directly navigates to the wanted pages to find the information within second

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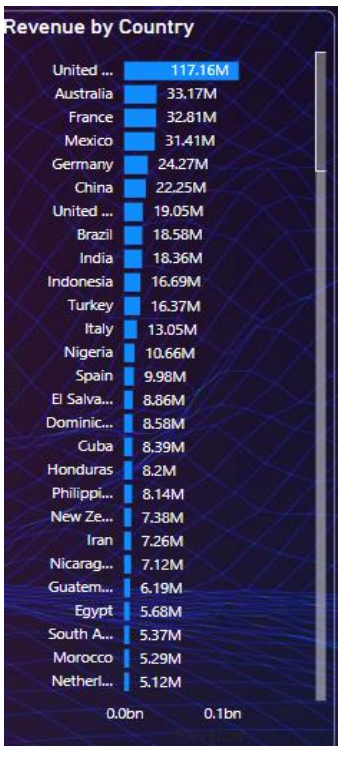

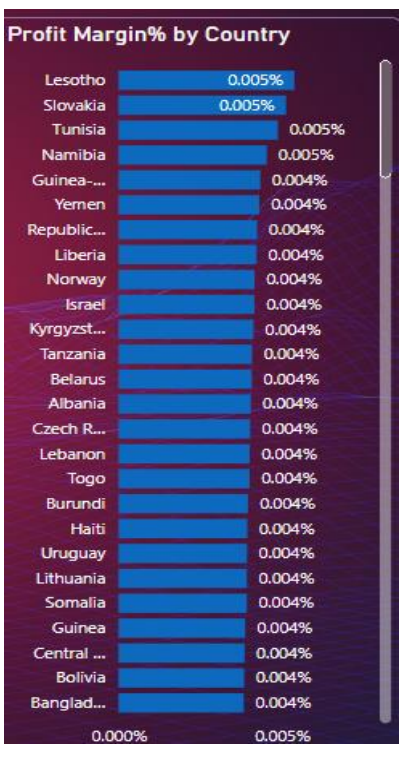

Fig 5. Country Vise analysis

In above fig 2015 year United States is our largest market in terms of revenue with ₹117.16M and total contribution of 19.47% with total revenue but if you look at the profit margin of United States is generating only 0.004% and Lesotho generating 0.005% value is larger than United States

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Fig 6. If we check the profit margin then here in Home & Furniture Slovakia comes into the picture which is generating the highest profit margin of 0.019%. Similarly, if we can check the Profit Contribution % by Country then here United States is the largest player with 3.78% of total contribution in total profit

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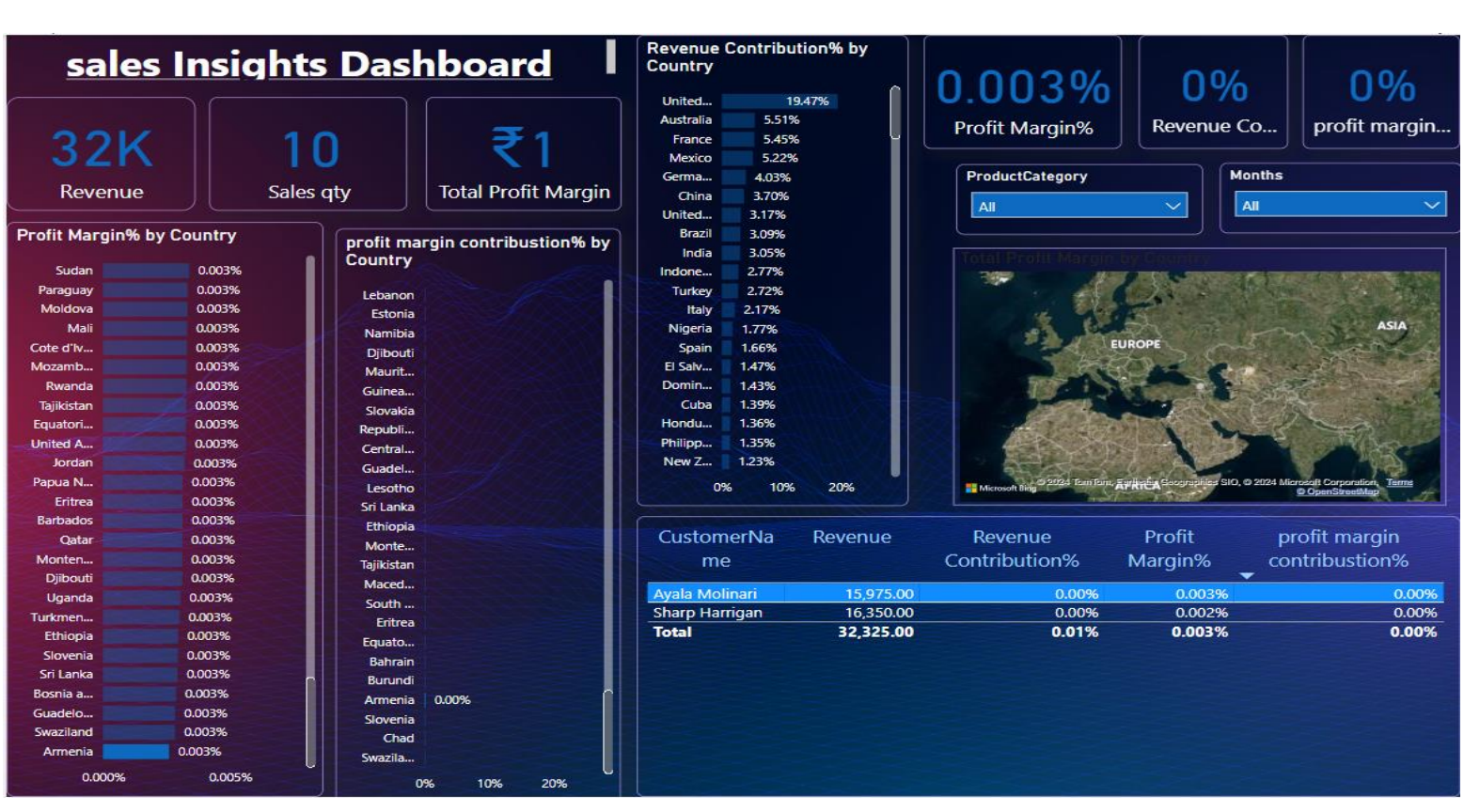

