



Business Intelligence System

CT122-3-2-BIS

Individual Assignment

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1.0 Introduction

Business Intelligence (BI) refers to the information gathering or storage of data to get meaningful information by evaluating and transforming complex data. This meaningful data can be used to make decision in business strategies, techniques, processes (operational insight) and many more.

It is written in a report done by Cristina Lago that in 1865 the term Business Intelligence first found from a document /work named as “Cyclopaedia of Commercial and Business Anecdotes” written by an American Author Richard Miller Devens (Devens, 1865).

In that report it is also mentioned that He (Author) mentioned this term to analyze Sir Henry Furnese’s work – how he became ahead of all competitors with the help of collecting and analysing information and how he made sensible business decisions.

During the early 1950’s, BI became an independent scientific process which was then taken / adopted to analyze tactics in business by the entrepreneurs. After that, For the first time IBM invented hard disk which was that time 5 MB in case of memory storage in 1956 and which created a huge opportunity for BI to replace all the physical storage system to digital ones.

In 1958, Hans Peter Luhn (IBM computer science researcher) wrote a document which named as “A Business Intelligence System” by utilizing the Webster’s dictionary definition of Intelligence.

In this documentation He (Luhn) described a system for “selective dissemination” according to “interest profiles”. In 1960, with the invention of world first electronic calculator which was able to do the work of 50,000 people working by hand, the world saw a dramatic increase in the introduction and use of computer. In that time people could gather huge quantities of data but unfortunately there was no software or necessary tools to make this data useful or meaningful.

As during that time electronic device like computer were not that easy to buy, had no huge space like now, as it was not fast there was a huge problem in case of storage and management.

In a view to solve this problem IBM’s IMS made Hierarchical Database Management Systems (DBMS) through using on Binary trees, where there are ancestors and child records in hierarchical order like tree. As a result of this (DBMS) data become independent, more secure, and helpful in case of searching data. In 1970 while BI vendors were created some of the tools like SAP, Siebel

and JD Edwards etc. become available which made obtaining and organizing data possible and effective than before. In the meantime, first comprehensive BI system was introduced / developed by both IBM and Siebel. After that development, all the information which was collected before during 5-10 previous years, BI application started giving a good structure than before to this huge amount of data. Again, different kinds of BI software and sources were needed to obtain/ accessed data because of that there were no opportunities to extract data together, data could only extract individually.

After the end of 1970, data warehouses have been created in 1980 which main aim is to analyze and report about data. To integrate data from one or various sources, data warehouse are utilized as central repositories. In data warehouse, all the information such as current, historical etc. are keep in one single file which are used to create various departments analytical reports of a company. Data warehouse now turned to be a main part of BI. The term BI (Business Intelligence) was first coined by Howard Dresdner, of the Gartner Group using it as an Umbrella term in a view to explain “concepts and methods to improve business decision-making through utilizing fact-based support systems ((Limp, 2019).

In early 90’s the term BI considered as Business Intelligence 1.0 after the end of first generation of BI. Various company then started making various types of BI tools. From these most popular one was Enterprise Resource Planning (ERP), which was used to manage software which helps to integrates applications to control and automate details of a business. In 1993 Edgar F. Codd first introduce OLAP in business Intelligence. After the end of 1990 Business Intelligence 2.0 introduced in 2000’s which added more effective management and speed to BI development and in that time some giant like IBM, Microsoft, SAP and Oracle concentrated more in BI. They made predictive analysis which add new dimension in BI and found a new process of utilizing data, algorithms, and machine learning. Again, BI got new direction with the start of e-commerce and social media like twitter, Facebook etc. by starting of 2010, it was found that 67% of giant companies have their own-service BI whereas 35% small company use pervasive BI.

Now we already entered to the BI 3.0 and it has become a helpful application for every company starting from giant to medium, banking to IT every company relay on BI. Nowadays, BI has various types of powerful tools which can be used in different devious at a time and can also visualize the outcome to get a perfect analytical report of a company. As we face many problems

in BI while it comes to data quality in future it is assume that with the innovation of various tools BI tools will be more accessible and collaborative and these will surely increase a good number of opportunities for business as well as employer (Lago, 2018).

1.1 Company Profile

An outdoor sporting manufacturer multinational company UMS Work Cycles which focuses mainly on manufacturing high quality of bi-cycles besides that they manufacture other equipment of outdoor sports and bi-cycles too. In this manufacturer company there are three headquarters located in Bothell, Washington, United States of America, and they have nearly 310 employees who are currently working there and 29 sales representatives. The major distribution process of the UMS work cycles has been done by the retail outlets of the resellers. The resellers of this company can be found around the world including Australia, Canada, France, The United Kingdom etc. Besides resellers, it also has an option of selling their product to an individual customer by their e-commerce platform using internet.

Nowadays UMS work cycle is working on some of the issue to grab the global market as they have a bad records on selling their products for couple of years. This issue is providing the product to a customer timely, maintaining a positive environment for the customers, giving reward to the good and hard-working employment through their work and many more.

1.2 Aim

In this project our main aim is to find customer insights, their buying comparison, their patterns of buying various accessories and model at the same time their habits and behaviors and finally to see trends of markets through a good analytical statistic and visualization in a view to increase UMS sales performance.

1.3 Objective

Through this BI project our main objective is to analyze customers statical data that is demography. With the help of this, we will be able to achieve some of the solution about the information of sales department from the recent press release. Besides, it would be possible to get statical view of best-

selling model of cycle and we may also extract some information about it that is why customer like this cycle most (what makes them more comfortable) side by side it would be helpful while it comes to sales territory that is in which region we have more demand than the production whether we need to increase our reseller there or not and is our product sufficient or not. In a summary we will be finding ways to increase sales and profit, we will be trying to track the sales performance and spot market trends, we may also find success rate and what are the problems behind ahead of sales.

2.0 Methodology

For this assignment, we will be following CRISP-DM methodology. The full form of this methodology (CRISP-DM) is Cross Industry Standard Process for Data Mining. It was introduced to normalize data mining method throughout the industry. After that it become very popular methodology for data science, analytics, and data mining.

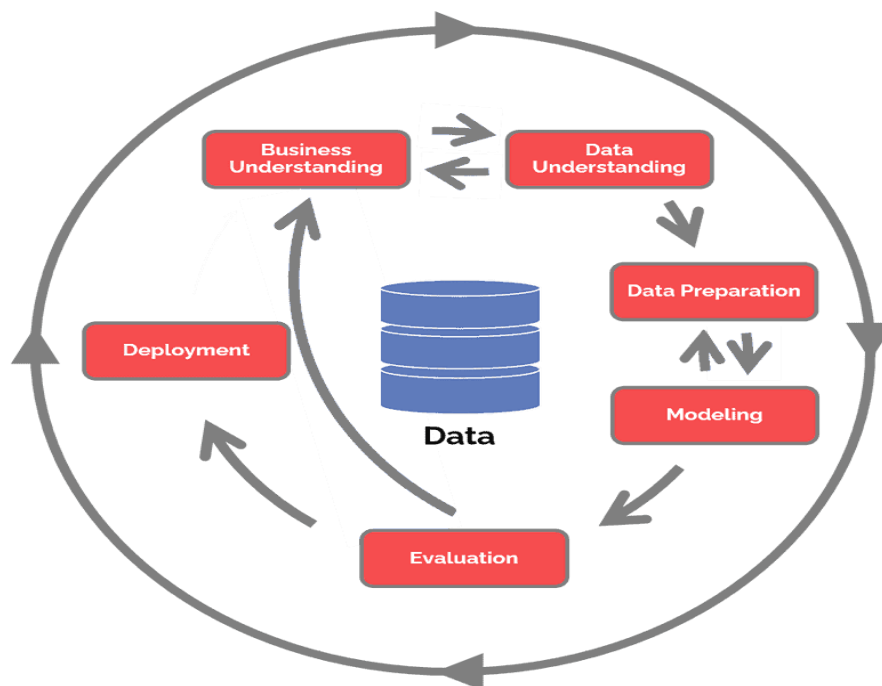


Figure 1

This methodology has six phases which are –

1. **Business Understanding** This is the first step of CRISP-DM methodology where it focuses on the knowledge of understanding the objectives and the requirement for the project. This stage is composed of documentation reading, meeting and in a view to help all the member of development team it makes relevant questions about the context. In this phase, the main aim of the project is defined before starting the project work. In an online platform name towards data science, Rodrigues (a Data layer IT professional) gave an example related to this phase which is like – This is the stage where development team should be informed what is the object (it could be increase sales, profit, revenue etc.) after this step they should understand about the behavior of client (their selling and how they sell it) (Rodrigues, 2020).
2. **data understanding** the second phase of CRISP-DM methodology is data understanding and the main objective of this steps is to know expected and achieved value from the given data. It examines the data quality in many ways for instance data governance, completeness, and distribution. In this step all the member within the development team work to find the best ways for extracting the best value from the given information. If somehow, the given data in not clear to the team, they can temporarily wait and study the data to understand the business and how it will be beneficial from the records.
3. **Data Preparation** This is the steps where data are prepared for the analysis with the help of data mining methods. In this step almost 80% of the project time are consumed in cleaning the dataset as information taken from different sources and there can be lots of records and different types of attributes so in that case most of the time there is incomplete records (attributes, row values) in real-world data, data can be noisy (outlier and invalid value), and it can also be inconsistent. This step helps to resolves various kind of data problems to make sure that the dataset which will be used for the modeling stage need to be acceptable and improved in term of quality of data because poor quality data can lead to a bed prediction.

4. **Model Building** In this stage the dataset must be in good shape so that different modeling process can be applied to address a specific business outcome. This phase has four task which are –
- a) **Selecting Modeling Techniques:** In this steps team need to specify the model or techniques that will be used in their work.
 - b) **Designing Tests:** This step focuses on the test which will be using to define the model (how accurately it works). It can be by dividing the given data in two cases one is for model training while another is for model testing.
 - c) **Building model:** This is the step where a particular business goal is addressed which can also be called as heart of the data mining.
 - d) **Assessing models:** The main objective of this steps is to review the chosen model that have been created by the team from a technical view and business view.
5. **Evaluation** The second last among all of the six steps is Evaluation in which team check if the model is up to the result and the result is valid or not. If in any case the result found to be wrong, the methodology give permission to review it from the step one so that team can understand why and where they did mistake in result.
6. **Deployment:** The last steps of the Crisp-dm is deployment in which we can find the result that has been done in present in a useful and meaningful manner and in this step by achieving result in understandable manner, goal that has been set for the particular project must be achieved.

3.0 Business Intelligence System:

In an article written on OmniSci (an online platform) that in a view to discover pattern, find future trends and draw a conclusion by doing analysis Business Intelligence technologies usually use some of the basic and advanced statistics and predictive analytics. It is also mentioned in that article, BIS is also kind of data exploration, sharing information and many more rather than only a linear practice. In BIS there are some basic functions which are – data mining, querying, data preparation, reporting and visualization of the data etc (“What is Business Intelligence? Definition and FAQs | OmniSci,” 2021).

3.1 Analytical Tools used

1.Power BI:

In the beginning of 2021, Microsoft in their website published an article about Power BI, in which they explained it as a collection of many applications, software services which will be working together to make one’s distinct data sources into a relevant, logical, and visually immersive. We can have our data as any form such as – excel spreadsheet, cloud based but we can connect our data sources and visualize it and find our pattern or make decision though sharing it with anyone easily with the help of Power Bi. They further added, while it comes to workflow in Power BI, here to do all kinds of analysis we need to begin with importing or connecting dataset from the data source where we kept the dataset on it (Power Bi) and then we can start creating our desire report. In order to view the reports to respective business users and interact the reports with them we can publish this report directly to mobile devices from our desktop (basically where we have power Bi desktop) (mihart, 2021).

Now when it comes to choosing Power Bi in our assignment to do all our finding, we have to see some of the comparison of Power Bi and other visualization tools. On 19th April (2021) Tamara did a documentation where she explained some of the comparison of power Bi with the other visualization tools. These are –

We might have to pay high price if we are going to use other visualization tools but here comes Power BI which comes at a low price. Other tools are basically made for data analytics like Tableau while it comes to power BI, it is one of the best tools to increase analytics in Business intelligence for general audience (Scott, 2021).

