



## APPLICATION OF BUSINESS ANALYTICS TECHNIQUES IN MOBILE STATIONS: AN EVIDENCE OF USA

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### Abstract

*We investigated how business analytics techniques can identify the problems of mobile station to increase the revenue. We recommend implementation of a business analytics and digital marketing system to improve the awareness of the stores and its mission and vision. We performed some decision-making analytics by researching the competitor ways of performing businesses. We researched platforms where we can effectively market our products and what kind of expected response we can avail from these marketing tools.*

*Keywords: Mobile station, Decision tree, Logistic regression, Cluster analysis, Association rule*

### INTRODUCTION

Mobile Station is a franchise retail store that sells cell phone accessories and repairs phone. Just like metroPCS<sup>1</sup>, this brand is owned by John Doe,<sup>2</sup> an Indian-American entrepreneur, and is franchised all over US as retail stores. Basically, retail stores are operated by franchisee, who pay a fixed amount every month for the right to gain profit, and sell licensed products in shopping malls. Mobile Station has its operating stores all over US but in Tampa Bay area it has

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<sup>1</sup><https://www.metropcs.com/>

<sup>2</sup> Actual name was kept anonymous upon owners request



stores only in Westfield Citrus park Mall and Westshore Plaza. It usually runs in kiosks and usually has 1-3 employees in each store. It generates its income either from repairing cell phone and tablets or from selling phone accessories such as phone case, screen protector, battery, power bank, memory card, headphone/earphone, and other phone accessories.

### Industry background

This business falls under both cell phone repair industry and cell phone accessories industry. The cell phone repair industry is growing and is expected to keep the profitability level at current level for next five years. The revenue in this industry is expected to reach \$4.89 billion in 2023 from \$4.14 billion in 2018.<sup>3</sup> The global cell phone market is also expected to grow \$255 billion by 2023.<sup>4</sup> The major key success factors for this industry are,

- a. **Availability of related goods and services:** Customers in this market tend to buy stuffs in bundle

(I.e. phone repair, case, glass etc. together). So, the more variety you have, the higher your revenue will be from each individual customer.

- b. **Physical locations:** Retailer should be aware of the store location as stores in every location

Don't generate same amount of revenue. Store manager<sup>5</sup> says, "A good location can increase the profit even by 40%-60%." As customers in all locations don't tend to spend same amount of money, failure to choosing right location may result in store shut down.

- c. **Availability of both premium and regular products:** As customers fall in high, medium, and low

price categories, every store should have products and services of those categories to satisfy individual need.

- d. **Having employees with good technical and marketing skills:** To repair a phone an employee

must have good technical skills. Providing poor and inappropriate repair services may result in lost revenue and even lost customers. Also, selling phone accessories require high level of influential skills as each individual product can be sold at different prices to different customers

<sup>3</sup><https://clients1.ibisworld.com/reports/us/industry/industryoutlook.aspx?entid=5802>

<sup>4</sup><https://www.alliedmarketresearch.com/mobile-accessories-market>

<sup>5</sup> Store manager at Westfield Citrus Park mall

depending on how employees interact and influence the customers. Poor selling skills may result in low selling price and sometimes even loose customers.

**e. Price:** The last but not least factor is Price. As price sensitive customers comprise a major portion of total customer segment, retailers must be careful to charge price to keep and retain customers. Even sometimes retailers need to sell underpriced products just to take customers away from competitors.

### Key market players

Though this industry doesn't consist of any major players, ifixandrepair,<sup>6</sup>Cellairis,<sup>7</sup>CellFix,<sup>8</sup> and Apple Inc. itself are major competitors for Mobile Station. Unlike any of its competitors, Mobile Station doesn't have any website, Facebook page, Youtube channel, or twitter page. Because of this inconvenience, Mobile Station is currently struggling to generate as much profit compared to other market leaders.

### Current Status of Business Intelligence/Analytics systems

Currently, Mobile Station doesn't utilize any Business intelligence/analytics systems to operate its business. As mentioned earlier, this organization doesn't have any website or promotional page either. As a matter of fact, its competitors are doing better in terms of profit and retaining customers. Following table represents the current status of Business Analytics systems in Mobile Station.

Table 1: DELTA model

<b>Data</b>	It doesn't work with any kind of data now. It has neither any kind of analysis nor groups with data orientation. It doesn't even have basic descriptive statistics in practice.
<b>Enterprise</b>	It has poor integrated systems with no enterprise perspective on data or analysis.
<b>Leadership</b>	Lacking knowledge on the benefits of having data analytics systems, management has no awareness of analytics.
<b>Targets</b>	Except focuses on daily sales, it doesn't target for further opportunities.
<b>Analysts</b>	It runs with employees having selling and technical skills. It doesn't see any need to hire people with analytical skills as it has no idea of data analytics.

<sup>6</sup><https://ifixandrepair.com/>

<sup>7</sup><https://www.cellairis.com/>

<sup>8</sup><http://cellfixinc.com/>

Based on the information given in above table, Mobile Station currently falls in Analytically Impaired<sup>9</sup> stage of business analytics maturity model. So, our goal is to use business analytics system to advance the business. We will provide recommendation on advancing business through collecting primary data and using Business Analytical approaches.

### THE BUSINESS ANALYTICS PROBLEM OF MOBILE STATION

In this section, we firstly present the business processes and finally identify the business problems.

Business process is the combination of several tasks which are performed by stakeholders to achieve a goal. The tasks are completed through a systematic way and are performed repeatedly like a life cycle. There are two types of business processes such as manual business process and automated business process. In manual business process, all tasks are performed without the help of technology. On the other hand, in the automated business process, technology helps to conduct the whole process more accurately and standardized way.

Figure 1: Business process



<sup>9</sup> DELTA model and & Five stages of Analytics Maturity

**Step 1: Setting the business goal:** It's the first step for the businesses. Based on this goal, business is started. Maximum business goal is to survive in the market for long term or to maximize the profit by providing the best services.

**Step 2: Identify the stakeholders:** Identifying the stakeholders is the primary step of the business process. Stakeholders can be internal or external. Internal stakeholders mean the internal people who conduct the whole business processes or who are the part of management. They help to smooth the business process. External stakeholders mean the customers or others.

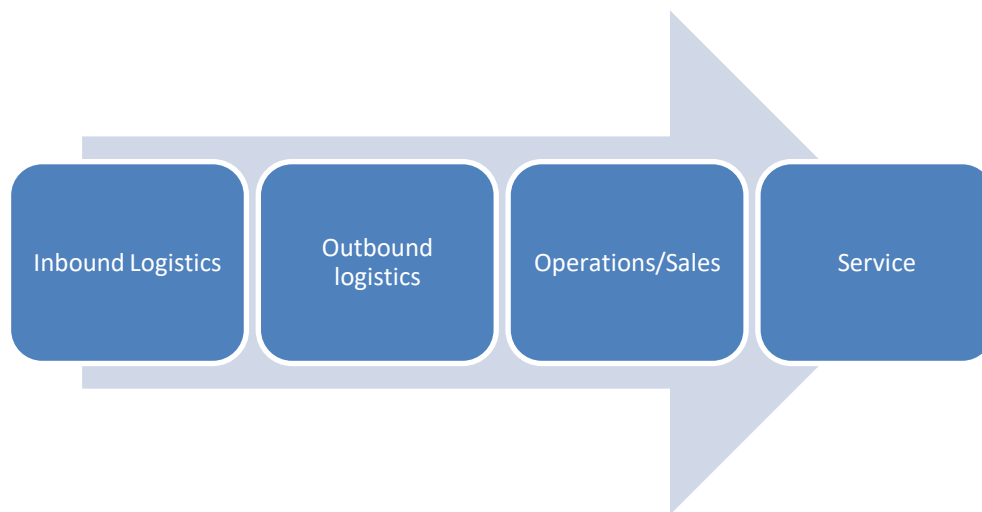
**Step 3: Needs or expectations of stakeholders:** Stakeholders are the main concentration of the business to generate the profit. So, it's needed to define the needs or expectations of the stakeholders. To understand the needs or expectations of stakeholders and managing are the primary challenge of the business process.

