

# Data Visualization advances Business by promoting easy story-telling and informed decision-making using Microsoft Business Intelligence.

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**Abstract** - Data visualization serves as a transformative tool in the realm of business, facilitating seamless storytelling and informed decision-making through the Microsoft Business Intelligence platform. The paper explores the role of data viz in the business context of dealing with problems. The paper highlights the relevance of merging analytics using intelligent data viz software in marketing, customer relationship management, sales, banking & fintech. The idea proposed is using data viz tools across sales, finance, and marketing domains to simplify data understanding and enhance decision-making in today's data-driven business environment.

**Key Words:** Big Data, Customer-Relationship Management (CRM), Financial Technology (FinTech), Average Total Price (ATP), Data Visualization (Data Viz), Business Analytics (BA)

## 1. INTRODUCTION

Data Analysis is a process that brings order and structure to collected data. It turns raw data into information that a team can utilize to make conclusions. The Analysis is conducted by using systematic trends or relationships between different types of data. As we are already aware data viz is the process of putting data into a chart or any other visual format that helps with analysis and interpretation. Data Visuals present the analyzed data so that it is simpler to make conclusions.

Now the type of data will determine the type of data analysis required and accordingly, the visuals will be made. Quantitative data allows for conducting quantitative and statistical analysis. Now there are two main types of quantitative analysis according to which the data visuals are expected.

*Inferential Analysis* – This is used when you want to examine differences and correlations between data. It includes regression analysis which helps you understand the cause-and-effect relationship in the available data.

*Descriptive Analysis* – This is used when understanding the patterns of a particular sample/data is required. It includes frequencies, counts, percentages, and other central tendencies.

A different type of visual would be used to help depict these differences. Hence it is very important to understand which tool will be essential for the currently assigned data. Big data is an inevitable source of progress for business. Based on insights of data, companies can improve their products, services, performance, security, conversions, revenue, and any business metrics that require growth potential. Visualization and analytics play a pivotal role. Often, it is represented by an enormous amount of unsorted and updated data in an unreadable form. Visualization and analytics are focused on turning big data into a comprehensible and practical source of high-value information for the business.

### *Determining Relationships*

When we place data sets on a map or chart, we can spot relationships and dependencies between them, identify specific conditions for certain events or results, etc. Thus, we can extract exclusive insights, which could have been unavailable if not for visual representation. Identifying correlations is an extremely valuable use of data viz. It is extremely difficult to understand the relationship between two variables without a visualization, yet it is important to be aware of relationships in data. This is a great example that shows the importance of data viz.

### *Examine Network*

An example of examining a network with data viz can be witnessed in market research. Marketing professionals need to do their homework on which audiences to target with their message, so they analyze the entire market to identify audience clusters, bridges between the clusters, influencers within clusters, and outliers.

### *Provide real-time monitoring, control, and response*

One of the biggest advantages of big data viz is providing transparency of the processes in an organization or company. Depending on the data source, executives monitor in real-time the employees' performance, a customer's purchase journey, or something as trivial as stationary consumption on the premises. These capabilities make better control over the processes and help take immediate action if needed.

### *Analyzing Value and Risk*

Determining complex metrics such as value and risk requires many different variables to be factored in, making it almost impossible to see accurately with a plain spreadsheet. data viz can be as simple as color-coding a formula to show which opportunities are valuable and which are risky.

### *Plot patterns to make predictions.*

Combined with advanced analytics, big data viz helps business cases that require finding patterns in data sets. Some of these patterns can be seen with the naked eye, for example, on a bubble plot. Others can be recognized only by smart, easy-to-understand algorithms. Using patterns & other insights, executives can make predictions by identifying trends and building a strategy based on real insights rather than assumptions. data viz allows us to recognize emerging trends and respond quickly on the grounds of what we see. Such patterns make more sense when graphically represented; because visuals and diagrams make it easier for us to identify correlated parameters. Certain relations are obvious, but others need to be recognized carefully and clarified to help us concentrate on a particular data point that can affect business.

### *Determining errors*

This advantage clearly shows why data viz is important, even indispensable. In some cases, visualized data can show errors, and inaccuracies or even help measure risks. Monitoring the performance of paper printing machines, for example, can help determine errors before they lead to malfunction or breakdown. In terms of people's safety, it relates to preventing accidents at the workplace and, in some cases, even saving lives.

