

National College of Ireland

Project Submission Sheet – 2021/2022

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Business Analysis of Walmart

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Abstract—In this project, Walmart sales analysis performed and proposed a solution for the gaps identified. Retailers use the knowledge from data analysis and use different offers, promotions strategy to cope up with the current market competition. In the implementation, we have designed a process flow where dataset is obtained from Kaggle, mockaroo. The data is fed into AWS RDBMS though which visualizations and CRM is implemented. To get understanding of an organization, we have used entity relationship diagrams. Using Analytical objectives, we have identified business requirements, goals and to reach the objectives, Visualizations, enterprise resource planning, inventory management system, customer relationship management are implemented.

Index Terms—CRM, Tableau, Inventory Management, AWS RDBMS, Analysis, Reports

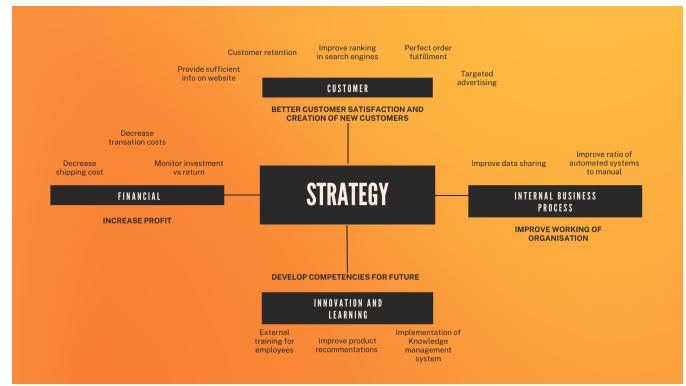


Fig. 1. Balanced Scorecard for Walmart

I. BALANCED SCORECARD AND STRATEGIES

A balanced scorecard is a combined measure of financial and operational components of an organization. Using only financial or operational metrics will lead to erroneous conclusions. The operational characteristics of the organization are overlooked if just financial measures such as *Return on Investment* are addressed. Taking a measurement of both financial and operational factors is an efficient technique to do so. A set of metrics that provide upper management with a quick and complete picture of the entire organization. It integrates financial metrics with operational metrics, customer satisfaction, innovation, and growth. These are the factors that will influence future financial performance.[1].

The balanced scorecard shown in Fig. 1 covers four aspects of Walmart. The customer component attempts to increase present customer satisfaction while also attracting new customers to the organization. The financial aspect tries to increase profits while reducing losses by strengthening the indicated areas. A company's technology should be kept up to date at all times. This is where the innovation and learning component comes into play. Working to improve internal business processes boosts the company's efficiency. This will be aided by the internal business process element.

II. SOLUTION DEVELOPMENT PROCESS

A. Data Source and Data Preparation

1) *Kaggle.com*: Kaggle is an online community composed of data scientists and enthusiasts. It has a large number of free data repositories. The retail data from Walmart is downloaded as a *CSV* file from Kaggle.

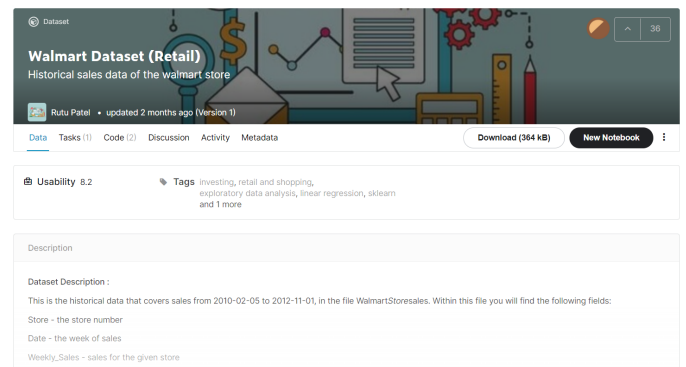


Fig. 2. All tables are now accessed in Tableau

2) *Mockaroo.com*: Mockaroo, a free test data generator, was used to generate Customer and Inventory data. Some of

the records generated include customer IDs, stock waiting to be received, and quantity on hand.