2. Microsoft Visual Studio

In order to develop console, web, mobile and many more types of applications an IDE has been developed in 1997 by Microsoft which name was visual Studio 97 which later updated into visual Studio 15.0 which we are using now. Different kinds of development software such as – windows store, API etc. can be used by Visual Studio to build business idea, manage code and many more (“Introduction to Visual Studio - GeeksforGeeks,” 2018).

In 2017 Koen (an award-winning BI professional) published an article, in his opinion to build various kinds of property values easily we can use Visual Studio. Again, the value of the properties will easily change if we change somethings in configuration. For example: if we want to have any new attributes or calculations in our power BI, we just need to have a quick change in our visual studio server and deploy, new value will automatically add into power bi so that we do not have to do any other configuration or import anything in server and deploy it every time (“MSSQLTips Author Profile - Koen Verbeeck,” 2017).

3. SQL Server Management Studio (SSAS)

SQL server Management Studio (ssms) is a kind of query tools which provides us many functions including SSAS OLAP cubes, model of data mining, SSIS package and so on and so forth. To manage server illustration and databases collectively we usually connect to analysis services in SSMS. In SSMS we can run different kinds of queries like XMLA or MDX if we need to conduct administrative works. In SSMS we got some of the benefit while it comes to loads database because with the help other tools and application, we can have only load databases when a query is dispatch but in SSMS, when we connect to server it loads all the databases which means all the numerous databases are automatically loaded into system memory if we got more than one tabular databases if we connect it by using SSMS.

4.0 Business Intelligence Solution (BI Solution)

4.1 Data Source (Microsoft SQL Server)

A data source is basically the location of a file (data file) from which we can import data. This data can be in any kind of format and the source can be anywhere if program can import it and can understand it how to read. In visual studio data source helps to connect with Microsoft SQL management server. It also keeps all server information for our database.

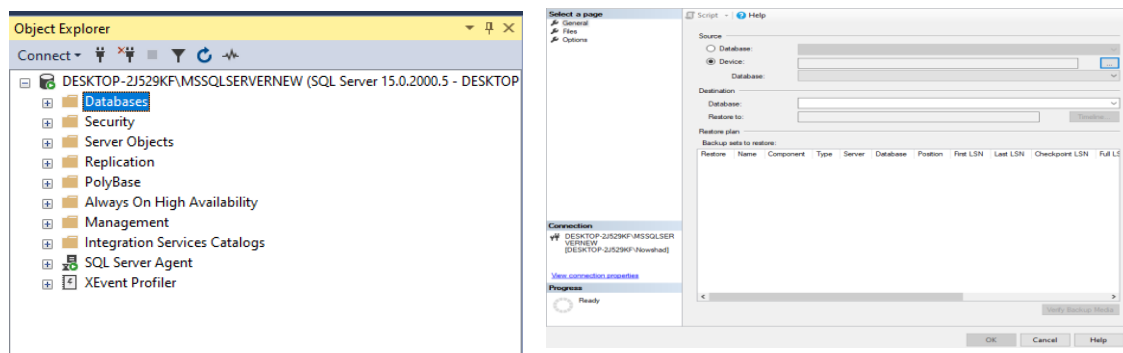


Figure: 2

In the above figure 2 it shows how we imported our dataset. Here to import this dataset, firstly we need to right click the database and then new window will pop up in which we need to select from where we want to import dataset. As instance if our dataset is in our desktop, we need to click the radio button which is besides device. While we will select device than we can browse it and can add data from our desire location which is shown is figure 3. And after importing now the data set is ready to import this in visual studio as multidimensional and data mining analysis.

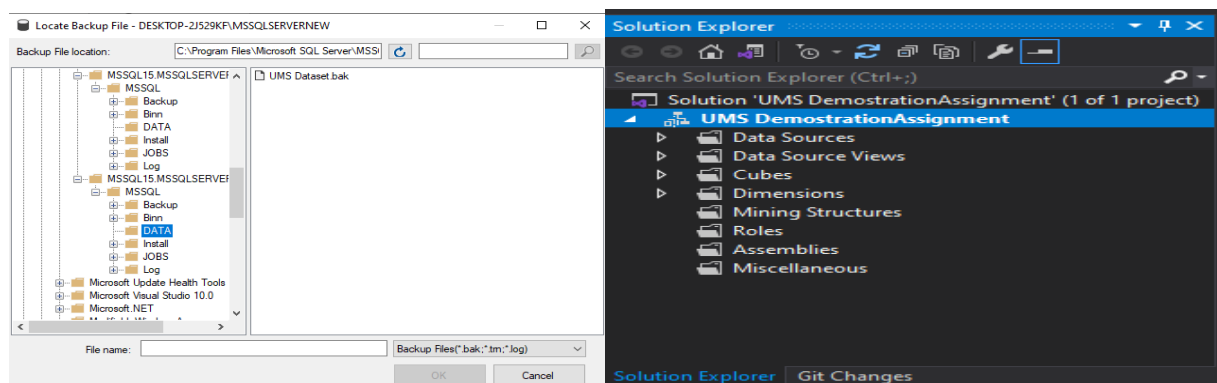


Figure: 3

4.2 Data Source View

A data source view is a path which contains metadata, and it represents particular or selected dataset information from one or more than one data source. To be more exact, it's generally a filtered version of main data source where only relevant table need to be included. In this figure 4 which shown below it (data source view) contains only relevant tables while main data source contains all tables. Here by relevant data, we mean the table which we are going to used to perform visualization. In our dataset, most of the dim table are relevant while in measure we have only two relevant table. These are – factInternetSales and factResellerSales.

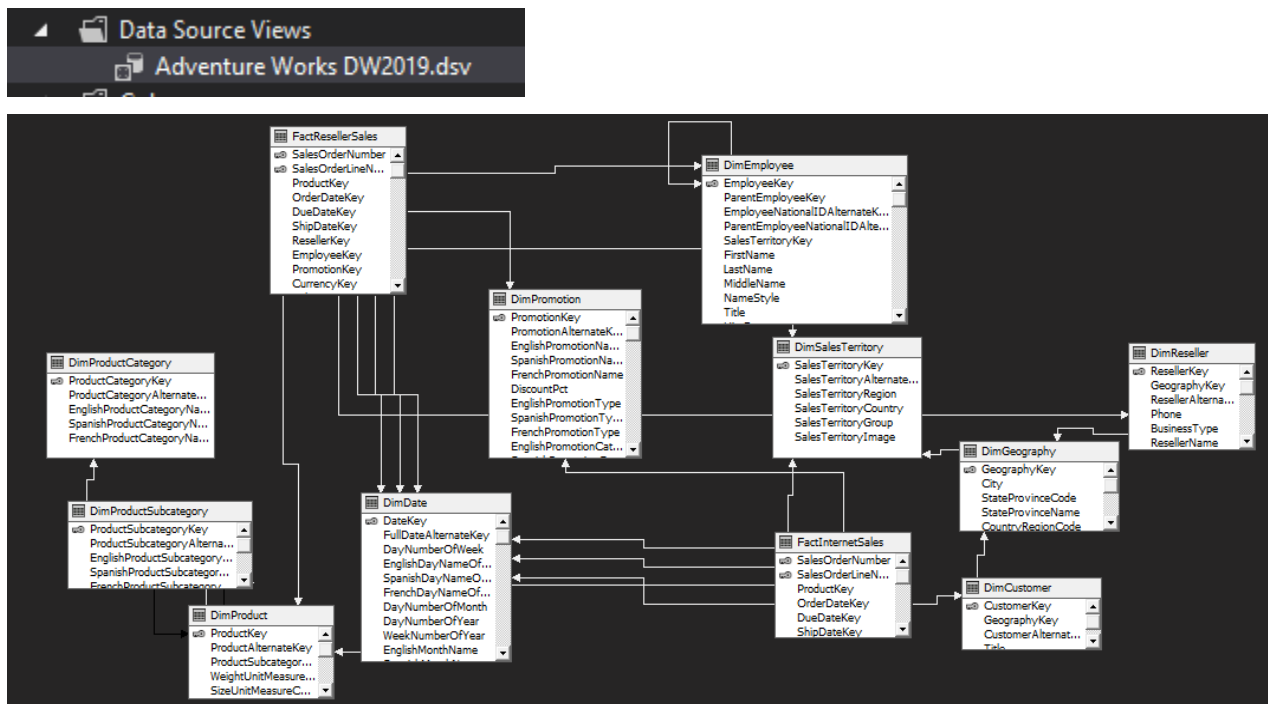


Figure: 4

4.3 Cube Structure

It helps to connect with other software like Power BI and all parts of the cube will make available to that software for visualization. In the figure 5 it shows what dim table going to use for visualization purpose and what fact table what have available for the visualization. As mentioned before there are only two fact table which will be used as measured these are fact internet sales and resellers sales.

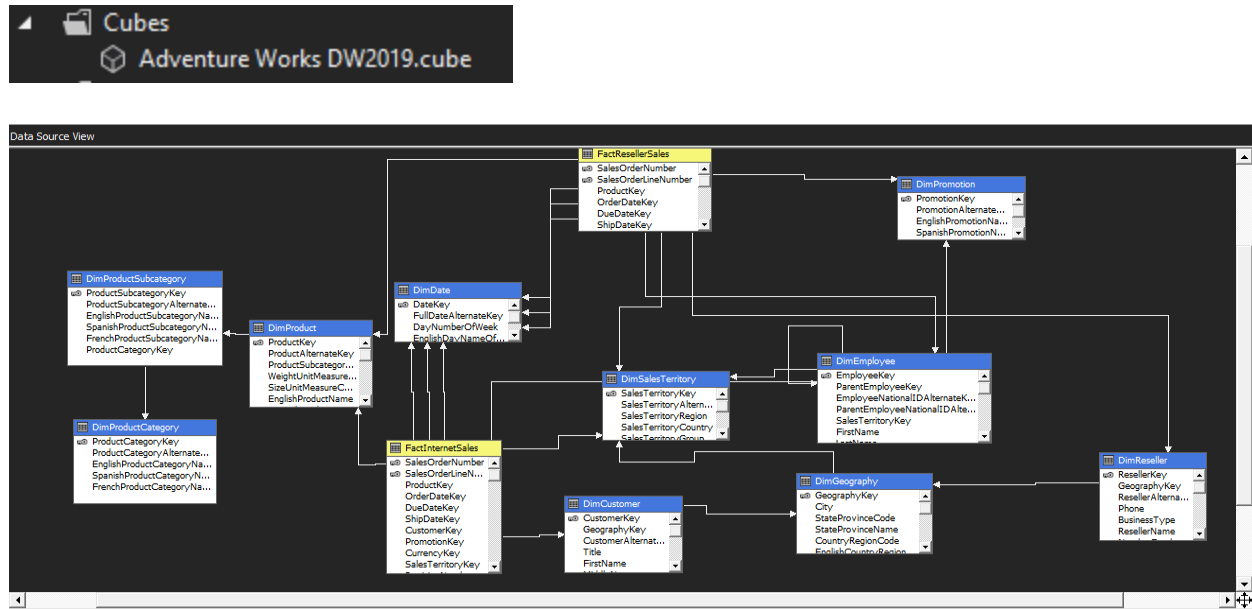


Figure: 5

4.3.1 MDX Calculations:

As stated in Microsoft documentation by Minewiskan in 2018 that MDX refers to multidimensional Expression which is used to do calculation of a calculated member. When we do calculation of one or more selected tables it doesn't increase the size of the cube as everything are stored within the cube. We can use calculated members for any dimension (Minewiskan, 2018). The dataset, which was given for this particular assignment, here we can only measure all the columns that are within the fact internet and resellers sales tables. To do so first we need to select the calculation option by clicking dataset within the cubes which is shown in the figure 6.