There are product and service line of our selected business. One is selling the mobile accessories and another one is fixing the mobile. There are two business process of our selected business for selling the products of mobile accessories and fixing the mobile which are shown below. From start to end there are several steps.

### Business Process in Mobile Station

The business process in Mobile Station begins from ordering products and ends in selling those in retail stores. Meanwhile it has storage and distribution in its value chain. Unlike normal business value chain, value chain of Mobile Station lacks product design and development, marketing, and feedback. Following diagram represents the value chain of Mobile Station.

Figure 2: Business Process in Mobile Station



**Inbound logistics:**

Mobile Station purchases majority of its accessories from China and some accessories from US vendors. The purchase decision depends on Store manager. The order is made online and is delivered directly from China to individual stores in US.

**Outbound logistics:**

Once the store manager receives the order, he/she stores the accessories and distributes to stores depending on demand. Mobile Station doesn't own any physical storage and storage decision depends on store manager.

**Operations/Sales:**

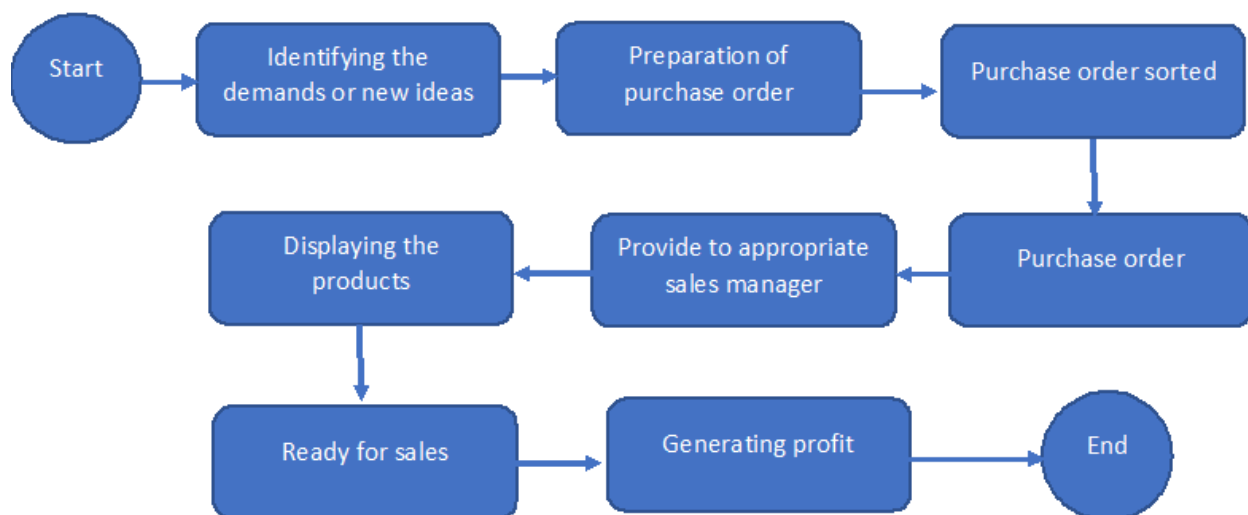
Stores are designed with all required and latest accessories. Mobile Station doesn't offer online purchase, hence all of its sales are operated in retail store. The in-store selling process will be shown later below. Mobile Station doesn't have any marketing and promotional activities to attract customers. So, sales in Mobile Station depends on customers who visit the store for their own sake.

**Services:**

Services in Mobile Station are crucial for maintaining long term businesses with customers. Stores provide both during-sale service, after-sale service, and warranty on phone repair. Customers usually have one-three months warranty on phone repair and seven days replacement warranty with other phone accessories.

**Selling process in Mobile Station**

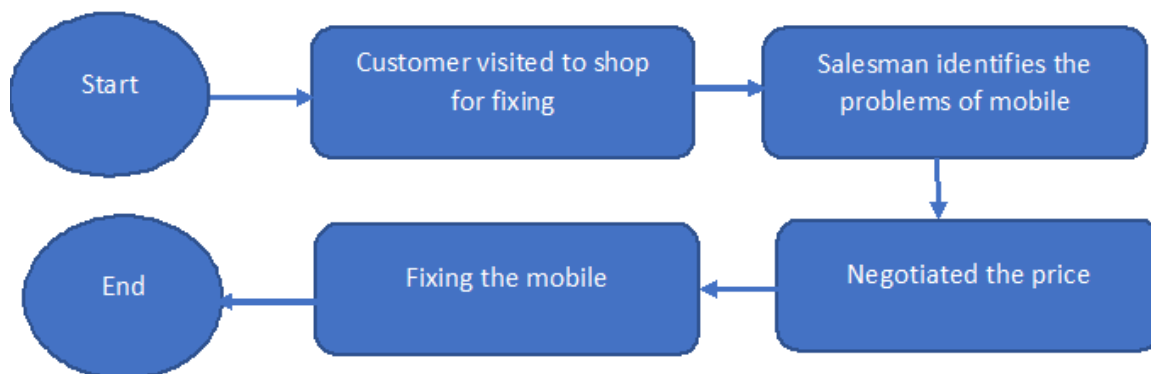
Figure 3: Selling process in Mobile Station



- **Identifying the demands or new ideas:** It's the first step of the business process. Here, business owner tries to identify the demand of customers, any new products in the markets and competitors' products chains. It's very important because based on the demands the whole orders of products are placed. If the owner fails to identify the demands accurately, he may loss some customers and profit. We think that it also helps to create the repeated customers or loyal customer base.
- **Preparation of purchase order:** After identifying the demands, owner takes the preparation of purchasing order of products. Products are ordered through online. Maximum products are purchased from the china. So, needed to search the products specification on online to get at lower price.
- **Purchase order sorted:** After searching the products, it's needed to sort the products according to price and demand. Owner always tries to earn profit at the purchase time without compromising the quality of the products. He believes that lower costing higher profit generated.
- **Purchase order:** Finally, owner orders the products through online. At this stage, owner relies on trusted online side and couriers.
- **Provide to appropriate sales managers:** After receiving the orders, owners handovers the products to salesman and makes it understands.
- **Displaying the purchased products:** When the products are received from owner, the salesman displays the products in the shop for the attractive of the customers.
- **Ready to sales:** Finally, the products are ready to sell.
- **Generating the profit:** Profit depends on the sales. More sales more profits.

### Mobile fixing process of Mobile Station

Figure 4: Mobile fixing process of Mobile Station



- **Customer visited to shop for fixing:** It's the first step of mobile fixing. There is no marketing activities for collecting the customers for fixing their mobile. So, after visiting at the shop, salesman talks to them about fixing. Here, owner follows the bottom to top process because he does not go to the customers, customers come to the shop. For that reason, the customers are not huge.
- **Salesman identifies the problem of mobile:** After getting the mobile fixing customer, he tries to identify the problems of the mobile and explains the problem to the customers.
- **Negotiate the price:** At this stage, salesman asks of doing or not fixing. If the customers agree to fixing, salesman negotiates the price of the service.
- **Fixing the mobile:** Finally, salesman starts to fix the mobile. Salesman ensures the quality of service and the owner monitors the process randomly.