B. System workflow

We have followed several steps for connection between data and data visualization in Tableau.

1) *Service 1 - Cloud data storage:* The Walmart data created has been migrated to the cloud. We have created Walmart Database in AWS MySQL. Required tables like Customer, Inventory, Inventory category type, Sales Details, and Shipping Details are created inside Walmart Database.

2) *Service 2 - Tableau:* Connection has been established between MySQL Server and Tableau giving host name, port number and password.

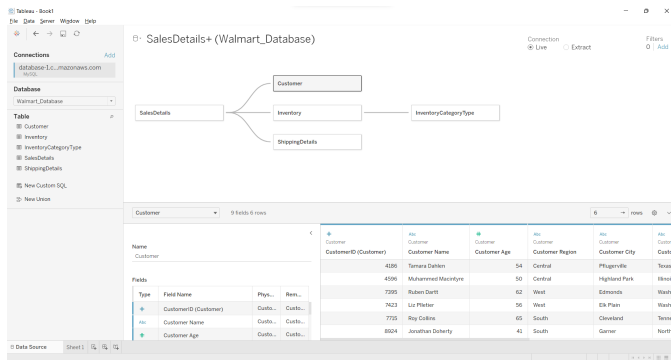


Fig. 3. All tables are now accessed in Tableau

III. IMPLEMENTATION OF SOLUTION

A. Analysis Using Dashboards And Reports Using Tableau

The following sales dashboard is the graphical representation and the overview of the sales, profit and other parameters that are crucial to fabricate an efficiently working system. The sales dashboard gives a bird's eye view of a variety of sales structure which includes state wise sales, quarterly sales, average profit and loss, shipping details, age wise profit and loss and product sales.

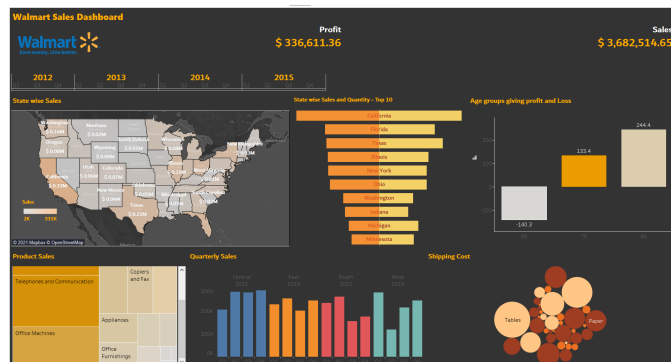


Fig. 4. Walmart Sales Dashboard

The above fig is the representation of Walmart sales analysis done on the given dataset. The dashboard provides an aggregation of various reports combined to give an overall overview

of company's operations and sales structure. This contains The KPI's (Key Performance Indicators) – Sales and Profit placed on top of the dashboard to give a quick understanding of the sales numbers in a particular year. The year band in the dashboard represents the span of years in which the sales have been occurred. The Dashboard presents a report where the State wise sales in the country by Walmart is visually depicted in the form of a map. The sales figures as per the year of sales with respect to each state is assigned to the map of the United States in million dollars currency format. State wise total sales with profits and order quantity sheets are merged into a butterfly design. A butterfly design is a type of chart. It is used to compare two different data sets having bar plot in them with single attribute in common. The x axis is shared between two horizontal bars to represent order quantity and sales at the same time. The inference from the above report