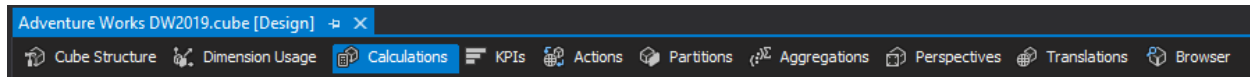


figure 6

After selecting calculation option from cube datasets now it time to do calculation. We can do this by clicking on the empty space in script organizer part, a new window will pop up after clicking, now select new calculated member option as shown in figure 7. After that now you are set to do calculations.

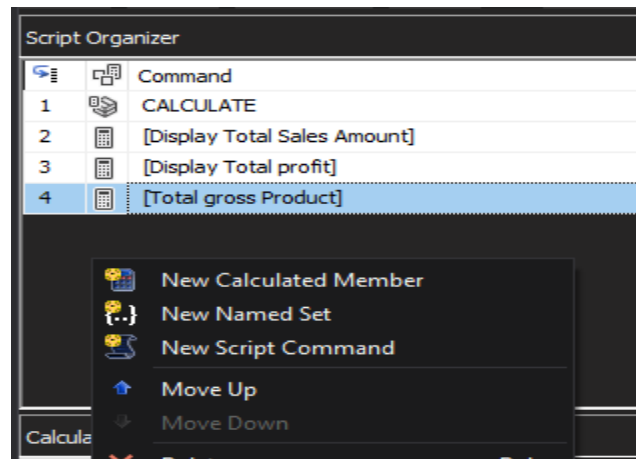


Figure 7

In this dataset I did only three calculation using fact internet sales and fact resellers sales table. From these two tables I used sales amount and fact reseller sales column for measuring “total sales amount” shown in calculation 1. For measuring total profit, I used sales amount, Fact resellers sales, total product cost and tax amount which is mentioned in calculation 2. And lastly to measures total GDP of the company I used same column except tax amount column which we can see in calculation 3.

[Measures]. [Sales Amount] + [Measures]. [Sales Amount - Fact Reseller Sales]

Calculation no – 1(Total sales amount)

$$([Measures]. [Sales Amount] + [Measures]. [Sales Amount - Fact Reseller Sales]) - ([Measures]. [Total Product Cost] + [Measures]. [Total Product Cost - Fact Reseller Sales] + [Measures]. [Tax Amt] + [Measures]. [Tax Amt - Fact Reseller Sales])$$

Calculation no – 2(Total profit)

$$((([Measures]. [Sales Amount] - [Measures]. [Total Product Cost])/[Measures]. [Sales Amount]) + ((([Measures]. [Sales Amount - Fact Reseller Sales] - [Measures]. [Total Product Cost - Fact Reseller Sales])/[Measures]. [Sales Amount - Fact Reseller Sales]))$$

Calculation no – 3(Total GDP)

4.4 Usage of Dimensions ()

In dimension part we need to select all the relevant dimension table which we will be going to use for the visualization part. If we select any table and from that table if we select any attribute than this attribute from that table will be available in our visualization tools. For this dataset visualization we will be having some of the table for visualization which are shown in figure 8.

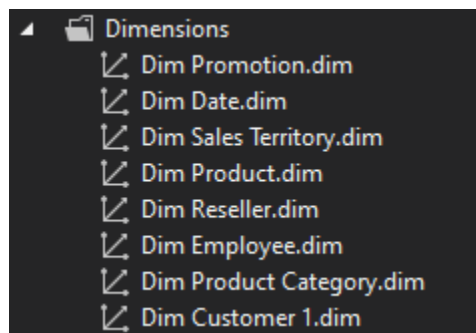


Figure 8

Now if we want to visualize any column of any table, we need to select that table and we can see all attributes that are available in that table and now we need to select that attribute that we want

for our visualization purposes. For instance – suppose I selected “Dim Promotion” Table we will see all its column which can be seen in figure 9. Now our job is to select and drag this attribute to the part attribute seen in figure 9 with yellow mark.

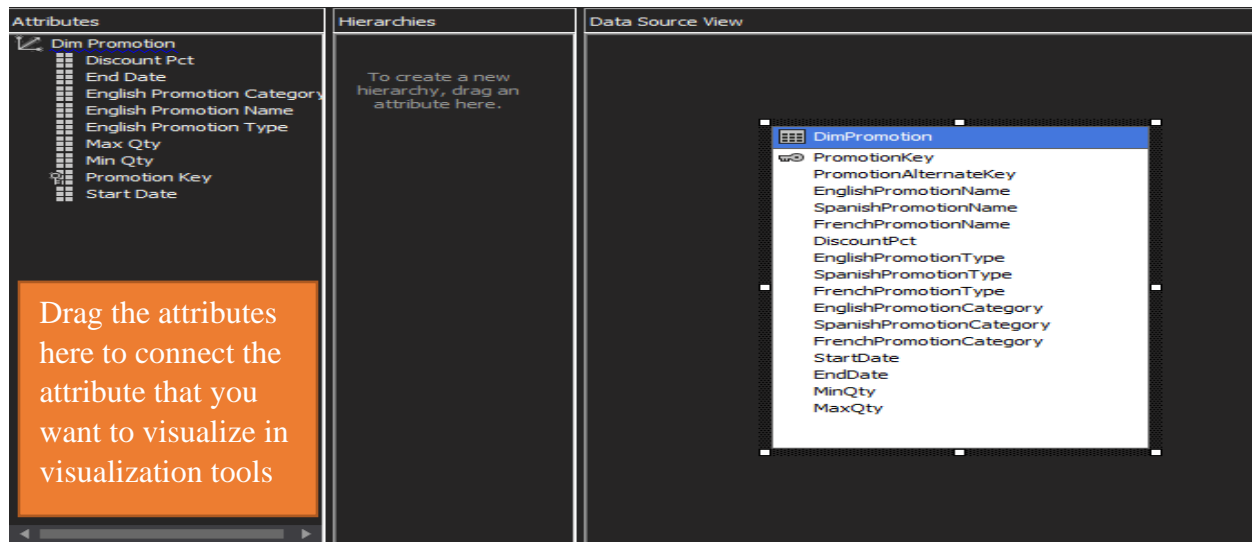


Figure 9

5.0: Business Intelligence Report:

After building and deploying dataset in visual studio we can see all the column that we have selected for visualization from dimension part and measure tables that we had in cube part in our visualization tools. Here power Bi is the selected visualization tools and all the measures and dimension that have been selected for visualization can be seen in figure 10.

Place mark with red box will be used as measures table other than that all are dimension table



Figure 10.

Report 1

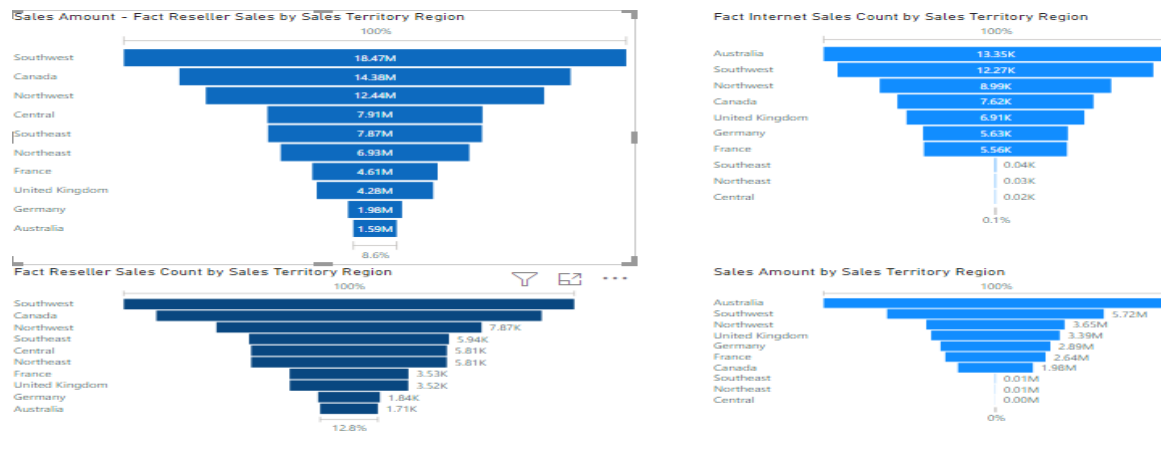


Figure 11

From the above figure 11 we can see it shows that total amount of sales of both e-commerce and resellers sales. It shows the total amount of sales in every individual place. Here we can also see some co-relation and pattern between sales amount and territory region in both sales process (e-commerce and resellers). Now to be more exact about the relation and pattern lets divide this figure into section.