### Business problems

It's a small business. So, owner faces few challenges for continuing as a small business. Among all the problems of finance, marketing, human resources; marketing problem is the biggest problem. Because there is no marketing for the products and fixing. So, customer does not know the shop who does not visit at the shop. It reduces the profitability. If the customers know the shop and services, the profit will increase rapidly. So, we try to identify the marketing problems which can be solved. We will present several analytical techniques to solve the problems at our solution part at the project. Now we present the business challenges below:

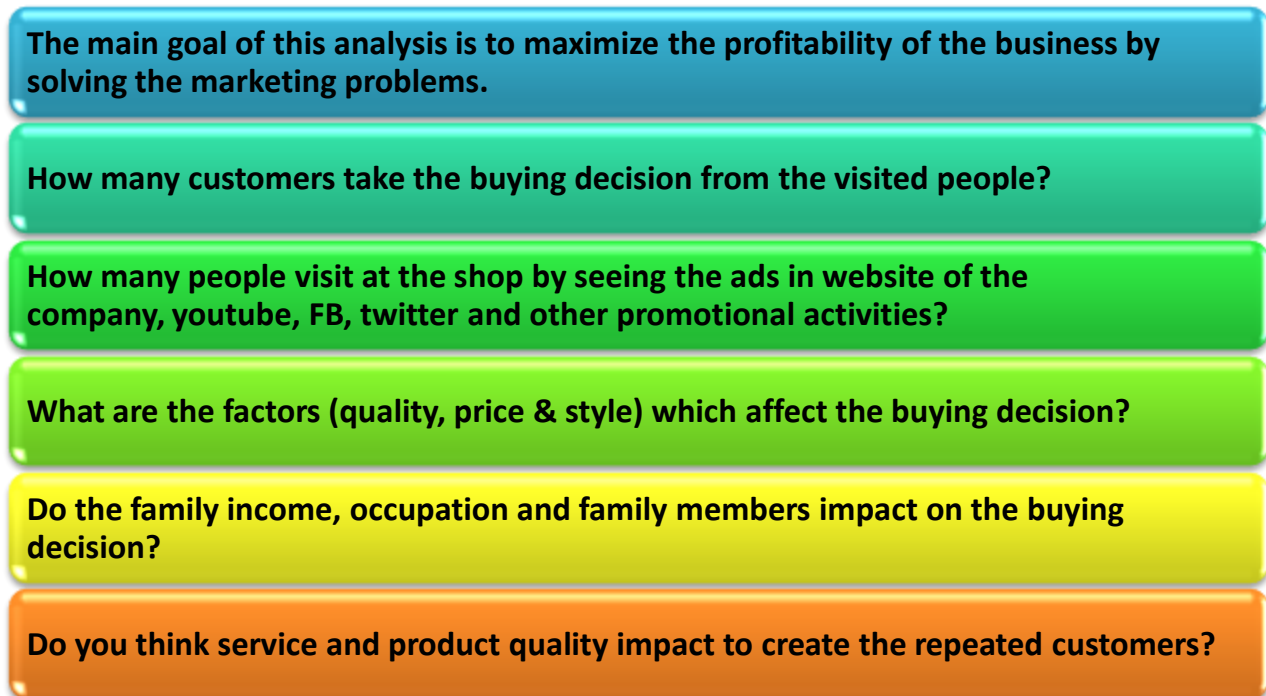
Figure 5: Business problems



We will identify the marketing problems and try to solve these by using the analytical techniques. Details of marketing problems are presented below.



Figure 6: Marketing problems



These are the possibilities to improve the current business processes by business analytical approaches which help the business to get the higher profit.

## RESEARCH METHODOLOGY

We design the dataset by considering the marketing segment of a Mobile Station. We have collected the whole data by preparing the questionnaire from several places such as market place where the mobile station is situated, community people where we live and other market places. The total number of dataset is 100. The total number of variables is 15 and the target variable is 1 (purchase). There is 84% “yes” purchases decision for this variable and only 14% “no” purchase.

In this research, we use the primary data. We select the several areas to collect the data from customers and other residents who frequently visit the mobile shops to fix the phones or buy the mobile accessories. We selected 3 shopping malls where several mobile stations are available, 1 residential area at Tampa and 1 market place in Florida. From the mobile stations, we collected data from 80 customers and others are collected from residential area and market place.

Table 2. Variables of the dataset

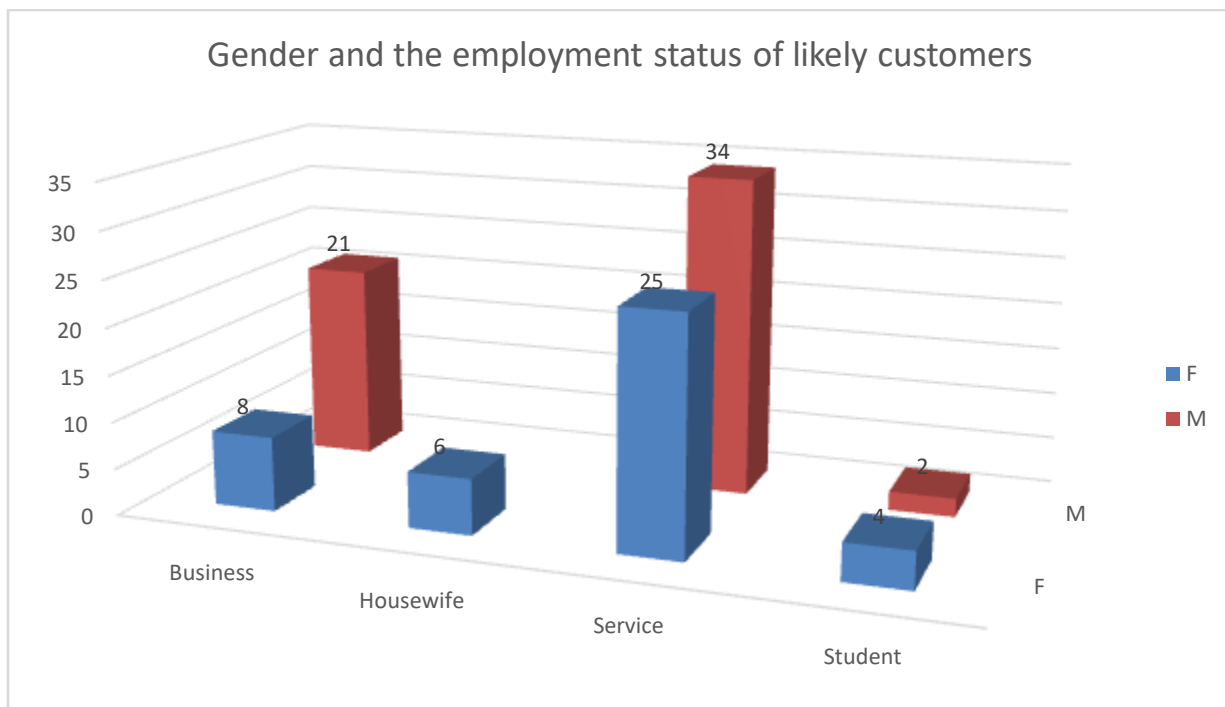
<b>Variable Name (Type)</b>	<b>Description</b>
Customer no. (continuous)	Serial number of customers
Name (Nominal)	The name of customers
Sex (Flag)	Sex (male-1, female-0)
Age (continuous)	Age of the customers
Occupation (Ordinal)	Occupation of the customers (student-1, service-2, business-3 & housewife-4)
Yearly income (continuous)	Yearly income of the customers
Family members (continuous)	Total number of the family members
Website (Flag)	Do the customers visit business website to see the offer before visiting the shop? (yes-1, no-0)
You tube (Flag)	Do the customers watch you tube ads to see the offer before visiting the shop? (yes-1, no-0)
twitter (Flag)	Do the customers watch twitter ads to see the offer before visiting the shop? (yes-1, no-0)
FB (Flag)	Do the customers watch Facebook ads to see the offer before visiting the shop? (yes-1, no-0)
others (Flag)	Do the customers watch other ads to see the offer before visiting the shop? (yes-1, no-0)
visited (Flag)	Do the customers visit the shop by seeing the ads at several sites of the offers before visiting the shop? (yes-1, no-0)
Purchase (Flag)	Do the customers take the purchase decision at the time of visiting the shop? (yes-1, no-0)
Factors-price, quality & style (Ordinal)	What are the factors of pursuing the purchase decision? (price-1, quality-2 & style-3)

Based on the dataset, we process the data by using the several software such as Excel, IBM SPSS Modeler to find the solution of the marketing problems of the Mobile Station.