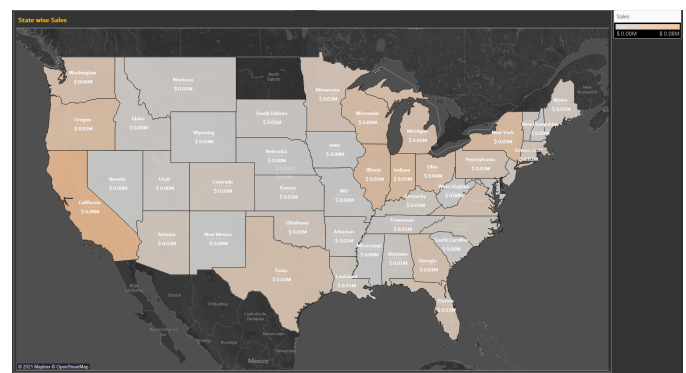


Fig. 5. State wise Sales

can be concluded by looking at the sales figures in each state. There is a clear depiction of the sales numbers as the colour code represents California being the state with highest sales value across all the years while Delaware has the least number of sales consistently. However, states for the likes of Texas, Minnesota and Washington followed California in sales performance. Another key interpretation from this report was identified to be the size of the state to the sales performance. Generally, the size of the state would correlate positively to the sales figures but here in the above report there is a key observation. The states falling under certain region namely at the West region - Montana, North Dakota, Wyoming and Nebraska have low sales figures compared to smaller states although the size of the state is sufficiently large. This could be the affect of certain events happening specifically at the region which is affecting the sales in that particular state. Thus, there is a clear indication for improvement for sales in the western region of the United States.

The next report represented in the dashboard is the portrayal of the age group of people bringing profits to the company. The below report in Fig 6 is from the year 2015 where the sales made by age group of 70 made good profits. Further, age group of 80 also made decent profits. However, there is an indication that age group of 90 showed reasonable amount of loss in sales. The reason for the loss can be understood by

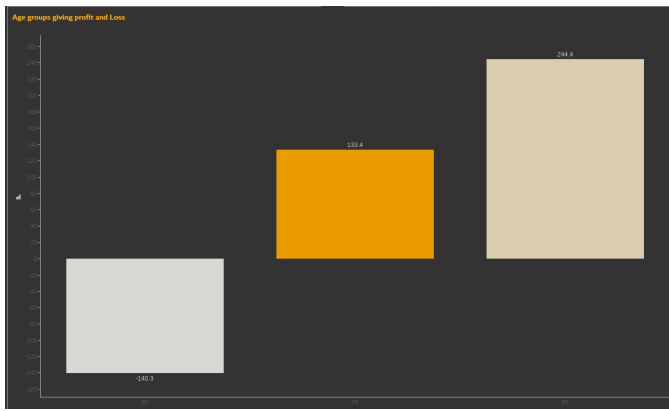


Fig. 6. Age group giving profits

looking at different factors and be given a conclusion about the reason for the loss and necessary actions can be taken to improve it.

The next report in Fig 7 the given dashboard the report representing the sales of the product sub category. The profits of these products are given in the form of tables or heat map where the colour grading of the products is given according to the profits. The products such as Tables and bookcases shoe negative profits when compared to other products which means those products are sold in loss.

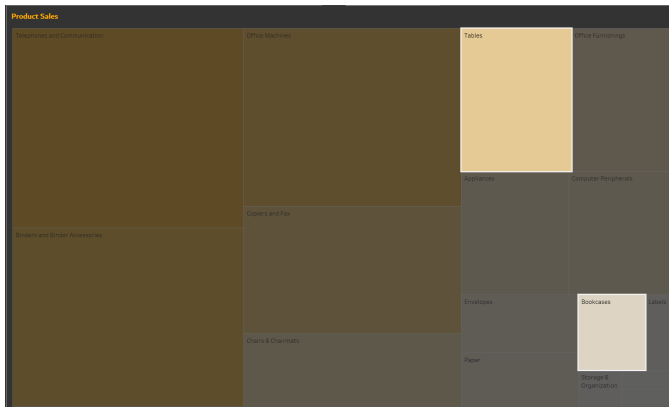


Fig. 7. Shipping costs of products

Also, the major selling products are identified by the size of the tiles and the colour. In the above fig it is evident that the Telephones and communication products were sold in good profits in the year 2015 stationary items were the least profit ones. The other report in the lower centre panel of the dashboard shows the quarterly sales graphs. The sales graphs show the sales figures in each quarter across different regions. The sales figures can be easily monitored by using the year tab to show the changes in sales figure in different years.