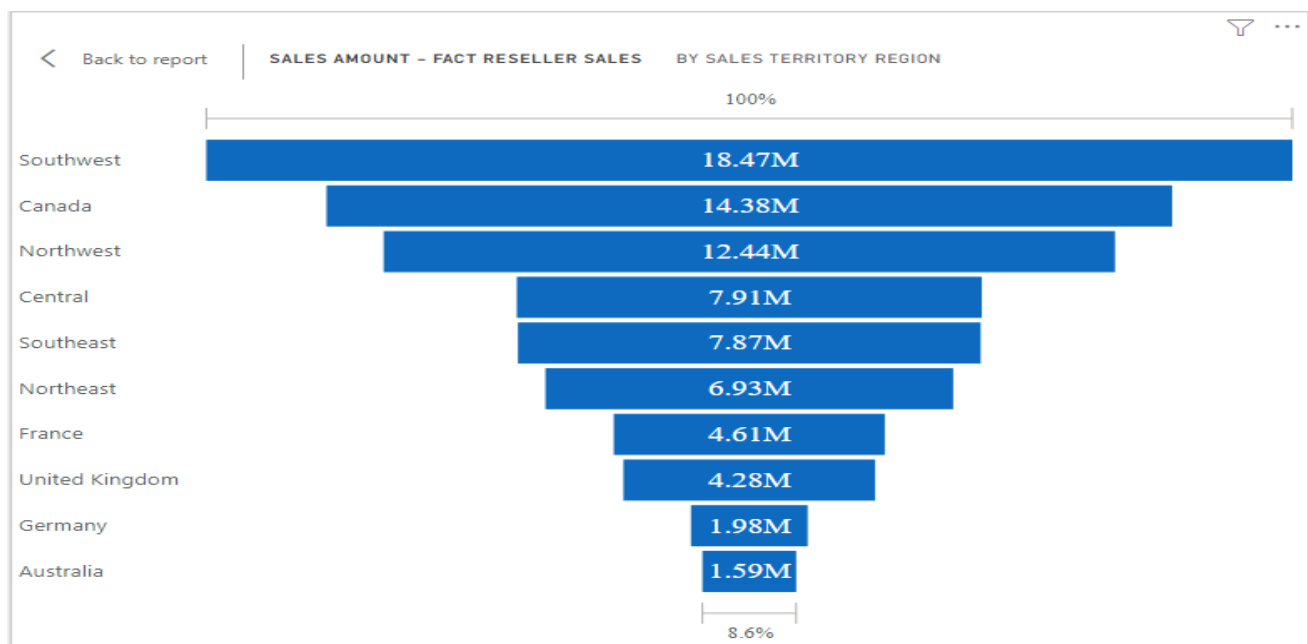


Figure 12

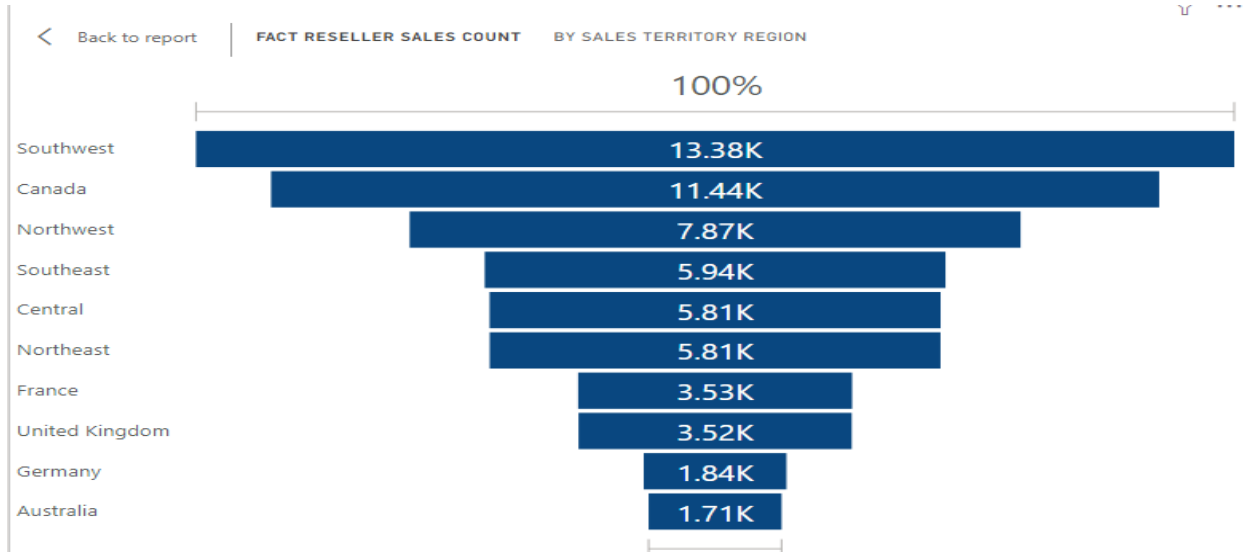


Figure 13

In these two figures we can easily see sales amount depends on resellers amount. For instance – We can see in figure 12 highest sales amount is in southwest which is about 18.47 million and the greatest number of resellers are also in Southwest that is 13.38k. In that way we can see the more the resellers the more the sales amount and the smaller number of resellers has a smaller number of sales amounts like Australia which are 1.71 thousand and 1.59 million respectively. Again, as we can see place where there is a smaller number of resellers, there is a low trend of sales amount it may be because of not knowing this bi-cycle brand in that area or maybe because of less popularity. So, to solve this problem in that particular region we can create more resellers or popularity. In 2019 Spagnolabarba wrote an article amount perfect marketing strategies on bi-cycle business where he mentioned less popularity can decrease sales amount as well as profit although ones provide a high-quality product and services.

To overcome this problem, he further mentioned some of the ways to increase brand popularity and as well as to increase sales amount. In his opinion before doing advertisement of a company first we need to give priority to the customers. First of all, we have to identify our local customers and what they want. For example – some customers like classic bi-cycle while some like sports. So that by product we need to make him satisfy on our product. As every customer are different from each other. Offering discount or give some of the interesting ways to get discount will be a

good way to start popularity and fame of the company. He further gave one example on how one can give discount in a bi-cycle company to increase their name and fame in a region. Example is – we can have a special offer for the students who would take our bi-cycle. Besides we can also give them a maintenance and makeover of bike at a low price. In that article he also mentioned another way to get reach to the people about ones bi-cycle company is to arrange a “go green and ride” campaign. It is basically creating awareness to a particular community health and how we can be benefited by a bike (spagnolabarbara, 2019).

Let us see the relation and pattern between sales count and sales amount that are sold by e-commerce platform.

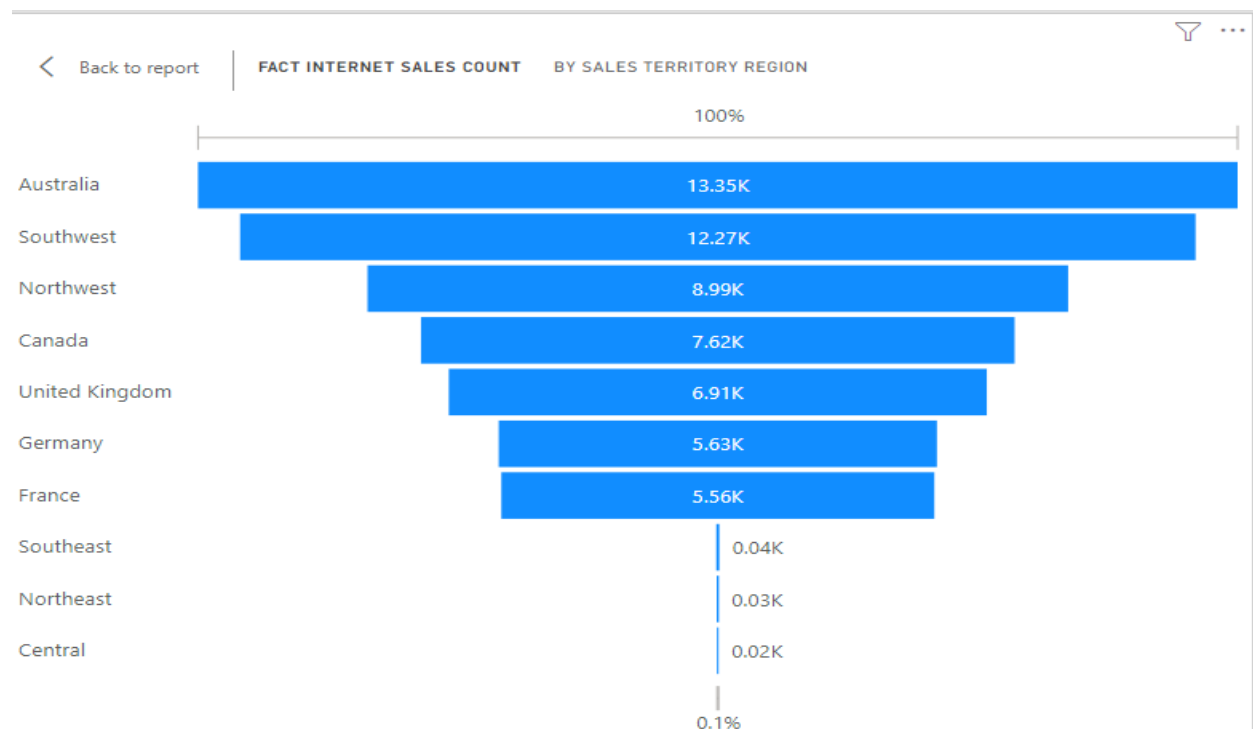


Figure 15

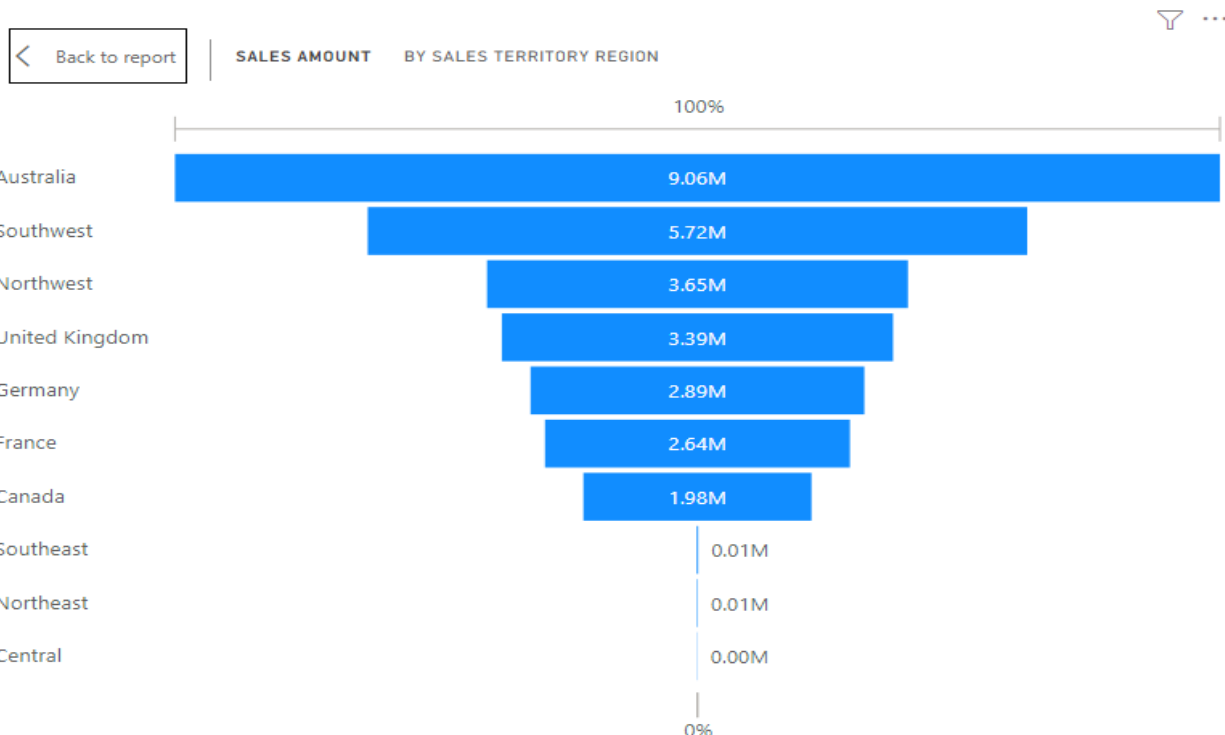


Figure 16

In figure 15 and 16 we can see a good relation between sales count and sales amount. As mentioned in resellers, internet sales count also bears the similar trends and here in figure 15 and 16 it can be seen that in Australia and Southwest we have the highest sales amount which are 9.05 and 5.72 M as these two have the highest number of sales counts that is 13.35 and 12.27 thousand respectively. Now when it comes to solution, we can increase our sales count and there is no other better way except giving focus on social media while it comes to e-commerce platforms to get reach to the customers. In 2018, Sarah published an article in an online platform where it mentioned how social media can generate sales and how it could help a company to get reach of the people easily. In this article it is noticed that to get reach to people a company can create an online page on Instagram, twitter and on Facebook to inform their daily interesting fact to the customers as almost 4.48 billion people are engaged in social media every time. Through these pages, a customer can easily get in touch with the salesperson who deals with e-commerce sales. Side by side to attract customers a company can also arrange an online contest involving the whole cyclist community of a country and can arrange prize for the winner in which a company can build a reputation. And in that way, we can increase our online sales too (sarah, 2018).

Report 2

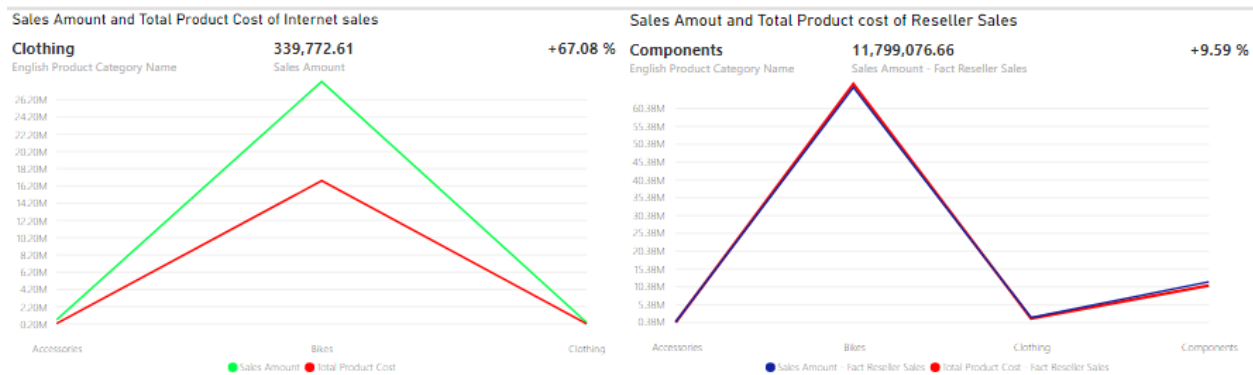


Figure 17

The above line graph shows difference between sales amount and total product cost of four types of products which are bike, accessories, clothing and component. Though UMS based on manufacturing bi-cycle, beside that that they also manufactured some of the accessories, component of bi-cycle and making cloth and in which we can see a great potential in term of selling and making profit.