**Data visualization**

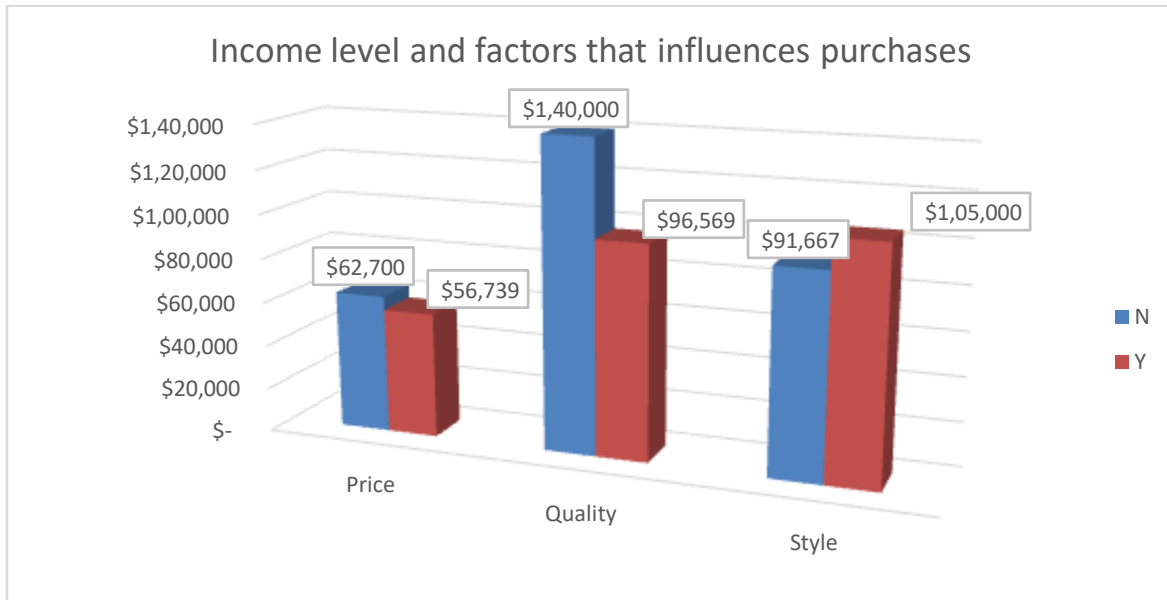
As stated above, we utilized the pivot table and other analytics functions in Excel to create meaningful assumptions from the data set we had. We initiated our data set by identifying the type of customers that normally visited the competitors’ shop and which by extension may indicate the type of customers likely to visit our client.

Figure 7: Gender and employment status



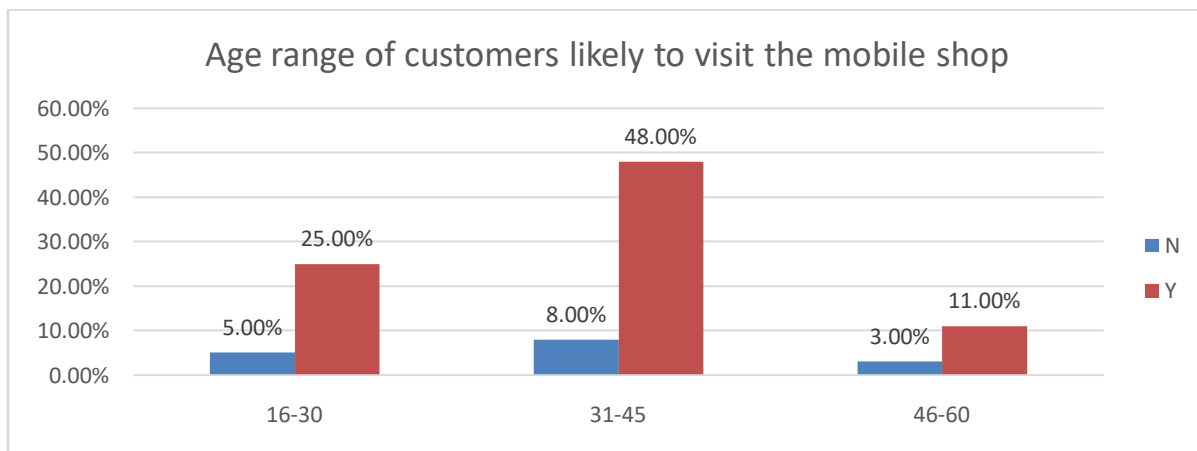
From a data set of 100, we had 57 male most of which are either working class people (34) or entrepreneurs (21) running their own businesses and a couple of students. Out of the female population (of 43), 8 had their own business, 6 were housewives, 25 were employed in the formal/service sector whereas 4 were students.

Figure 8: Income level and factors that influences purchases



Out of the 100-people surveyed, we noted that, the highest income group of customers indicated quality and style as a major factor they consider before making purchasing decision. The lowest income group of customers were more concern about the prices of the products than the other factors. This is an important revelation because it will help our client channel more resources into improving the repair works they undertake for the customers as well as the kind of product they sell. It's obvious from the dataset we analyzed that customers preferred stylish and quality products over affordability all other things being equal.

Figure 9: Age range of customers likely to visit the mobile shop



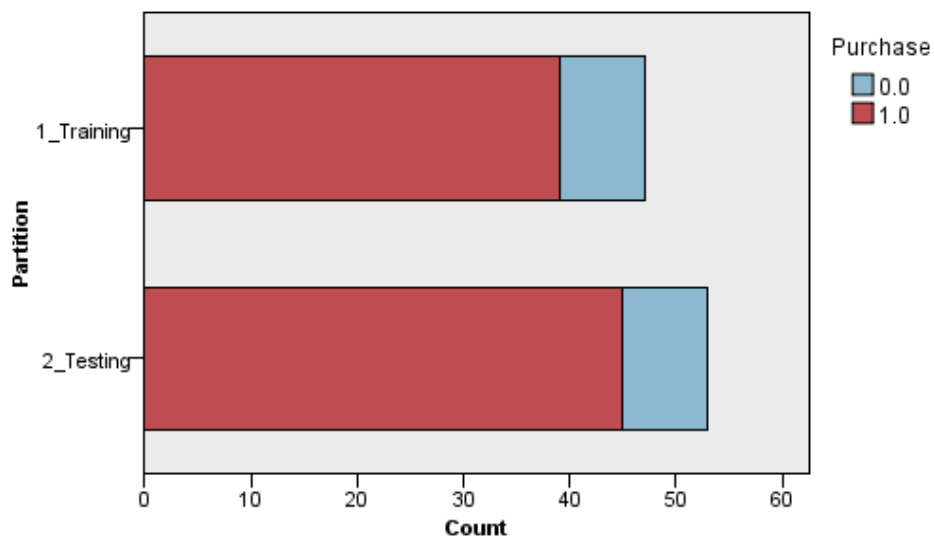
We noticed from the dataset that the highest age range likely to visit the mobile shop were those between 31-45 years, followed by 16-30 years. This is quite consistent with our expectations because the younger generation tends to be tech savvy and are more likely to smart phones and tablets.

## DATA ANALYSIS

### Decision Trees

We employed decision trees as our data analysis technique as it's a powerful prediction technique. Decision tree outputs help us to better understand the critical variables which are affecting our target variable (purchase). We use IBM SPSS Modeler to run the decision tree. Before partition and balance the data, there is 84% of customers take the purchase decision and only 16% do not take the purchase decision. After partition and balance the data, there is 85% of customers take the purchase decision for testing dataset.