The graph clearly shows that across all the years and region one common underlying inference can be achieved and that is that the first and the last quarters consistently do well than the second and the third quarters. There could be a clear reason as

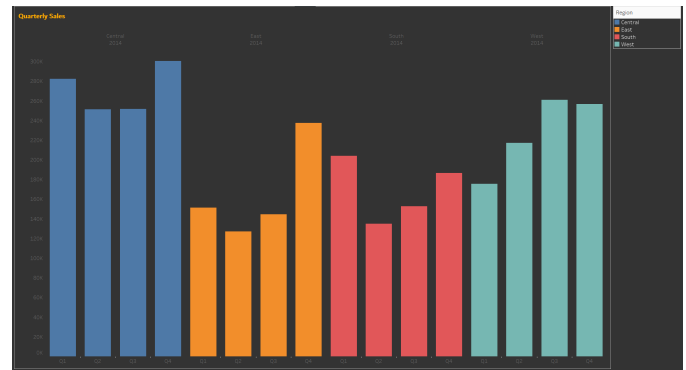


Fig. 8. Quarterly Sales

to why sales consistently drop in Q2 and Q4 and hence using these assumptions there could be a scope to improve the sales.

Further on the sales dashboard has a report representing the shipping cost and the shipping mode for different products. This is represented in the form of packed bubble graph. The colour grading in the graph represents the products that have highest to lowest shipping cost across products. The inference from this graph can be seen as Tables and Bookcases and Chair mats have sufficiently higher shipping cost.

products such as tables and bookcases. There could be a clear correlation that the shipping cost is affecting the profits for these products. Here there is also another clear indication that shipping by express air has much lower cost of shipping than the other modes of shipping or transportation for delivery of the product.

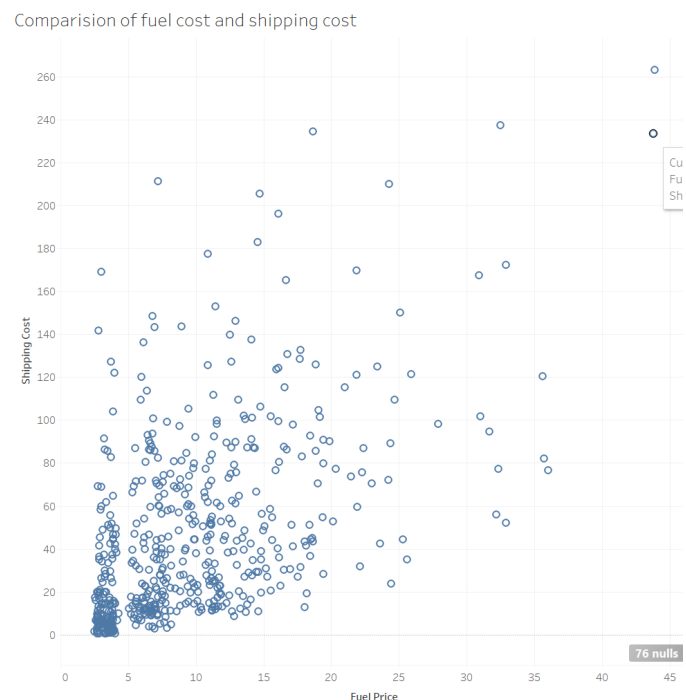


Fig. 9. Fuel cost Vs Shipping Cost

The above image shows comparison of fuel prices and ship-

ping cost. The above fig the distribution correlation between fuel and shipping cost attributes. When the fuel price increase , company automatically increase the shipping cost and at the same time when there is a decrease in fuel price , the shipping cost decreases.

But we also know that shipping cost varies with distance too. The image shows for different customers living in different regions ordering different items, the shipping cost also varied from the mentioned cases and also decrease in shipping cost for the opposite cases where shipping distance is near and ordered quantity is less.