## **2. LITERATURE SURVEY**

Marketing analytics is a field that leverages data to enhance marketing decision-making. This case study offers an overview of marketing analytics specifically focusing on visualization, segmentation, and class prediction. It also explores the connections between marketing analytics and other disciplines like expert systems, statistics, and operations research [1].

A study conducted in this research below[2] determined that business analytics has an impact on marketing performance particularly when mediated by marketing. Essentially businesses that utilize business analytics to comprehend their customers and market trends can enhance their marketing performance by leveraging channels to connect with and engage their customers.

Customer relationship management (CRM) enables retailers to collect and analyze customer data to gain insights into customer behavior. This information can be utilized to anticipate customer responses over time and develop targeted marketing strategies geared toward enhancing customer satisfaction and overall company value [3]

Finance is a very important aspect of business. Understanding the capital markets, sales, cash flow, revenue, profit-loss, etc. is not everybody's cup of tea. Comparing these aspects simultaneously can help understand the company's roadmap. Some of the aspects of finance like intertemporal and portfolio decisions can generate time series which can be used to predict future values [4].

The paper studies [5] that Bank providers must attempt to better understand their customers in an attempt not only to anticipate but also to influence and determine consumer buying behavior. The paper accordingly presents and develops a model that attempts to articulate and classify consumer behavior in the purchasing of financial products and services.

The 21st-century emerging phenomenon of Fintech is a widely popular concept. Financial technology (Fintech) is about technology that aims to automate the use of financial services. Fintech has twin foundations namely data science discipline and finance expertise, like fundamental knowledge in investment analysis offered by the CFA program. The industry is dependent on roles like machine learning and data engineers' expertise in finance.

Sales data [6] can contain many records, and filtering sales data to identify significant intuitions is a frequent strategy in sales analysis. Managers and owners benefit from tools like dashboards for visualizing gathered data. The products that are offered by various sales locations are typically shown by certain tools.

## **3. PROPOSED IDEA**

Concentrating on the business sector, an idea to utilize the data viz tool to simplify data understanding is proposed in this paper. There are instances wherein the stakeholders may not be experts in a particular field and to navigate them through the story of data, a dashboard comes in handy. In this paper, the three major niches of business; sales, finance, and marketing are chosen to demonstrate how dashboards enhance storytelling and interpretation in the field of business. The dataset for the respective niches is taken and a dashboard is made to demonstrate the difference that data viz creates in decision making. It highlights how data viz benefits the business stakeholders and can be a very reliable alternative for the decision-making process in a business.

#### 4. METHODOLOGY

A practical approach is followed by implementing dashboards for various departments of business. Sales, Finance, and Marketing departments of different businesses are targeted. A problem statement is designed to understand common types of problems that an individual company could face. After that, the standard approach and ideal approach to the problem are defined and the snapshots of interactive dashboards made from scratch are shown. Important insights and observations that can be drawn from the respective dashboards are mentioned to make the reader understand the impact of dashboards. The presence of a dashboard in the different business departments can heavily impact the efficiency and decision-making process of a business.

##### 4.1 Sales Analysis of a Business

*Problem Statement* - The stakeholder has to identify leads, forecast sales, and improve customer retention. In a market that is expanding quickly, the company's sales manager is having a hard time keeping track of sales. He is having issues with the insights provided by his company. He has some of the regional managers of the business working for him in the North, South, and Central parts of the world to accomplish this. He demands the records, and the regional manager delivers him Excel files. Skimming through more than thousands of data is the only potential approach that can be followed. He can't use this approach to make modest decisions, though. All that the management needs is a picture of the business's weakest area, which it should concentrate on to increase sales and enhance performance.

The potential solution by which the stakeholder can resolve this problem is discussed below:

1. The company conducts business from India; hence USD values are sometimes required to be converted to interpret insights. Therefore, in order to convert those USD numbers to INR, we will need to employ some methods. Here, we'll add a new column and fill it with the value of the translated currency. calculating the totals using the US dollar as the currency.
2. Although the term "sales data" is broad and covers a variety of indications, in general, if you can measure something in relation to the sales process, it qualifies as useful sales data. It could be challenging to choose where to concentrate your efforts given the expansive definition of sales data.
3. Stakeholders must reevaluate current methods to better understand clients in this technological age of large-scale data to gain a competitive edge in

the market. If data cannot be analyzed, understood, and used in context, it is meaningless.