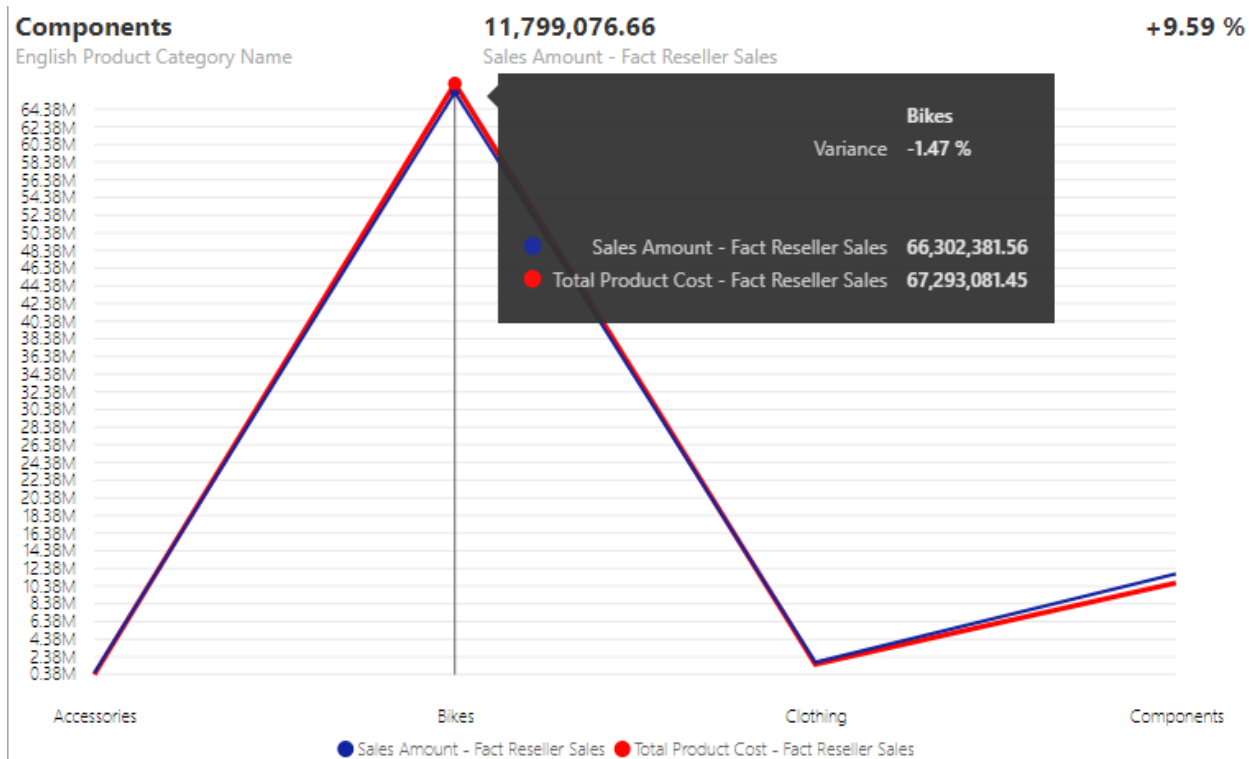


Figure 18

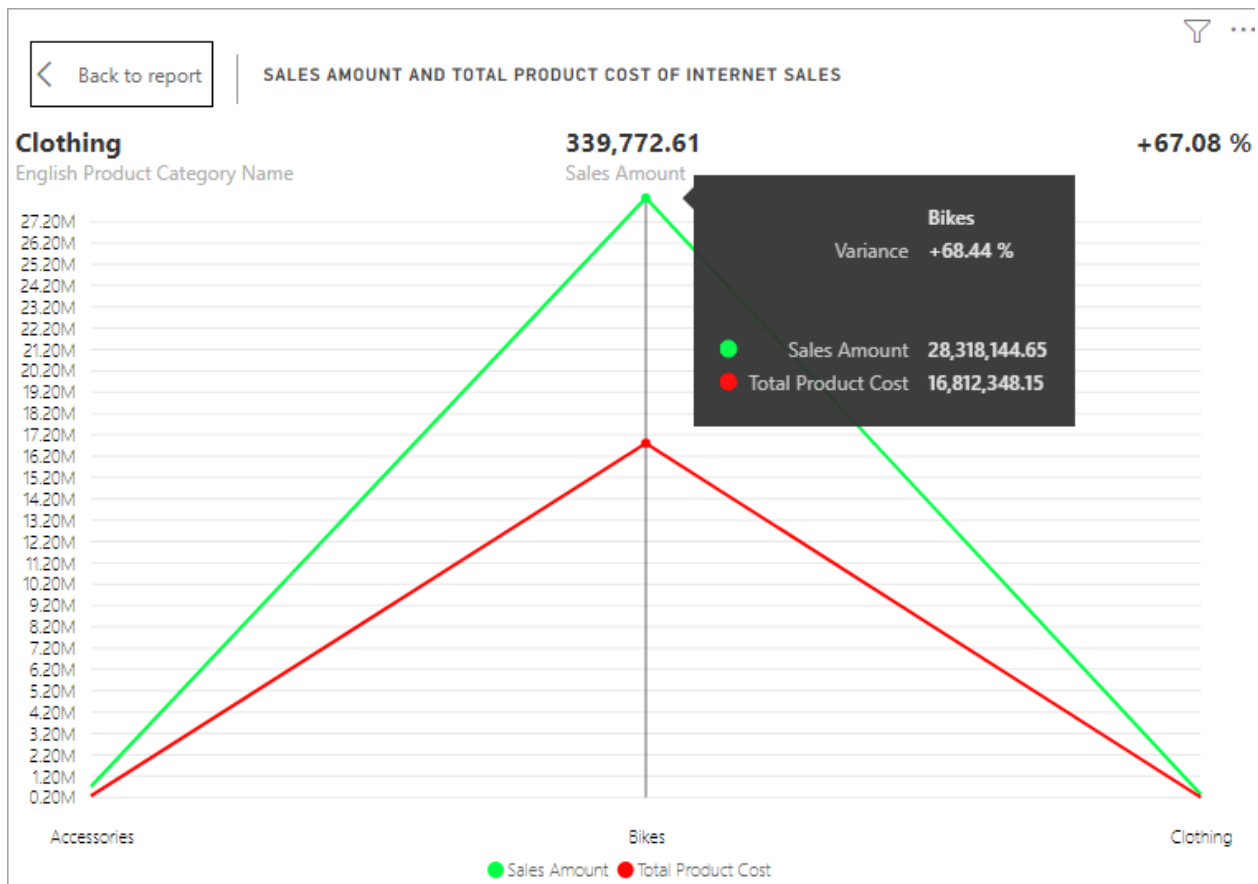


Figure 19

In the above line graph 18 and 19 we can see total product cost and sales amount of bike in internet sales and resellers sale. In figure 18 we can see though the product cost is too high, but the sales amount is lower than the product cost which is almost 1.47% or 0.991 million low. While in e-commerce platform this trend is different. Here sales amount is nearly 68.44% higher than the total product cost that is 28,318,144,65 Million.

[Back to report](#)

SALES AMOUNT AND TOTAL PRODUCT COST OF INTERNET SALES

[Back to report](#)

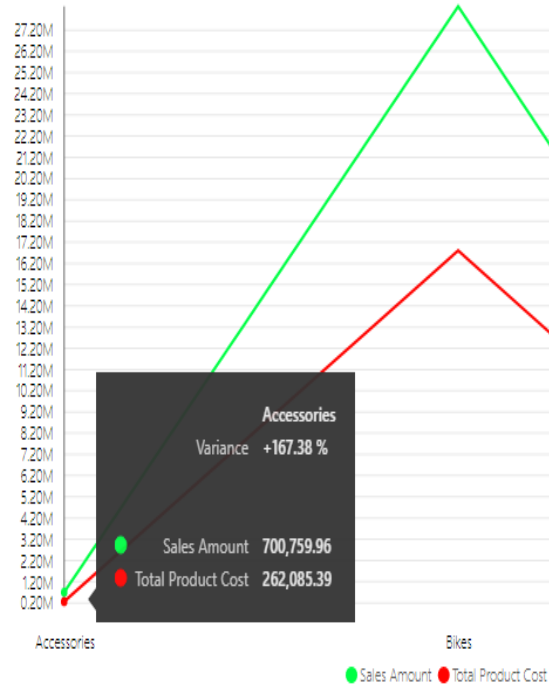
SALES AMOUNT AND TOTAL PRODUCT COST OF RESELLER SALES

Clothing

English Product Category Name

339,772.61

Sales Amount



Components

English Product Category Name

11,799,076.66

Sales Amount - Fact Reseller Sales

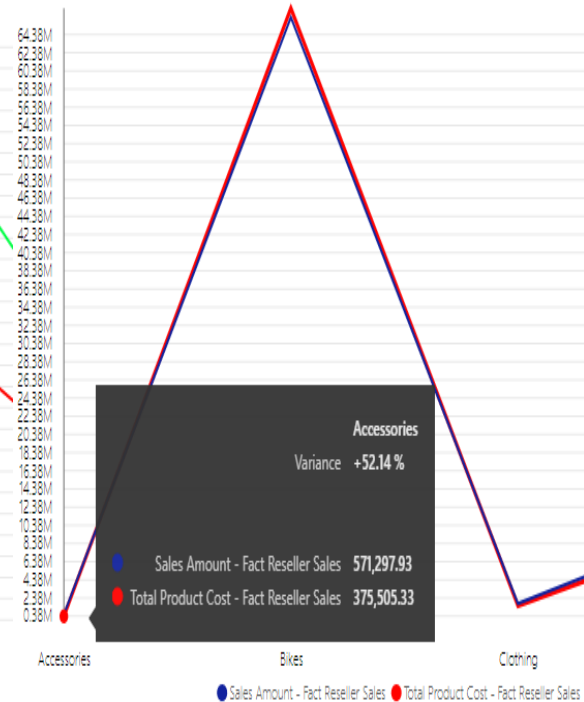


Figure – 20(Internet sales).

Figure – 21(resellers sales)

In the figure – 20 and 21, if we notice we can see in both section that is fact resellers and internet sales they make profits by selling accessories. In e-commerce platform the make more than 3 times profit if we see the difference between sales and product cost which is 700,759.96 and 262,085.39 respectively. Again, in resellers section, they also make profit by selling accessories which is 52% of product cost through they manufacture only limited accessories compare to bike.

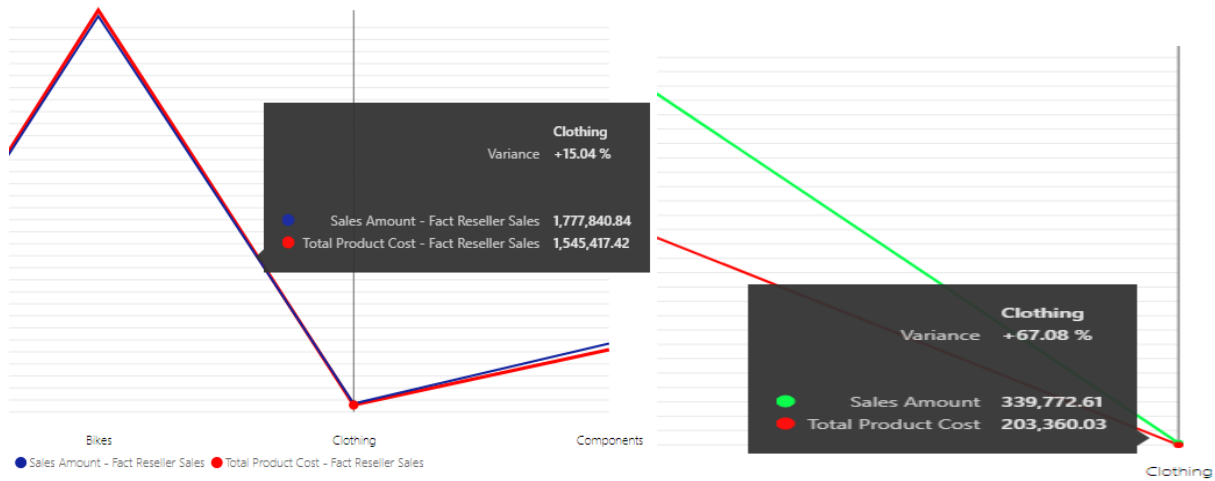


Figure – 22(Reseller's sales).