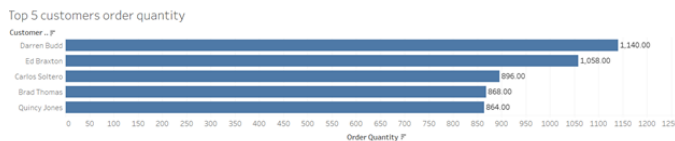


Fig. 10. Fuel cost Vs Shipping Cost

By knowing the top customers with order quantities, business can divert sales advertisement and promotions to top customer, also providing them with discounts/coupons. By estimating the order quantities from the customer, business can override its strategies for more improvement. The below figure shows the top five customers with quantities ordered in total.

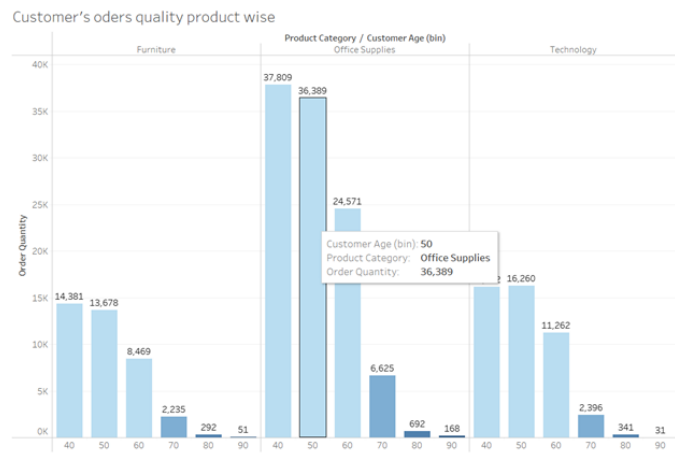


Fig. 11. Customer order quantity of products

From the above fig, the bar plot is plotted between ages of the customers and order quantity along with product category. One side of the overview show age having 40 have highest order quantity and 90 has the lowest order quantity. In the secondary overview, Product category – office supplies have highest order, which clearly states that customers have ordered more orders in office supplies.

B. Gap Analysis

Gap Analysis From the above Dashboard and reports there are clear evidences for scopes to improve business in various

functions of the organization with alignment to the factors affecting business strategies.

- 1) The states in the western region of the United States although are relatively large states have lower sales performance which could be due to any event happening specific to western states.
- 2) The tile plot and bubble plot offer a clear inference regarding the profits and shipping cost respectively. Tables and bookcases showed loss in the year 2015 whereas in the same year the shipping cost of Tables and bookcases where the highest.
- 3) The quarterly sales across regions in all years show that there is a dip in sales in Q2 and Q3 compared to the first and the last quarter.
- 4) From the reports, there is correlation in the fuel price and shipping cost. However, this particular scenario is inevitable but as the previous report interpreted there can be losses incurred with poor shipping route design where cost of fuel also plays a vital role.

C. Inventory Management

The inventory management is incorporated in the company to take care of the flow of products in the organizations inventory. The inventory is an important asset of an organization [2]. The main functions of the inventory manage is to keep track of the stocks available, the number of orders need to be fulfilled, Stocks which is need to be received for supplying, the cost price at which the stocks are bought , the total number of stocks, the sold price of the stocks , the quantity of products ordered by the customers and so on. So a better inventory management influence a good business work flow. There should be regular management of in and out flow of the products from the inventory to avoid the lack of stocks. This helps in overselling of products as the organization would be aware of what to be ordered. The lack and excess of stocks could be managed easily. It minimizes the costs by keeping track of expenses in every aspects the inventory. This helps the organization to track the profit. It supports the organization in providing a better customer experience as the ordered products could be quickly delivered at the right time. In this project the

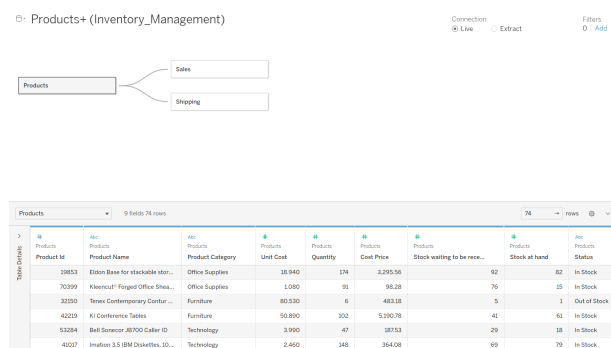


Fig. 12. Tables in the Inventory Management System

inventory management is implemented using Tableau software.