Fig 7. In 2015 year, Armenia generating the lowest profit margin of 0.003%. If we can check the Profit Contribution % by Country then here also Armenia is the Lower with 0.00% of total contribution in total profit.

Fig 8. In our top 5 customers, the Mcclain O' Donnell is our biggest customer who has generated total ₹1.3M revenue generated in 1year

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Fig 9. In our top 5 product, the T-shirt is our highest product has generated total ₹ 52M revenue generated in 1 year.

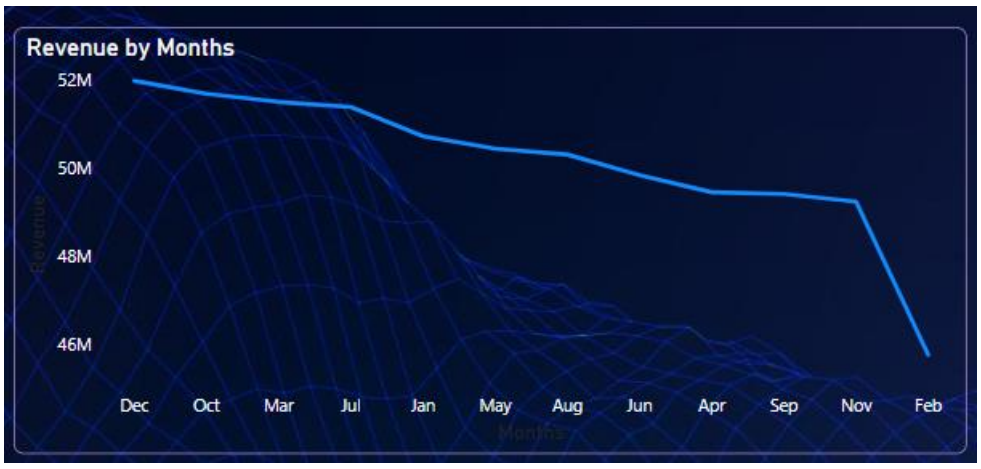

Fig 10. Revenue Trend is showing that in Nov revenue has been decreased drastically

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7.Discussion

Power Bi tool is a business-oriented tool, when I have started the basic things to learn regarding this tool, I was just following as it was taught to me, as doing research regarding Power BI like reading different papers and journals of it. I got an idea that how it is useful to computers field. At that time this business intelligence tool with an inbuilt application will work with queries and programming language to sort out the data. So, I have picked DAX query language for this retail analytics project and to Analyse and present with a beautiful dashboard. Still learning deeply into the subject to gain more knowledge regarding Power BI.

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8. Conclusions

This project gave me an opportunity to learn the new platform Power BI. I have done data visualization project previously. In this report, I have done accessibility and unit testing of the DAX query language as I have only reported the data for the year 2015. The project data and the Power BI tool through which we can visualize the data for the years 2015. The Power BI platform not only gave me an opportunity to analyze the data and present in meaningful way, but also gave me an opportunity to think about the key indicators that are essential for the success of the sales in various countries. I am planning on pursuing my career in Power BI.

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