Figure – 23(Internet sales)

The figure 22 that is resellers sales shows they have 15.04% higher sales amount than the cost and they manufacture a very limited amount of cloth which is also similar to figure 23(internet sales) where they make a good amount of sales that is 67.08 % higher compared to product cost, they have very low amount of cloth manufacture.

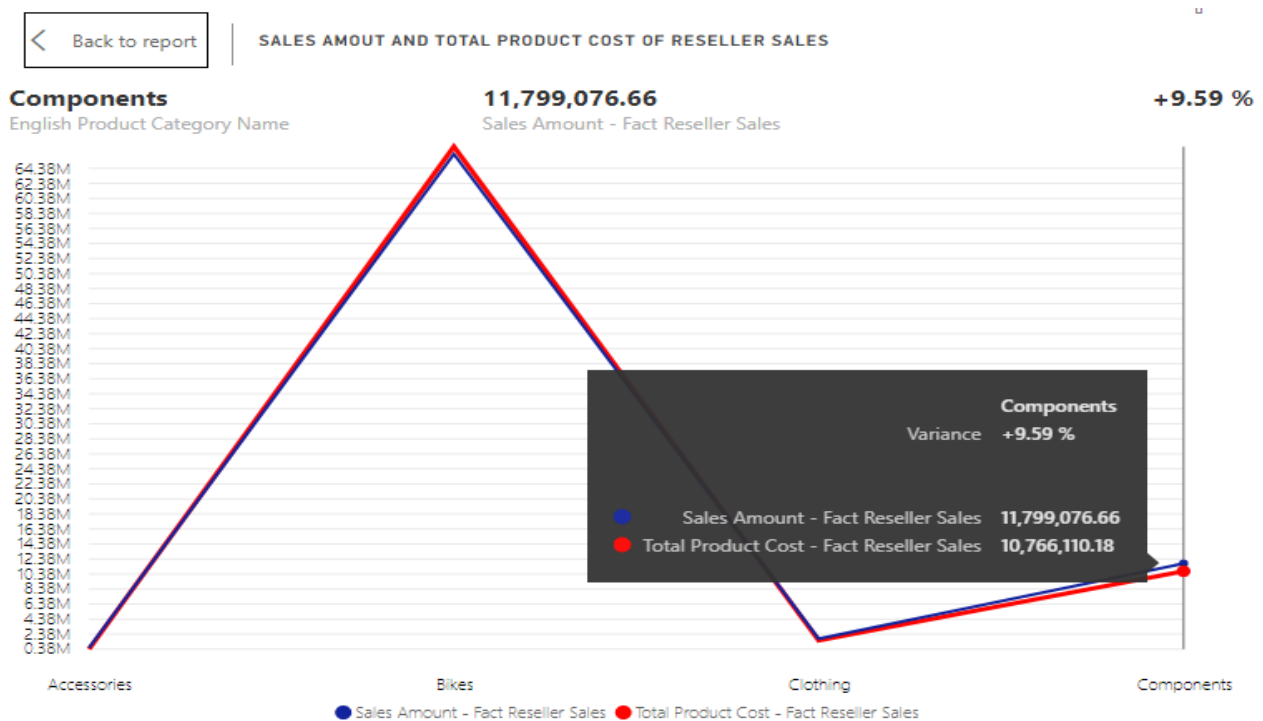


Figure 24

In this line graph it is clearly noticeable that the resellers have 9.59% higher sales amount in their component product cost. They manufactured very a smaller number of component and in e-commerce platform they even don't have any section for selling component of bicycle like gear, wheel etc.

So, from all the graphs shown above from figure -17 to figure 23 it is very clear that they have a smaller number of options to sell their product in internet compared to resellers but unfortunately, they make good profit from e-commerce platform. In 2015 an online platform (fundivo) makes an article on strategy of bi-cycle business where it explained how a company can increase their sales amount and revenue by having presence on online. It mentioned every reseller or bike shop should have their own website where they can provide every detailed of a product, how one can buy it and other related service offers. They should make sure that they can provide any product if someone willing to buy anything from them ("6 Proven Marketing Tips for Bike Shops to Boost Your Business | Fundivo," 2015).

On the other hand, company can also focus on making other three products that is accessories, component, and clothing. Recently on 28 April 2021 an online platform named as Market watch made a report about the growth of the bi-cycle accessories where we can find the market of bi-cycle accessories is increasing day by day ("Bicycle Accessories Market Share Analysis, Key Growth Drivers, Challenges, Leading Key Players Review, Demand and Upcoming Trend by Forecast to 2027," 2021). In another report made by Cision (a website), It says some of the accessories of bi-cycle such as- helmet, bottle has a good significant rate of growth in global bi-cycle accessories market. It also mentions in that website that, in 2018 the market value of bi-cycle accessories globally was around 13 billion US dollars which also has a great potential to grow its market value in future by 7% (Persistence Market Research Pvt. Ltd, 2019).

Report 3.

Birth Date	Display Total Sales Amount	Display Total profit
	\$80,450,596.98	(\$5,965,565.00)
2/10/1916	\$80,450,724.26	(\$5,965,495.51)
2/9/1917	\$80,450,625.96	(\$5,965,549.18)
6/5/1917	\$80,450,682.46	(\$5,965,518.33)
9/20/1917	\$80,450,660.95	(\$5,965,530.08)
2/11/1918	\$80,450,703.24	(\$5,965,506.99)
11/8/1918	\$80,450,604.26	(\$5,965,561.03)
2/14/1919	\$80,450,650.45	(\$5,965,535.81)
3/10/1919	\$80,450,768.25	(\$5,965,471.49)
11/14/1920	\$80,450,675.96	(\$5,965,525.44)
1/2/1922	\$80,450,604.26	(\$5,965,561.03)
4/10/1922	\$80,450,660.95	(\$5,965,530.08)
6/6/1922	\$80,450,621.97	(\$5,965,551.36)
4/14/1923	\$80,450,657.45	(\$5,965,531.99)
8/16/1923	\$80,450,603.26	(\$5,965,561.57)
11/16/1923	\$80,450,685.96	(\$5,965,516.42)
10/5/1924	\$80,450,610.96	(\$5,965,557.37)
12/3/1924	\$80,450,637.20	(\$5,965,543.04)
2/23/1925	\$80,450,659.93	(\$5,965,534.19)
8/25/1925	\$80,450,682.46	(\$5,965,518.33)
1/10/1926	\$80,450,660.95	(\$5,965,530.08)
Total	\$109,809,274.20	\$3,766,624.41

Table – 1

The above table -1 it shows the overall sales performance and profits that has been done from the people of all ages group. Here in the given dataset, we have customers from age 35 – 105 years old that is customers whose date of birth is 1916 – 1986 some of them can be death also. Now if we group this people into some age limit such as sales amount or profit that has been made from people whose age over 60 years.

Birth Date	Display Total Sales Amount	Display Total profit
	\$80,450,596.98	(\$5,965,565.00)
2/10/1916	\$80,450,724.26	(\$5,965,495.51)
2/9/1917	\$80,450,625.96	(\$5,965,549.18)
6/5/1917	\$80,450,682.46	(\$5,965,518.33)
9/20/1917	\$80,450,660.95	(\$5,965,530.08)
2/11/1918	\$80,450,703.24	(\$5,965,506.99)
11/8/1918	\$80,450,604.26	(\$5,965,561.03)
2/14/1919	\$80,450,650.45	(\$5,965,535.81)
3/10/1919	\$80,450,768.25	(\$5,965,471.49)
11/14/1920	\$80,450,675.96	(\$5,965,525.44)
1/2/1922	\$80,450,604.26	(\$5,965,561.03)
4/10/1922	\$80,450,660.95	(\$5,965,530.08)
6/6/1922	\$80,450,621.97	(\$5,965,551.36)
4/14/1923	\$80,450,657.45	(\$5,965,531.99)
8/16/1923	\$80,450,603.26	(\$5,965,561.57)
11/16/1923	\$80,450,685.96	(\$5,965,516.42)
10/5/1924	\$80,450,610.96	(\$5,965,557.37)
12/3/1924	\$80,450,637.20	(\$5,965,543.04)
2/23/1925	\$80,450,659.93	(\$5,965,534.19)
8/25/1925	\$80,450,682.46	(\$5,965,518.33)
1/10/1926	\$80,450,660.95	(\$5,965,530.08)
Total	\$86,141,673.02	(\$4,056,014.35)

Table – 2

Birth Date	Display Total Sales Amount	Display Total profit
2/22/1961	\$80,461,780.97	(\$5,961,748.05)
3/2/1961	\$80,453,430.72	(\$5,964,619.47)
3/3/1961	\$80,451,731.45	(\$5,965,243.16)
3/10/1961	\$80,459,671.27	(\$5,962,670.65)
3/11/1961	\$80,452,355.24	(\$5,965,051.33)
3/14/1961	\$80,456,697.58	(\$5,963,708.23)
3/17/1961	\$80,456,650.33	(\$5,963,734.03)
3/21/1961	\$80,454,994.56	(\$5,964,202.13)
3/24/1961	\$80,457,661.32	(\$5,963,397.04)
3/31/1961	\$80,455,354.67	(\$5,963,704.11)
4/1/1961	\$80,453,059.53	(\$5,964,832.13)
4/3/1961	\$80,450,637.20	(\$5,965,543.04)
4/4/1961	\$80,453,072.93	(\$5,964,854.27)
4/7/1961	\$80,454,507.88	(\$5,964,422.88)
4/8/1961	\$80,467,332.20	(\$5,960,103.89)
4/10/1961	\$80,463,418.10	(\$5,961,288.69)
4/11/1961	\$80,450,691.46	(\$5,965,513.42)
4/12/1961	\$80,450,713.82	(\$5,965,504.77)
4/13/1961	\$80,454,430.17	(\$5,964,305.10)
4/14/1961	\$80,450,708.93	(\$5,965,523.67)
4/15/1961	\$80,472,581.56	(\$5,958,543.83)
Total	\$88,179,094.93	(\$3,398,162.91)

Table – 3

The above table 2 shows, the data of the people whose is over 60 and the amount of sales and profit made from this group of customers. In this table we see we have almost 4 million profits. Again, in table 3, there is the information of the customer whose age is over 50 but below 60 years. In this section (table 3) it can be noticed that we have almost 3.4 million profits from this age group.