This dashboard is made by combining two different datasets from the Food and Beverages Company. Using the combination of these data sets, different charts are created, and conclusions are drawn by varying different aspects according to the needs.



Fig -1: Sales Dashboard

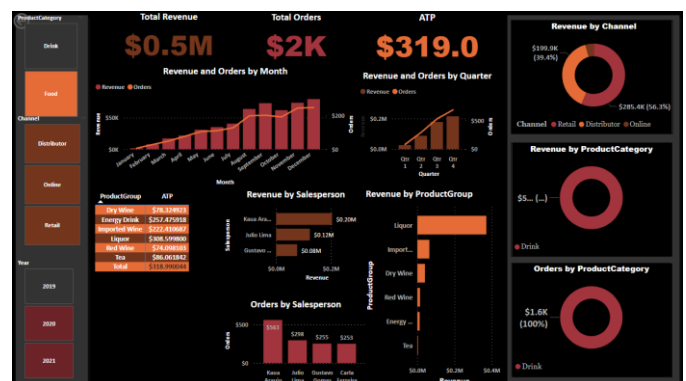


Fig -2: Sales Dashboard

##### Insights from Dashboard:

- This dashboard is helpful in attaining the profit of the business domain as it contains the top revenue by salesperson and top orders by salesperson.
- This dashboard provides the Revenue and orders by month also knowing the drink & food such that it can be known where they need to expand.
- The “years” 2019, 2020, and 2021 overall performance and sales profit and loss month-wise are included in the key insights dashboard.
- There are 3 “channels” Distributor, online, and retail by which we can understand the overall revenue of orders by month and year and by product category.

- The stakeholders will get to know the revenue, orders, and ATP (Average total price) by clicking on the particular channel.
- The dashboard contains a table that includes the product group and respective average total price (ATP)

*Observation from the dashboard:*

In Figure 1, the analytics is done for the year “2019”. Here from the product category both “Drink” & “Food”, the total number of orders the company got is \$17K and the average total price “(ATP)” is \$380.3. In the revenue by channel pie chart, we can see that retail has generated a large revenue which is 53.27% among the channels.

In Figure 2, the analytics is done based on the product category “drink” and year “2019”. As we can see revenue and orders by month are increasing every month but the total revenue, we get from drinks in 2019 is \$0.5M which is less than the total revenue of Drink and food in 2019. So major Revenue has been generated by Food in 2019. In the table of Product group and ATP, we can see the Top 3 products are dry wine, energy drinks & imported wine.

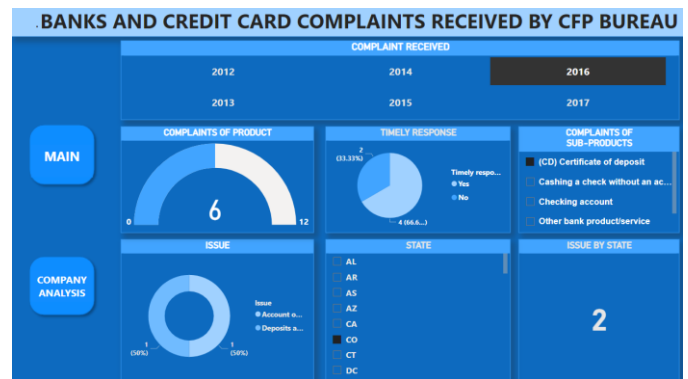
**4.2 Finance Analysis of a Business**

*Problem Statement:* The stakeholder must supervise the count of complaints that the bank receives and how efficiently the complaints are resolved every quarter.

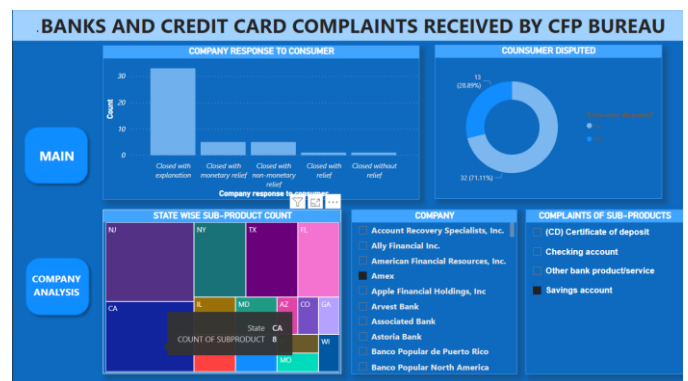
The potential solution by which the stakeholder can resolve this problem is discussed below:

1. They may check the enormous amount of data that is received every month which can be in the form of a table in an Excel sheet. This may sound like a simple procedure to adapt, however, if we dig more into this, there can be more than 1000 individuals in that duration who must have complained. The tedious scrolling through a huge number of data sets can be time-consuming and head-scratching. Not only limited to this, there can be a question of accuracy regarding the conclusions that the manager makes. The study of analytics by manually drawing conclusions from data sets that are this heavy is difficult.
2. A trendy, efficient, and accurate approach to solving this problem can be the use of an interactive dashboard. Making an interactive dashboard is a one-time effort. After that, the datasheet can be updated and the results can be utilized to draw quarterly conclusions.

A data set is used from the Consumer Financial Protection Bureau to build an interactive dashboard using PowerBI. The complaints that are received regarding banks and credit cards from different states and companies for different products are being analyzed.



**Fig - 3: Finance Dashboard**



**Fig - 4: Finance Dashboard**

*Insights from Dashboard:*

- On the ‘MAIN’ page (Fig-3), we can switch to different years of complaints ranging from 2012 to 2017. This can help understand and compare analytics year-wise.
- The stakeholders can also understand the complaints with respect to different states so they can conclude and compare which state may need more attention.
- The dashboard posits analytics on whether there was a timely response by the company to the complaints. It shows very specifically the count of problems that were responded timely and the count that weren’t.
- On the ‘Company Analysis’ page,(Fig-4) we can closely understand how the company responds to the complaints and what is the status of the complaint.

- The dashboard also highlights the count of people who had disputes and this can be accessed with respect to the company or even the sub-product.
- There is another visual that shows which state had complaints for particular sub-products.
- Another feature shows whether the goal is achieved i.e. if all the complaints are resolved or not.

*Observation from Dashboard:*

On the first page, the dashboard shows that in 2016, the state 'CO' received '6' complaints under the category of 'Certificate of Deposit', and out of those, '4' were responded to timely, and the other '2' were not. The '2' of them that were not timely responded had diverse issues. One of them had an issue with 'account opening, closing, and management' and the other one with 'deposits and withdrawals'.

On the second page, we can witness that for the company 'Amex', the 'Savings Account' sub-product complaint analytics is shown. There are '33' complaints that are closed with the explanation, '5' complaints closed with monetary relief, '5' closed with non-monetary relief, '1' closed with relief and '1' closed without relief. We can also check out that '13' which is 28.89% of consumers have disputed, whereas '32' which is 71.11% have not disputed. The dashboard also posits state-wise sub-product count as to which state has how many complaints for a particular sub-product.

**4.3 Customer and Marketing Analysis of a Business**

*Problem Statement:* A Retail business's profitability is currently weak due to customer attrition and a significant number of customers switching to competitors. The Stakeholder has to evaluate customer retention strategies and implement effective marketing strategies to retain customers to solve this problem. The Stakeholder lacks a good understanding of their customers and marketing performance. Without this information, it is difficult to identify areas for improvement and make informed decisions.

The potential solution by which the stakeholder can resolve this problem is discussed below:

1. The Stakeholder first tries to do customer surveys to understand their needs and expectations, but this process takes time and not all customers are visible, and from the previous information that the Stakeholder has in a simple table or paper version, it takes a long time to review each piece

of information again. make decisions to improve customer retention.

2. Next, the Stakeholder can view insights from an interactive dashboard on the Customer and marketing of a business to make the right decisions based on previous trends of the business. The dashboard provides several valuable insights into customer and marketing analytics. This information can be used to improve the company's marketing, develop new products and services, and improve the overall customer experience. Stakeholders can understand the problem and come up with a solution even if they don't have much technical knowledge about creating a dashboard.

The dataset is taken from a Marketing Campaign of a Retail Business to create the Dashboard using the Microsoft Business Intelligence Tool.



**Fig - 5: Marketing Dashboard**

*Insights from Dashboard:*

- The Stakeholder analyzes several relevant parameters that provide valuable information about the company's performance and customer dynamics. These parameters include customer preferences, which allows us to understand their needs and desires.
- In addition, the dashboard provides a comprehensive view of website traffic trends, showing the effectiveness of marketing efforts in attracting and retaining website visitors over time.
- The Top Selling Products section highlights the most popular and profitable products that drive decisions about product development and marketing strategies. Customer demographic information provides a clear picture of the customer base, enabling targeted communication and product personalization.