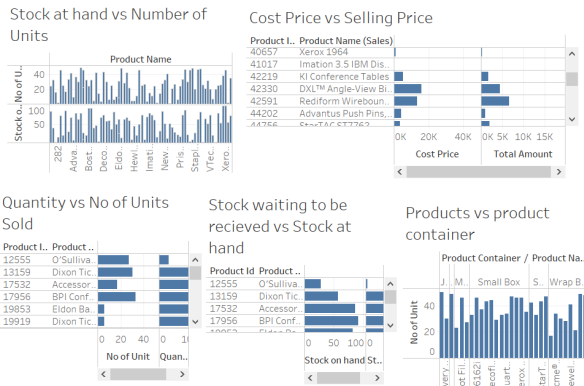


Fig. 13. Inventory Management Dashboard

Dashboards have been created to track the stocks in the inventory, the number of stocks bought, the cost price of the stocks, the sold price of the products, the numbers units sold, the containers required for the reach product,dashboard has and story has been framed which encompasses all these factors.

D. Customer Relationship Management

Microsoft's Dynamic 365 application is used for Customer Relationship Management. A CRM system's goal is to increase sales by attracting new customers, improve marketing, and conduct customer research. Walmart's CRM system will help them understand more about their target audiences and how to best respond to their demands, resulting in customer retention and sales growth[3].

1) *Lead Creation*: A lead is a potential customer for the company. It can also be an existing customer. Sources of leads for Walmart range from surveys, feedback, emails or campaigns. Potential customer mean that there is a sales opportunity.

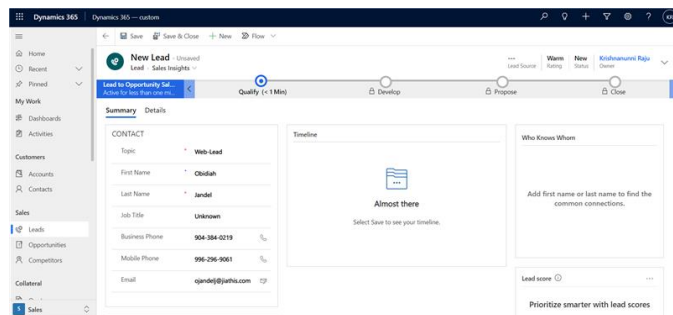


Fig. 14. Lead Creation using Microsoft Dynamic 365

2) *Qualifying the lead*: A lead can be qualified as an account, contact or opportunity. If a lead is a customer of a competitor, that can be converted into a contact and after specific time the contact can be pursued by sales team. If there is a probability of sale it can be converted into an opportunity. The lead qualification is done based on certain criteria.