Birth Date	Display Total Sales Amount	Display Total profit
1/1/1971	\$80,451,840.82	(\$5,965,186.66)
1/4/1971	\$80,455,046.84	(\$5,963,876.47)
1/7/1971	\$80,451,412.21	(\$5,965,238.18)
1/11/1971	\$80,450,985.07	(\$5,965,353.11)
1/12/1971	\$80,456,928.40	(\$5,963,295.48)
1/14/1971	\$80,450,768.53	(\$5,965,471.34)
1/17/1971	\$80,459,508.71	(\$5,962,490.34)
1/18/1971	\$80,450,955.91	(\$5,965,418.91)
1/19/1971	\$80,450,702.67	(\$5,965,507.30)
1/23/1971	\$80,450,668.56	(\$5,965,525.92)
1/30/1971	\$80,475,030.07	(\$5,957,219.79)
1/31/1971	\$80,454,979.73	(\$5,964,137.03)
2/1/1971	\$80,453,193.00	(\$5,964,766.37)
2/4/1971	\$80,459,607.58	(\$5,962,741.71)
2/8/1971	\$80,465,862.52	(\$5,960,555.48)
2/9/1971	\$80,458,743.78	(\$5,962,741.36)
2/10/1971	\$80,454,416.89	(\$5,964,387.00)
2/11/1971	\$80,463,821.79	(\$5,961,367.81)
2/15/1971	\$80,465,054.12	(\$5,960,923.33)
2/18/1971	\$80,450,749.92	(\$5,965,506.44)
2/22/1971	\$80,457,240.68	(\$5,963,175.42)
Total	\$92,099,430.88	(\$2,129,831.05)

Table – 4

Birth Date	Display Total Sales Amount	Display Total profit
1/3/1981	\$80,463,691.66	(\$5,960,799.57)
1/4/1981	\$80,455,634.18	(\$5,963,811.91)
1/5/1981	\$80,450,884.52	(\$5,965,408.01)
1/7/1981	\$80,452,615.93	(\$5,964,950.54)
1/9/1981	\$80,450,711.92	(\$5,965,502.25)
1/12/1981	\$80,453,048.16	(\$5,964,818.25)
1/14/1981	\$80,450,610.96	(\$5,965,560.93)
1/16/1981	\$80,456,210.82	(\$5,963,530.66)
1/17/1981	\$80,457,387.10	(\$5,963,181.00)
1/20/1981	\$80,455,104.24	(\$5,964,156.40)
1/21/1981	\$80,456,578.29	(\$5,963,525.88)
1/22/1981	\$80,450,610.96	(\$5,965,557.37)
1/23/1981	\$80,459,372.19	(\$5,962,614.39)
1/30/1981	\$80,456,190.58	(\$5,963,840.62)
2/1/1981	\$80,456,470.24	(\$5,963,584.88)
2/3/1981	\$80,456,955.57	(\$5,963,659.57)
2/6/1981	\$80,455,123.78	(\$5,964,083.32)
2/8/1981	\$80,450,634.74	(\$5,965,547.95)
2/9/1981	\$80,457,330.49	(\$5,963,341.32)
2/11/1981	\$80,453,963.00	(\$5,964,525.95)
2/12/1981	\$80,458,404.34	(\$5,962,910.35)
Total	\$84,740,789.06	(\$4,546,104.48)

Table – 5

From the above two tables that table 4 and 5, these two tables show the age group between 36-50 years and in table 4 if we notice we can see had nearly 2 million profits from the people whose age is between 40-50 while in table 5, we have a remarkable change in profit that is over 4.5 million though these people age is between 36-40 years.

From these all-mentioned table, we can see people whose age is between 50 – 70 years and whose age are from 36-40 have more impact on the profit. In 2019 an online website (statista) made a report where it showed us some graph about the user of bi-cycle within England from 2017 – 2019. It mentions in that document that most of the user of bicycle are whether a child or an old person who do cycling in their leisure time. In that article it is further mentioned that children whose age is between 5-10 years old, 86% of them has cycle and children whose age is between 11-16 years old, they also have tendency to use cycle which is 69% but from the age 17 it decreases gradually but when it comes to over 40-50 years it increases again.

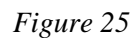
Here from these table as we see people whose age 36-40 has children shown a demo is table 6. So, they buy bi-cycle for their children and when it comes to people over age 50 they use it as to pass their leisure time.

Birth Date	Total Children
2/17/1981	1
2/18/1981	0
2/20/1981	3
2/21/1981	0
2/22/1981	0
2/22/1981	3
2/23/1981	0
2/23/1981	1
2/23/1981	2
2/23/1981	3
2/23/1981	4
2/24/1981	0
2/24/1981	1
3/1/1981	0
3/2/1981	0
3/3/1981	0
3/3/1981	2
3/3/1981	3
3/3/1981	4
3/8/1981	0
3/9/1981	0
3/9/1981	1

Table -6

In another article we can find by targeting market, customer profile including gender, Income, age, marital status etc. we can expand our business with having more sales and profits (edwardlowe,2021).

Report 4.



30



Figure 26

Model Name	Display Total Sales Amount	Display Total profit	Total gross Product
HL Road Handlebars	\$43,395.60	\$7,811.21	\$0.26
HL Road Pedal	\$32,849.54	\$5,912.89	\$0.26
HL Road Rear Wheel	\$19,709.71	\$3,547.75	\$0.26
HL Road Seat/Saddle 2	\$4,232.26	\$761.80	\$0.26
HL Road Tire	\$5,053.00	\$2,758.94	\$0.63
LL Road Frame	\$1,225,812.74	(\$42,592.45)	\$0.05
LL Road Handlebars	\$5,422.54	\$976.05	\$0.26
LL Road Pedal	\$21,087.19	\$3,795.66	\$0.26
LL Road Rear Wheel	\$58,488.77	\$10,527.95	\$0.26
LL Road Seat/Saddle 1	\$162.72	\$29.29	\$0.26
LL Road Tire	\$4,964.19	\$2,710.44	\$0.63
ML Road Frame	\$121,345.32	(\$8,089.70)	\$0.01
ML Road Frame-W	\$1,158,485.69	(\$53,287.22)	\$0.03
ML Road Front Wheel	\$78,986.43	\$14,217.58	\$0.26
ML Road Pedal	\$24,624.89	\$4,432.46	\$0.26
ML Road Rear Wheel	\$10,574.78	\$1,903.46	\$0.26
ML Road Tire	\$3,623.55	\$1,978.45	\$0.63
Road Bottle Cage	\$2,283.46	\$1,246.76	\$0.63
Road Tire Tube	\$1,851.36	\$1,010.82	\$0.63
Road-150	\$3,347,829.41	\$92,302.23	\$0.38
Road-250	\$10,047,284.63	(\$886,289.05)	\$0.34
Total	\$36,061,477.57	(\$2,874,298.13)	\$0.36

Table-7

In the figure 26, it is very clear that this figure indicates sales, GDP and profit amount of Road Bicycle. Here though some of the model has less sells, still in this section around 3-4 models and

staff like ML, HL, LL frame which has good sales rate and profit, and this section has 0.34 of GDP and almost nearly 3 million US dollars of profit.

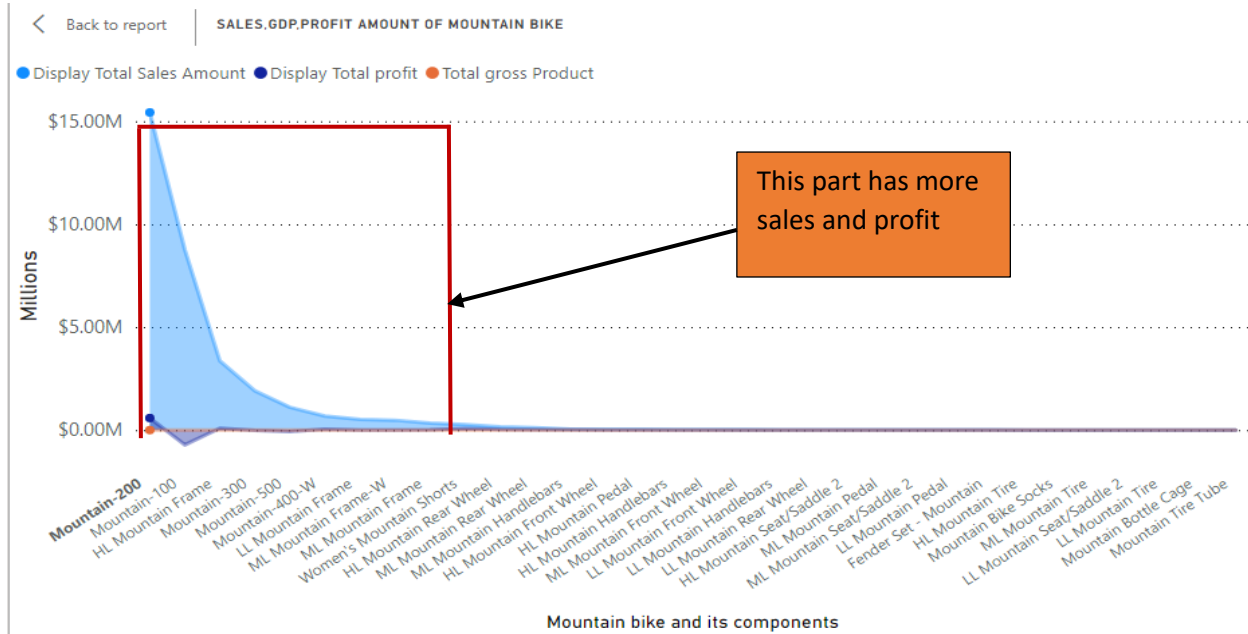


Figure 27

Model Name	Display Total Sales Amount	Display Total profit	Total gross Product
Fender Set - Mountain	\$7,846.86	\$4,284.39	\$0.63
HL Mountain Frame	\$3,365,069.27	\$91,262.14	\$0.11
HL Mountain Front Wheel	\$39,988.64	\$7,197.95	\$0.26
HL Mountain Handlebars	\$34,375.35	\$6,187.57	\$0.26
HL Mountain Pedal	\$38,018.33	\$6,748.58	\$0.26
HL Mountain Rear Wheel	\$166,013.28	\$29,241.25	\$0.26
HL Mountain Seat/Saddle 2	\$16,392.10	\$2,950.56	\$0.26
HL Mountain Tire	\$6,720.00	\$3,669.12	\$0.63
LL Mountain Frame	\$521,864.42	\$3,199.44	\$0.09
LL Mountain Front Wheel	\$22,462.85	\$4,024.83	\$0.26
LL Mountain Handlebars	\$22,008.27	\$3,896.62	\$0.26
LL Mountain Pedal	\$10,908.01	\$1,963.42	\$0.26
LL Mountain Rear Wheel	\$18,005.27	\$3,240.94	\$0.26
LL Mountain Seat/Saddle 2	\$5,636.96	\$1,007.67	\$0.26
LL Mountain Tire	\$3,848.46	\$2,101.25	\$0.63
ML Mountain Frame	\$343,785.29	\$10,609.71	\$0.11
ML Mountain Frame-W	\$482,953.16	\$5,680.21	\$0.09
ML Mountain Front Wheel	\$33,360.39	\$6,004.87	\$0.26
ML Mountain Handlebars	\$51,753.71	\$9,246.36	\$0.26
ML Mountain Pedal	\$12,852.63	\$2,313.46	\$0.26
ML Mountain Rear Wheel	\$119,193.52	\$20,896.59	\$0.26
Total	\$33,537,567.85	\$138,550.35	\$0.53

Table 8

The figure 27 and table 8 both indicates the sales and profit amount within the mountain bike. Here we can see we have a good potential in selling mountain bike and which is 30.5 million almost like road bike but in case of making profit it makes almost half of the road bike which is nearly 0.138 million. Here in mountain bike section, we can also notice only a few brands are sold most which is mark with red color in figure 27.