- In addition, the analysis shows Education vs. consumption that highly educated customers spend more, suggesting marketing efforts aimed at this demographic.
- Finally, quality feedback analysis sheds light on common customer complaints related to product quality and informs efforts to improve the overall quality of products and services. Together, these parameters enable a Stakeholder to make informed decisions, refine strategies, and promote business growth.

#### *Observation from Dashboard:*

Observing The number of website visits has steadily increased over the past year. This suggests that the marketing efforts are working, and the company is attracting more visitors to its website. Product '6' is the most popular and top-selling product, followed by Product '1'. This information can be used to guide product development and marketing.

Most customers are aged 25-34. This information can be used to target marketing messages and develop products and services that appeal specifically to that demographic.

Highly educated customers spend more money. This suggests that the company should focus its marketing on this demographic.

The most common complaint concerns the quality of the products. This information can be used to improve the quality of the products and services provided by the company.

## 5. KEY FINDINGS

- BA can be used to improve customer analytics by, segmenting customers, understanding customer churn, and measuring customer satisfaction.
- BA can be used to improve marketing analytics by, tracking the performance of marketing campaigns, measuring the ROI of marketing campaigns, and identifying new market opportunities.
- BA extensively utilizes data-driven insights to provide optimized financial processes like investment decisions, and risk management strategies, cost analysis, compliance, and performance analysis, with the ultimate aim to aid organizations in achieving an edge in the industry.

## 6. CONCLUSIONS

Answering detailed analytics to make informed decisions without the help of these interactive dashboards isn't easy. The stakeholders, even with very little background in finance, can easily interpret the dashboard and make decisions. This is a rough analytics board that can differ in reference to the requirements of the company. The company may want to create and combine different sets of data points to get results that satisfy their needs. Implementing a dashboard in the field of finance can be a breakthrough. These dashboards and their results can encourage further research and implementation in predictive analysis. Likewise, businesses understand customer behavior, track the performance of marketing campaigns, identify new growth opportunities, and be better at how they allocate their resources, where they expand, and the products and services they offer. Businesses can use analytics to identify the most profitable customer segments and target those segments with specific marketing campaigns. Alternatively, businesses can use analytics to track the performance of marketing campaigns and determine which campaigns are most effective.

## 7. REFERENCES

- [1] France, Stephen & Ghose, Sanjoy. (2019). Marketing Analytics: Methods, Practice, Implementation, and Links to Other Fields. Expert Systems with Applications. 119. 456-475. 10.1016/j.eswa.2018.11.002.
- [2] Kabiraj, S. and Joghee, S. (2023) "Improving Marketing Performance: How Business Analytics contribute to Digital Marketing", International Journal of Technology, Innovation and Management (IJTIM), 3(1), pp. 9-18. doi: 10.54489/ijtim.v3i1.209.
- [3] Verhoef, Peter & Venkatesan, Rajkumar & McAlister, Leigh & Malthouse, Edward & Krafft, Manfred & Ganesan, Shankar. (2010). CRM in Data-Rich Multichannel Retailing Environments: A Review and Future Research Directions. Journal of Interactive Marketing - J INTERACT MARK. 24. 10.1016/j.intmar.2010.02.009.
- [4] J.G. De Gooijer, R.J. Hyndman "25 years of time series forecasting"
- [5] Int J Forecast, 22 (2006), pp. 443-473 Beckett, A., Hewer, P. and Howcroft, B. (2000), "An exposition of consumer behaviour in the financial services industry", International Journal of Bank Marketing, Vol. 18 No. 1, pp.15-26. <https://doi.org/10.1108/02652320010315325>

- [6] Damodar, Harsh, Hitesh & Rashid (2021). An application for sales data analysis and visualization using python and django. International Research Journal of Modernization in Engineering Technology and Science Vol.18 No.06 pp-1757. e-ISSN: 2582-5208
- [7] P., Priyadarshini & Kalyan, Veeramanju. (2022). Business Intelligence for the Evaluation of Customer Satisfaction in E-Commerce Websites- A Case Study. International Journal of Management, Technology, and Social Sciences. 660-668. 10.47992/IJMETS.2581.6012.0243.