Figure 10: Partition and balance the data



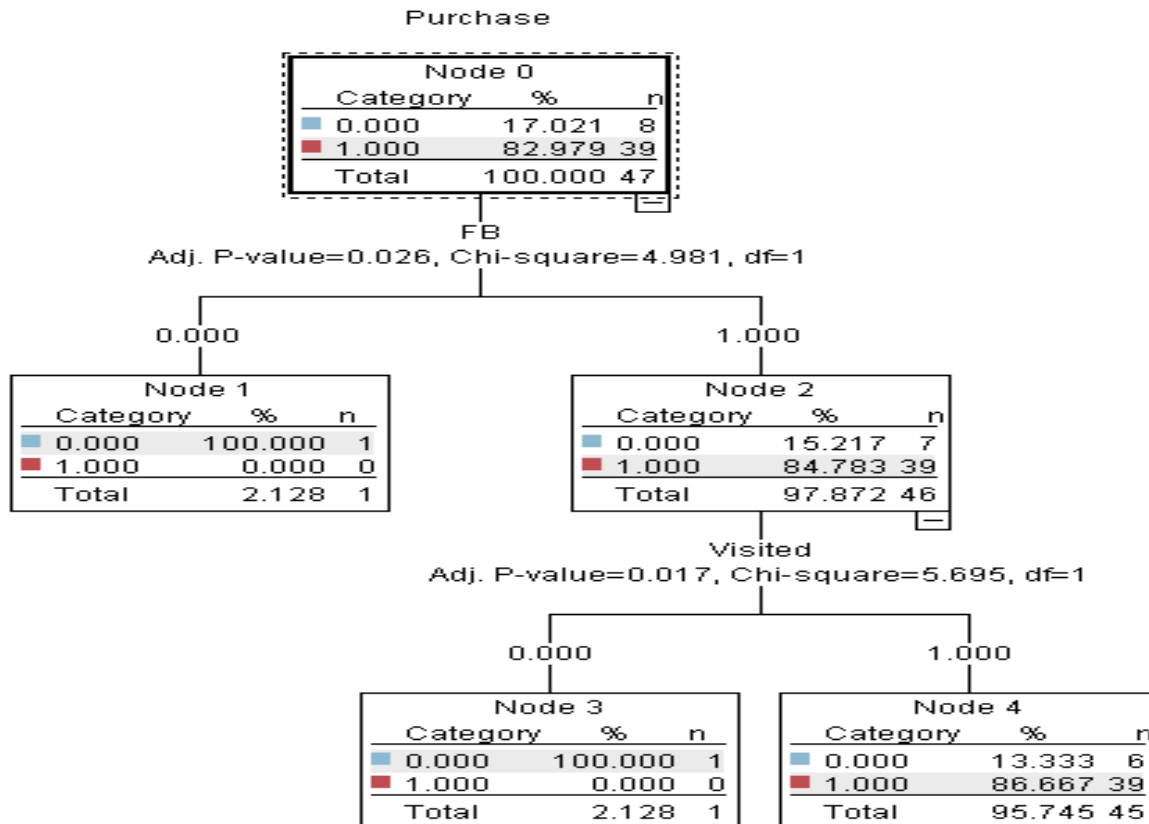
We use the CHAID and CRT models. Based on the decision tree and other criteria (sensitivity, specificity and error rates). Firstly, we present the decision tree of CHAID model.

Table 3: CHAID model's decision

Attribute of new customer	Data
Purchase	1 (yes)
FB (Facebook)	1 (yes)
Visited	1 (yes)

We see that there is a high probability to respond to a promotional activity at FB by this customer because the confidence level of responding the mail is 86.67% (approximately).

Figure 11: Decision tree



Secondly, we present the decision tree of CRT model.

Table 4: CRT model

Attribute of new customer	Data
Purchase	1 (yes)
FB (Facebook)	1 (yes)
Visited	1 (yes)
Age	<=47.50
Yearly income	>145,000
Twitter	1 (yes)

We see that there is a high probability to respond to a promotional activity at FB by this customer because the confidence level of responding the mail is 100%.

Figure 12: Decision tree

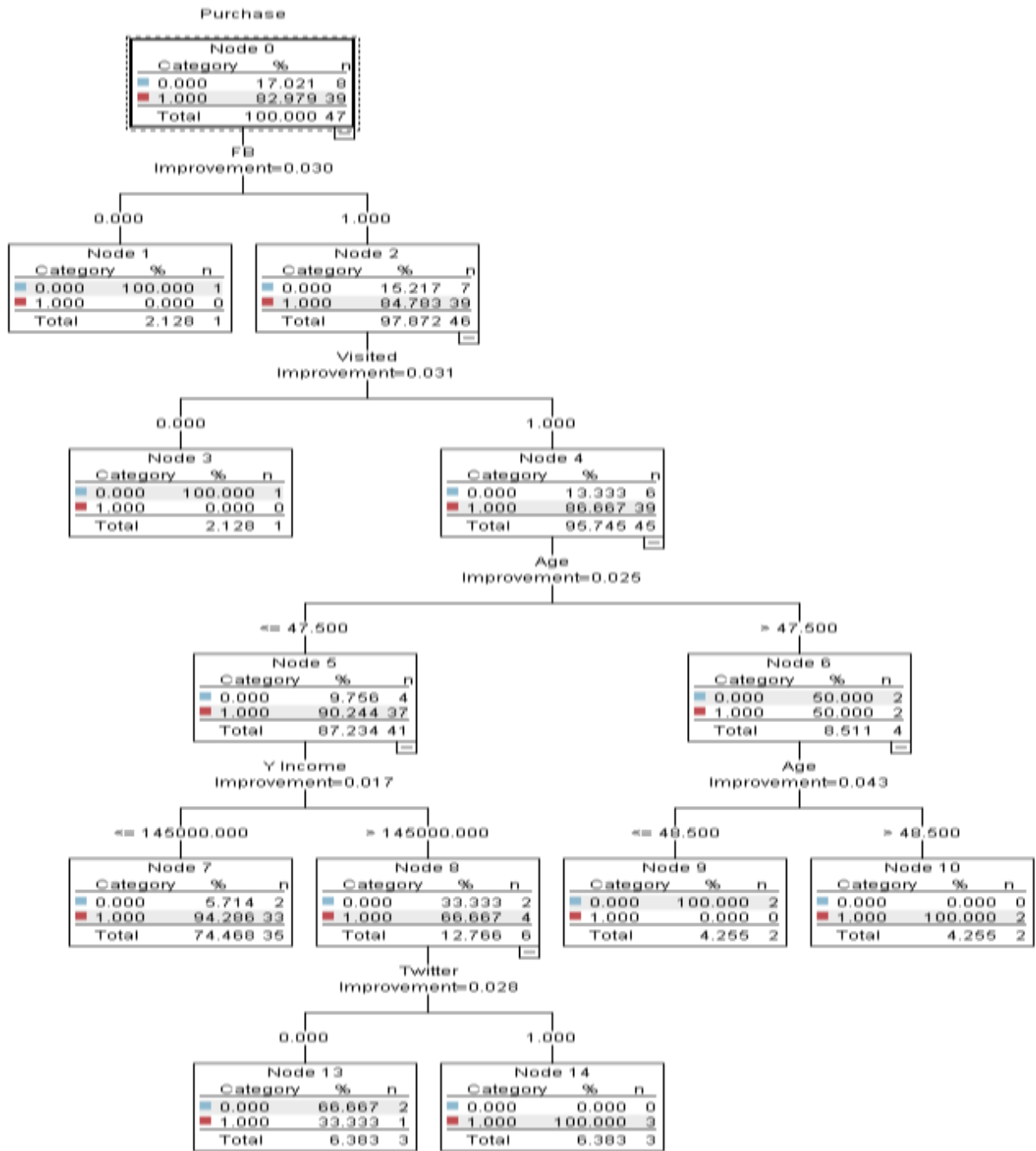


Table 5: Accuracy table

Models	Overall accuracy rate	Sensitivity	Type-II error rate
C&R tree	86.79%	95.56%	4.44%
CHAID	88.68%	100.00%	0%

Finally, from the accuracy table and coincidence matrix table; we choose CHAID model as better model because the accuracy model is higher (88.68%), sensitivity is higher (100%) and type-II error rate is lower (0%). So, we can say that CHAID model is better to predict the customers to take the purchase decision after seeing the ads at several online medias. The highest probability is 85.1% (0.851) which is found from the testing dataset that a customer is classified as “purchase” and the total cases are 51 which have same probability (appendix: screenshot-1).

### Logistic Regression

Regression analysis means to examine the relationship between dependent (explained) variable and independent variable(s). Logistic regression is a specialized form of regression that is designed to predict and explain a binary (two-group) categorical variable rather than a metric dependent measure. It is limited to two-group (binomial) dependent variable. We use the logistic regression instead of multiple regression because our target variable (purchase) is binomial (yes-1, no-0). Firstly, we test the multicollinearity problem in the dataset by using regression node and we find that there is no multicollinearity problem at our dataset VIF values of all the variables are less than 10 (appendix: table-2). After this testing, we use the logistic regression model and CRT model to predict the customers' choice.

Secondly, from the model summary of logistic regression (appendix: table-3), -2LL (21.622), Cox & Snell R Square (0.311) and Nagelkerke R Square (0.417) are lower. So, we can say that these values are satisfactory because we know that lower the -2LL value, the better fitting the model.