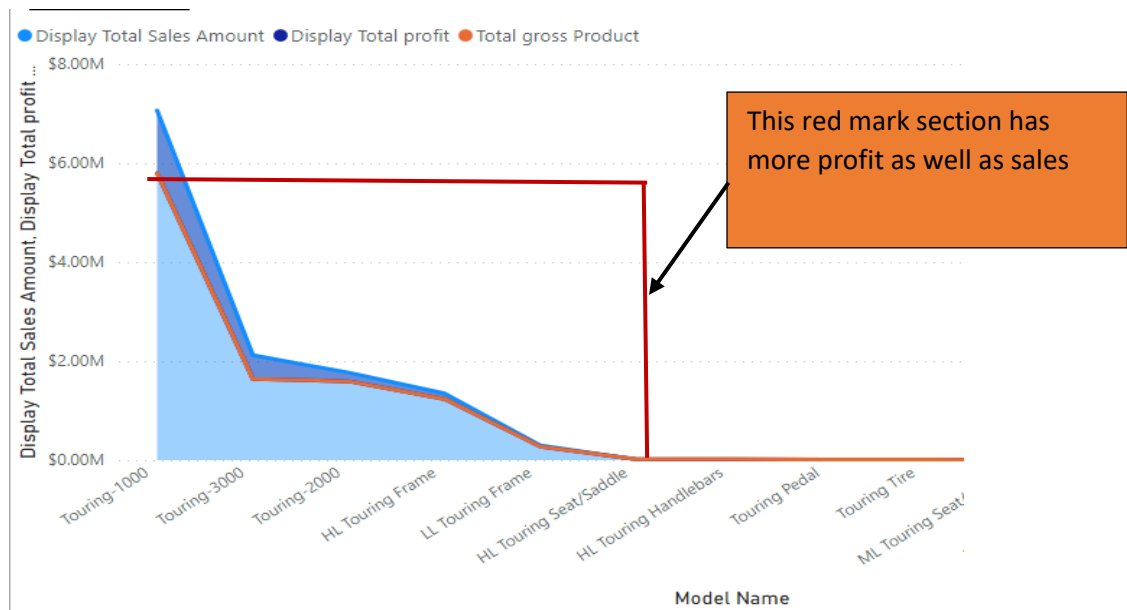


Figure 28

Model Name	Display Total Sales Amount	Display Total profit	Total gross Product
HL Touring Frame	\$1,347,457.74	(\$113,058.72)	(\$0.00)
HL Touring Handlebars	\$12,087.24	\$2,175.70	\$0.26
HL Touring Seat/Saddle	\$13,454.78	\$2,421.85	\$0.26
LL Touring Frame	\$294,869.95	(\$23,900.91)	(\$0.00)
LL Touring Handlebars	\$1,548.62	\$278.75	\$0.26
LL Touring Seat/Saddle	\$1,480.75	\$266.53	\$0.26
ML Touring Seat/Saddle	\$1,972.66	\$355.07	\$0.26
Touring Pedal	\$7,143.32	\$1,285.79	\$0.26
Touring Tire	\$4,870.32	\$2,659.19	\$0.63
Touring Tire Tube	\$1,417.16	\$773.76	\$0.63
Touring-1000	\$7,062,332.23	(\$1,266,527.02)	\$0.26
Touring-2000	\$1,767,442.02	(\$178,008.61)	\$0.34
Touring-3000	\$2,117,031.51	(\$481,376.43)	\$0.21
Total	\$12,633,108.30	(\$2,052,655.05)	\$0.28

Table 8

From these table and figure, it can be noticed that it represents information about the Touring brands bi-cycle and its staff. Here it is seen, though it has less sales compared to mountain and road brands, it makes a good amount of profit which is over 2 million and its most selling staff is 2-3 kinds of model and all kinds of frame.

Model Name	Display Total Sales Amount	Total gross Product	Display Total profit
All-Purpose Bike Stand	\$6,201.00	\$0.63	\$3,385.75
Bike Wash	\$12,221.87	\$0.99	\$3,688.97
Cable Lock	\$16,225.22	\$0.31	\$3,727.83
Chain	\$9,377.71	\$0.26	\$1,671.87
Classic Vest	\$230,468.87	\$0.97	\$62,863.89
Cycling Cap	\$34,553.00	\$0.05	(\$7,803.02)
Fender Set - Mountain	\$7,846.86	\$0.63	\$4,284.39
Front Brakes	\$50,299.31	\$0.26	\$8,966.71
Front Derailleur	\$44,484.27	\$0.26	\$7,900.17
Full-Finger Gloves	\$128,847.58	\$0.26	\$23,652.47
Half-Finger Gloves	\$85,050.10	\$0.97	\$24,558.02
Hitch Rack - 4-Bike	\$203,136.16	\$0.98	\$57,496.22
HL Bottom Bracket	\$39,581.44	\$0.26	\$7,124.64
HL Crankset	\$148,622.58	\$0.26	\$26,505.81
HL Fork	\$61,034.61	\$0.26	\$10,911.08
HL Headset	\$19,083.69	\$0.26	\$3,435.07
HL Mountain Frame	\$3,365,069.27	\$0.11	\$91,262.14
HL Mountain Front Wheel	\$39,988.64	\$0.26	\$7,197.95
HL Mountain Handlebars	\$34,375.35	\$0.26	\$6,187.57
HL Mountain Pedal	\$38,018.33	\$0.26	\$6,748.58
HL Mountain Rear Wheel	\$166,013.28	\$0.26	\$29,241.25
Total	\$36,266,703.40	\$0.54	\$453,414.61

Table 9

In the mentioned table 9, it describes about profit that are made from all types of cycle except road and touring brand bicycle and its components. Though the selling amount are too high but unfortunately it makes only around 0.453 million dollars profit which is almost 1/5 and 1/7 part of both touring and road section.

In 2021 an online platform (Grand view Research) published a report about the most used bi-cycle type and here it says in 2020 market size of bi-cycle globally was 54.4 billion which will increase by 7.0% from 2021 to 2028. It is also mentioned that most of the people in the North America used road bi-cycle which is almost half of the bi-cycle market size and after that the users of mountain bike are higher followed by hybrid and other sort of bi-cycle. The above scenario has been shown in below picture (figure 29).

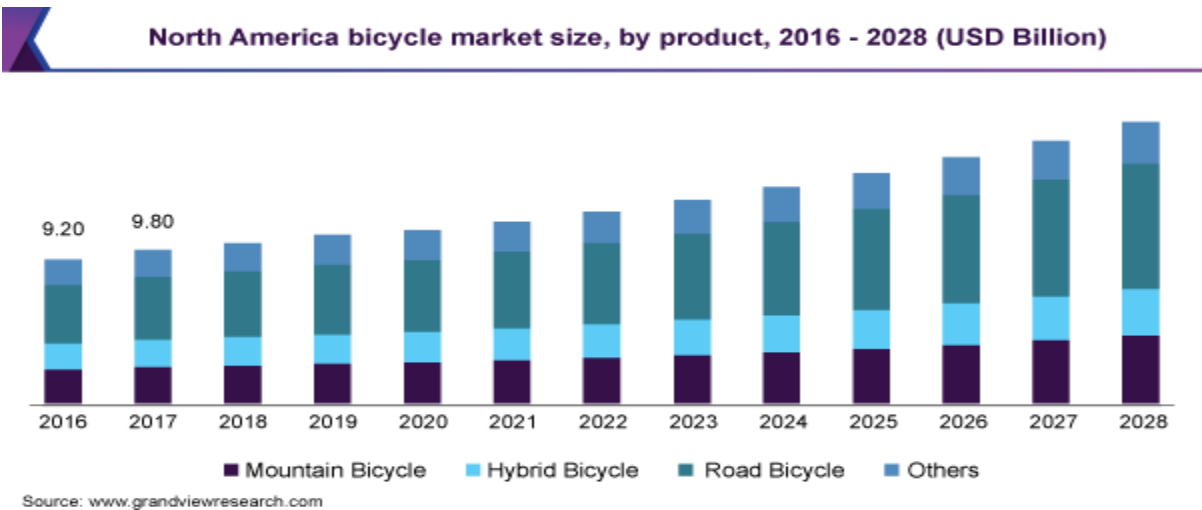


Figure – 29

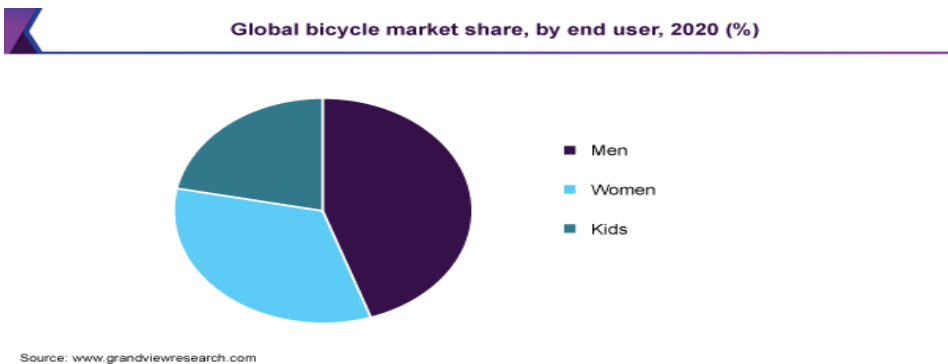


Figure 30

In this article, it further explains that most of the bi-cycle users of the worlds are male followed by female and kids. Figure shown above taken from this article where they showed a pie-chart about the users of bi-cycle (“Bicycle Market Size, Growth & Trends Report, 2021-2028,” 2021). Let us see in our dataset what are the impact of gender in profit.

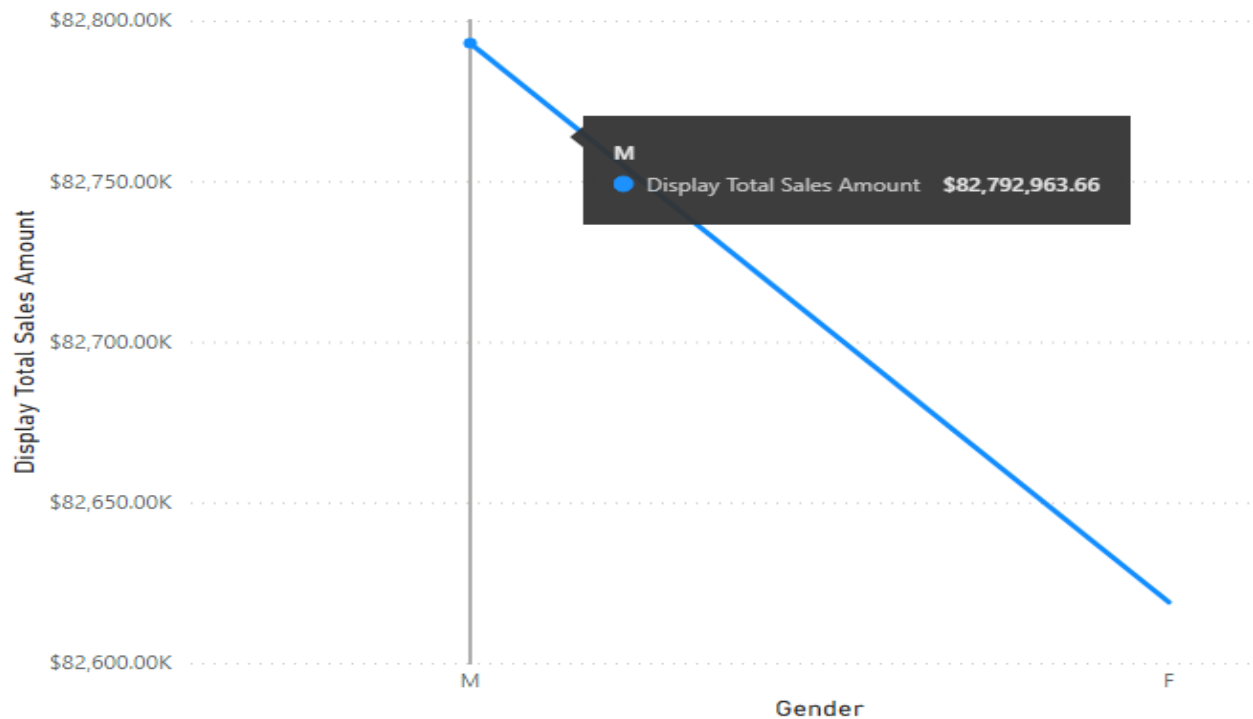


Figure – 31.

If we see figure presented above (figure 31) it has information about the most bi-cycle users between male and female. It also has the similar patterns which was mentioned in figure 30.

So, from this analysis we can come up with a solution to focus on most profit brand most compared to less profitable bi-cycle, and we can increase the price of some specific bi-cycle like mountain which has a great market value all over the world. Specially to grab the market globally as shown in figure 28 company must need to concentrate on developing and making quality staff on road

bicycle. Besides that, as we make more profit from male users, we can focus on that type of staff which they usually take.

6.0 Conclusion:

Throughout this whole project we have used some of the tools including MSSQL to store the datasets as dataset was .bak file, visual studio to select the relevant table and column which was needed for visualization purpose and at the end we used power Bi as visualization tools.

Before doing reports, I have studied the whole datasets to know the relevant table which would be useful for the analysis. From this understanding I have created four reports where I have explained different issue, which may be the facts on reducing selling and making profit towards the UMS work cycles. Yet this result might not be hundred percentage correct as I have noticed there are uncleaned records in some of the column which are really needed for the analysis for instance – in gender attributes there are almost 1/3 of the records are unknown. So, these uncleaned records and outliers can have a great impact towards a bad analysis, and which may cause a bad result or an unexpected result if the company implement this finding in future. Other than that, the other finding like selling different products, selling platforms, types of models etc. looks good and hopefully this analysis would world as expected.

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