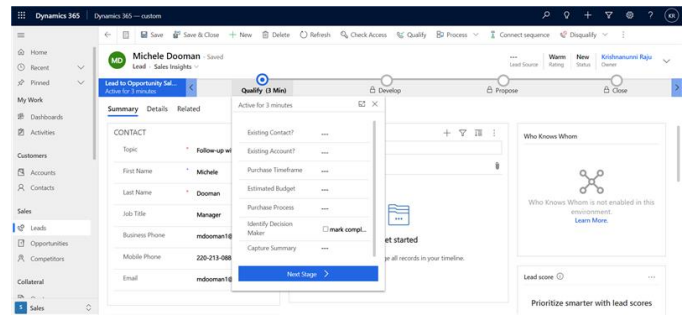


Fig. 15. Qualifying the Lead

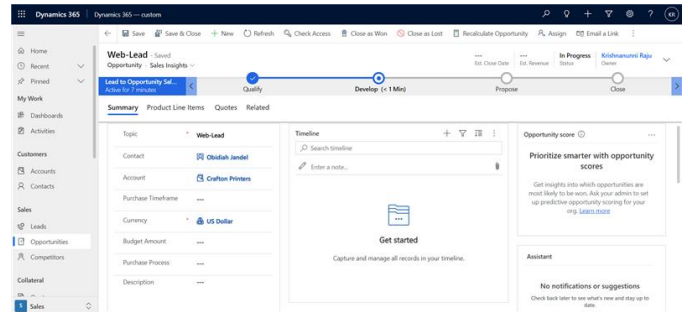


Fig. 16. The lead qualifies as an opportunity

3) *Lead Qualified as Opportunity*: If a lead is qualified, It is converted into an opportunity. Below figure shows a lead converted to opportunity. An opportunity is a lead with high probability of sale. Opportunity is associated with a contact

4) *Closing the lead*: Once an opportunity is won or lost, it is closed. If it is won, the actual revenue generated from the opportunity is added and is closed.

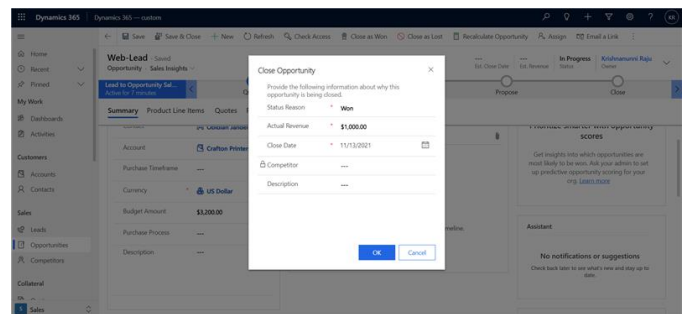


Fig. 17. The lead is won successfully

IV. BUSINESS SOLUTION

A. Internal Business Process

- 1) Implementation of a customer relationship management (CRM) and inventory management system to improve customer relationships and make better use of inventory resources.
- 2) Data sharing with CRM system and Inventory Management system by Walmart Sales team.

B. Financial

- 1) Providing discounts during Q2 and Q3 these terms in accordance with identifying an associating event such as festivals or days of significance can boost sales during these quarters.
- 2) Finding an alternative in shipping method or redesigning the logistics and delivery routes of these goods can bring a significant change in profits for Tables and Bookcases product Category
- 3) Proper maintenance of shipment vehicles to increase efficiency and redesigning delivery routes to come up with efficient delivery system would drastically reduce shipment cost leading to increase in profits.

C. Innovation and Learning

- 1) Customers abandoned carts must be saved in the system, and further analysis of the carts should aid in the identification of products that were prospective candidates for sale but were not sold. The reasons behind these products abandonment must be investigated. Customer discovering a similar product from a competitor at a lower price or customer not finding all important information about the product on the website could be some of the reasons. Walmart might expect some product sales to increase after these issues are resolved.

D. Customer

- 1) Promotional offer for papers, scissors, pens and art supplies after the holidays for school. This will improve sales during a season when such products are sold the most.
- 2) Pay special attention to influencer marketing. Every region will have a modest number of social media influencers who will promote the firm for a lower fee.
- 3) Despite having a greater population, Montana, North Dakota, Wyoming, and Nebraska have lower sales. Identify a regional event and provide discounts, as well as publicize the offer.
- 4) The states in western region can be monitored for the reason of decline in sales and certain sales strategies such as discount coupons, monthly sale offer or reduction on products highly sold in western region can be adopted to increase sales.

REFERENCES

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- [2] Adam Hayes, "The Ins and Outs of Inventory Management." Investopedia, 18 May 2019
<https://www.investopedia.com/terms/i/inventory-management.asp>
- [3] "Bain & Company". Bain, 2019,
<https://www.bain.com>

V. CONCLUSION

In conclusion, Walmart have a huge consumer base in different states of USA where we have used business analysis on the Walmart dataset which is taken from Kaggle, to get an overview of the sales and analysis used tableau dashboard. Identified the financial metrics and analytical objectives of the business. By using dashboard reports, we have proposed the different problems and provided the solution for Internal business process, to the customers and financial problems.