Thirdly, from the Classification Table (appendix: table-4) of the logistic regression model analysis, the overall predicting accuracy of the model is 83%%. So, we can say that the accuracy of the model is higher.

Table 6: Overall accuracy table

Models	Overall accuracy rate	Sensitivity	Specificity	Type-II error rate	Type-I error rate
C&R tree	81.13%	88.89%	37.50%	11.11%	62.50%
Logistic Regression	81.13%	84.44%	62.50%	15.56%	37.50%

Fourthly, from the accuracy table and coincidence matrix table; we choose logistic regression model as better model because the accuracy model is same with CRT model (81.13%),



sensitivity (84.44%) is almost same with CRT model and type-II error rate (15.56%) is also almost same with CRT model. But the specificity (62.50%) is higher than CRT model and type-I error (37.50%) is lower than CRT model. So, we can say that logistic regression model is better to predict the customers to take the purchase decision after seeing the ads at several online medias. The highest probability is 100% (1) which is found from the testing dataset that a customer is classified as “purchase” and the total cases are 51 which have same probability (appendix: screenshot-2).

Finally, Comparison on ROC graph between logistic regression (appendix: graph-1) and CRT (appendix: graph-2) models, we think that logistic regression model is more accurate than CRT. The reason is that the accuracy is higher in logistic regression model for testing data set which means that true positive is higher. So, it's has an opportunity to classify correctly by logistic regression model for testing data set. Although, true positive is higher in training (learning) data set at logistic regression decision tree model.

### Cluster Analysis

Cluster analysis is the finding groups of objects such that the objects in a group will be similar (or related) to one another and different from (or unrelated to) the objects in other groups. The objective of the cluster analysis of finding useful groups of objects among the data by using statistical techniques. We also use the cluster analysis to our project work to find the groups of objects with similar to one another and different from the objects in other groups. From the output of the cluster analysis, the cluster quality is fair (0.292). There are three clusters or groups. Based on the cluster size, 49% cases belong to cluster-3, 39% cases belong to cluster-1 and 12% cases belong to cluster-2. The ratio of largest cluster to smallest cluster is 4.08.

Figure 13: Model summary

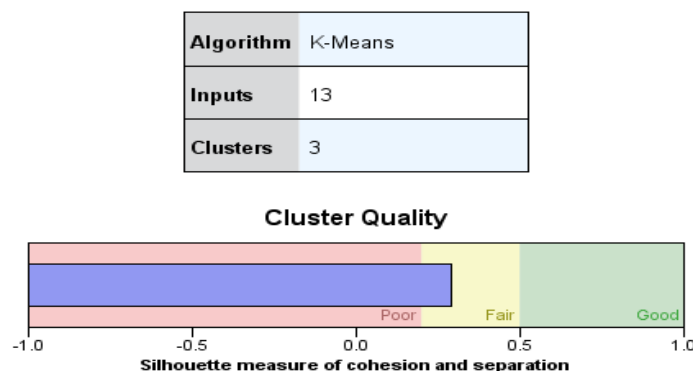
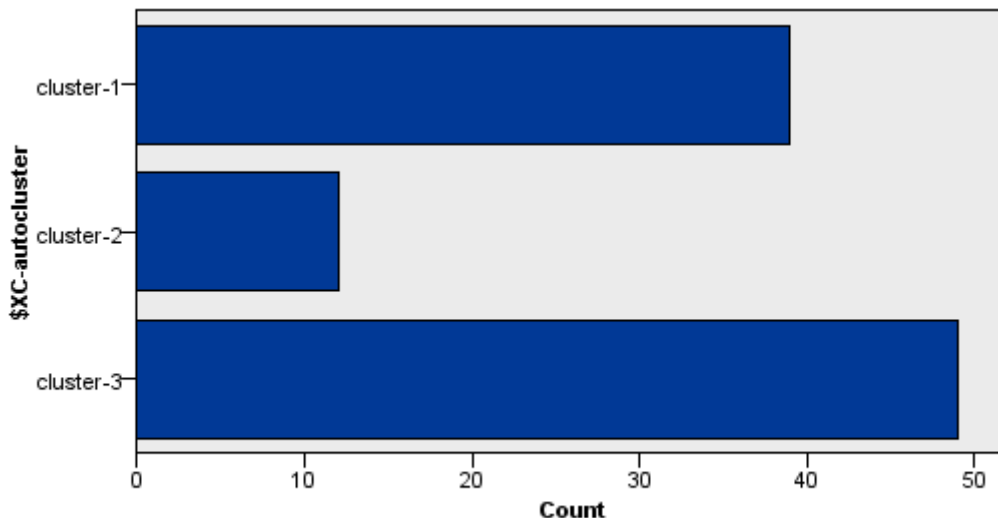
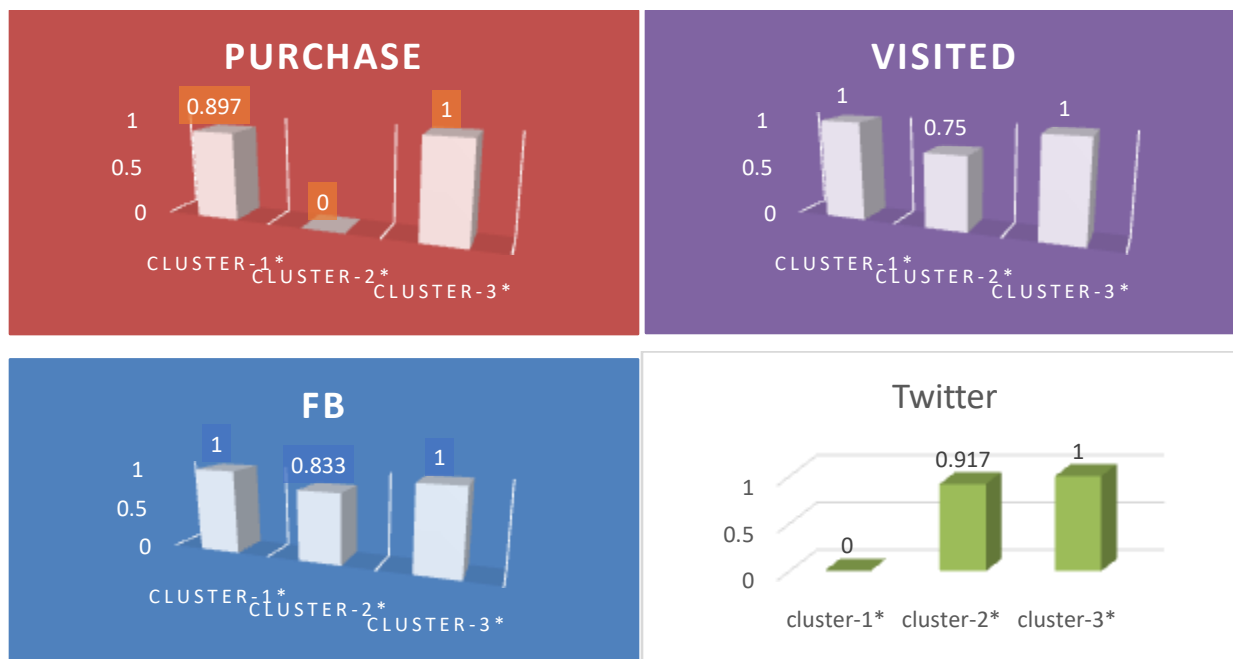


Figure 14: Cluster result



Now we use the means to represent the output as per attributes of three clusters. From the output of means we draw a bar chart to show the comparative situation of three clusters which are shown below.

Figure 15: Comparative situation of three clusters

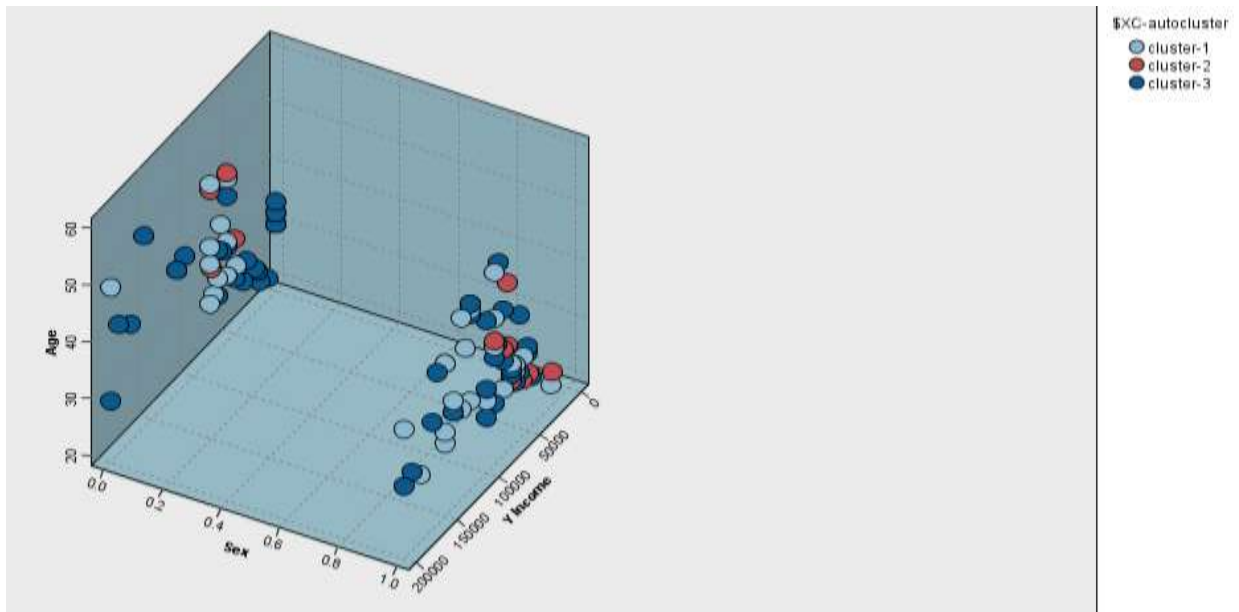


We see that in the cluster-3 has highest purchase (highest number of customers take the purchase decision), highest visited (highest number of customers visit the shop to take the purchase decision), highest FB (highest number of customers watch the ads to visit the shop to

take the purchase decision) and highest Twitter (highest number of customers watch the ads to visit the shop to take the purchase decision) values.

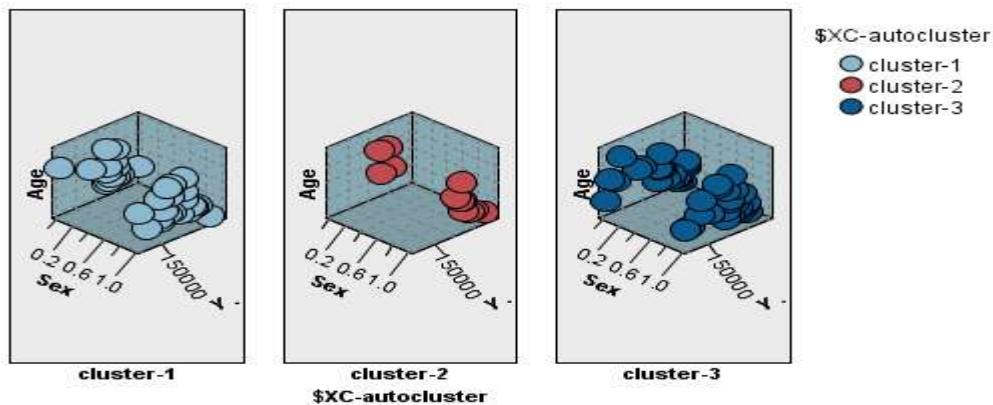
There are three clusters or groups based on the three dimensions of sex, age and yearly income. It seems that cluster-3 has the highest number of data or covers largest number of data and cluster-2 covers the lowest number of data.

Figure 16: Three clusters



In cluster-1, all data belong at the area of age, sex and yearly income. In cluster-2, all data belong at the area of age and sex mostly. In cluster-3, maximum data belong to age, sex and yearly income.

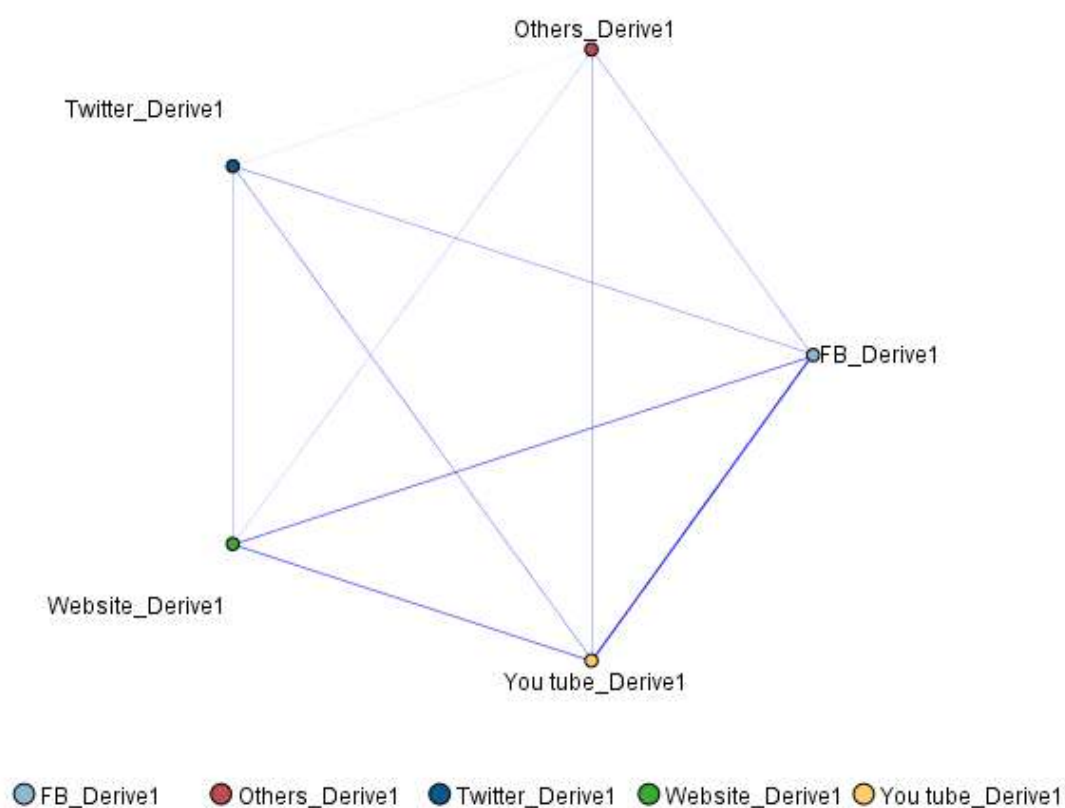
Figure 17: Clusters



### Association rule

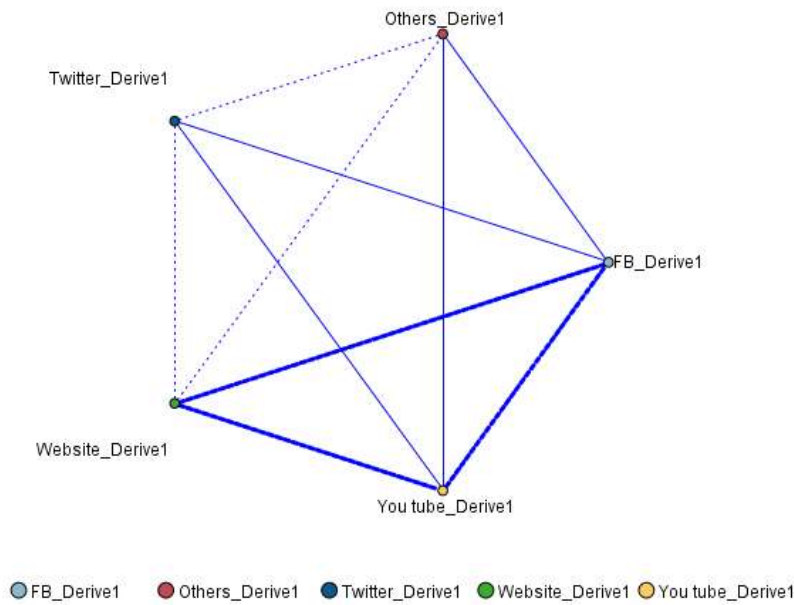
Association rule is a descriptive approach to explore data that can help identify relationships among values in a dataset. Analyze things that happen at the same time and find association rules about items that appear together in an event as a purchase transaction. Based on this information of customers who see the ads at several online sites, we recommend few item sets for ads which will help the owner to take the better decision for providing the ads at several medias. Before using the apriori model, we use web (graph) to show the association of item sets of several online medias.

Figure 18: apriori model



From the graph, we can see the association of item sets. Few item sets are strongly linked (useful for the business), few are moderate linked (less useful for the business) and others are weakly linked (weak association rule). After setting “Strong links above” value to “60” and “Weak links below” value to “50”, we find another graph which is shown below.

Figure 19: Associations



There are three item sets (associations) at strong links, four item sets (associations) at medium links and others are weak item sets (associations). Strong link associations are needed for the business to understand for marketing the products which are used for ads one for another (antecedent and consequents). At the strong links, we think that the association of you tube and Facebook, website and you tube, website and Facebook are most likely logical. So, we can say that these associations are significant for the business. At the medium links, the association of twitter and FB, you tube and twitter, you tube and others, FB and others are less useful or less association rule. We also think that weak links are not concerning factors for the business because these item sets are not significant or weak association rule.

Table 7: Association links

Strong Links		
Links	Field 1	Field 2
96	You tube_Derive1 = "T"	FB_Derive1 = "T"
74	Website_Derive1 = "T"	You tube_Derive1 = "T"
74	Website_Derive1 = "T"	FB_Derive1 = "T"
Medium Links		
Links	Field 1	Field 2
59	Twitter_Derive1 = "T"	FB_Derive1 = "T"
58	You tube_Derive1 = "T"	Twitter_Derive1 = "T"
53	You tube_Derive1 = "T"	Others_Derive1 = "T"
53	FB_Derive1 = "T"	Others_Derive1 = "T"
Weak Links		
Links	Field 1	Field 2
46	Website_Derive1 = "T"	Twitter_Derive1 = "T"
42	Website_Derive1 = "T"	Others_Derive1 = "T"
29	Twitter_Derive1 = "T"	Others_Derive1 = "T"

At the apriori model, we set the “Minimum antecedent support (%)” to “10”, the “Minimum rule confidence (%)” to “80.0”, and the “Maximum number of antecedents” to 5. Among the association rules, we find the association rule that has the highest confidence (e.g., 97%).

Table 8: apriori model

Consequent	Antecedent	Support %	Confidence %	Rule Support %	Lift
FB_Derive1	Twitter_Derive1	60.0	98.333	59.0	1.003
FB_Derive1	Twitter_Derive1	58.0	98.276	57.0	1.003
Youtube_Derive1	Others_Derive1	54.0	98.148	53.0	1.002
FB_Derive1	Others_Derive1	54.0	98.148	53.0	1.002
FB_Derive1	Others_Derive1	53.0	98.113	52.0	1.001
Youtube_Derive1	Others_Derive1	53.0	98.113	52.0	1.001
FB_Derive1	Youtube_Derive1	98.0	97.959	96.0	1.0
Youtube_Derive1	FB_Derive1	98.0	97.959	96.0	1.0

At the association rule according to the highest confidence level (97%), eight item sets comply the rule support (more than 10), lift is more than 1 and confidence level more than 97%. So, we can say that these item sets (associations) are helpful to increase the sales. Owner of mobile station can use these sets for ads which can increase the profitability of the business.

Among the association rules, we find the association rule that has the highest rule support (e.g., 50).

Table 9: Association rules

Consequent	Antecedent	Support %	Confidence %	Rule Support %	Lift
FB_Derive1	Youtube_Derive1	98.0	97.959	96.0	1.0
Youtube_Derive1	FB_Derive1	98.0	97.959	96.0	1.0

There are two item sets (you tube & FB, FB & you tube) according to the highest rule support (50) with good lift (equal to 1) and the confidence level is higher than 97%. We can recommend twitter & FB (rule support is 59, lift is 1.003 and the confidence level is 98.33%); twitter, you tube & FB (rule support is 57, lift is 1.003 and the confidence level is 98.28%); others & you tube (rule support is 53, lift is 1.002 and the confidence level is 98.15%); others & FB (rule support is 53, lift is 1.002 and the confidence level is 98.15%); others, you tube & FB (rule support is 52, lift is 1.001 and the confidence level is 98.11%); others, FB & you tube (rule support is 52, lift is 1.001 and the confidence level is 98.11%) We think that these item sets (associations) are good for this business for FB show the ads of the products and services.

Among the association rules, we find the association rule that has the highest lift (e.g., 1).

Table 10: Association rules

Consequent	Antecedent	Support %	Confidence %	Rule Support %	Lift
Website_Derive1	Others_Derive1 Twitter_Derive1	29.0	82.759	24.0	1.089
Website_Derive1	Others_Derive1 Twitter_Derive1 Youtube_Derive1	28.0	82.143	23.0	1.081
Website_Derive1	Others_Derive1 Twitter_Derive1 FB_Derive1	28.0	82.143	23.0	1.081
Website_Derive1	Others_Derive1 Twitter_Derive1 Youtube_Derive1 FB_Derive1	27.0	81.481	22.0	1.072
FB_Derive1	Twitter_Derive1	60.0	98.333	59.0	1.003
FB_Derive1	Twitter_Derive1 Youtube_Derive1	58.0	98.276	57.0	1.003
Youtube_Derive1	Others_Derive1	54.0	98.148	53.0	1.002
FB_Derive1	Others_Derive1	54.0	98.148	53.0	1.002
FB_Derive1	Others_Derive1 Youtube_Derive1	53.0	98.113	52.0	1.001
Youtube_Derive1	Others_Derive1 FB_Derive1	53.0	98.113	52.0	1.001
FB_Derive1	Youtube_Derive1	98.0	97.959	96.0	1.0
Youtube_Derive1	FB_Derive1	98.0	97.959	96.0	1.0

According to the association rule (lift is 1 or more), the above-mentioned item sets are not bad for the business for using ads purpose because these item sets have good rule support (more than 10), good confidence level (more than 80%) and good lift value (equal or more than 1). So, we can recommend the owner of the business to use these items sets for ads purpose to increase the sales.

## IMPLEMENTATION

“It is crucial that analytics solutions are developed and provided to the enterprise with the end goals in mind.”<sup>10</sup> Implementing analytics solutions is broad and complex as it relates to how the information-based solutions are developed and provided to the enterprise.<sup>11</sup> Before implementing analytics solutions, two important considerations are required. First, the implementation should start with the “End” in mind (i.e. what the solutions will bring to the firm). Second, how internal stakeholders such as marketing leaders, service representative, salespeople etc. might utilize the solutions that analytics provide.

In our current project, the End that we have in mind for analytics solutions is to enable Mobile Station to compete successfully in the market, promoting its business and increasing its sales. So, first we will explain implementation process and provide recommendations. Secondly,

<sup>10</sup><https://www.ama.org/documents/7%20pillars.pdf>

<sup>11</sup><https://www.ama.org/documents/7%20pillars.pdf>

we will address the managerial, financial, technical, and infrastructural challenges that Mobile Station may face to implement the solutions.

Our data analysis from Decision Trees shows that the promotional activities through Facebook, YouTube, twitter, website etc. will make 85% of total customers to purchase from Mobile Station. And the CHAID model demonstrates that, promotion through Facebook will make 86.67% of total customers to visit and Mobile Station and purchase from it. Also, from the Logistic Regression we have found 51 cases that have 100% probability to purchase from Mobile Station after promotional activities. As our overall data analysis demonstrates a very high possibility of bringing customers to Mobile Stations through promotional activities, Mobile Station should promote its business through different media. Now, what media such as Facebook, YouTube, Website, twitter etc. Mobile Station should use to promote its business depends on our analysis on Association Rule. According to the findings from Association Rules, most of the item sets (associations) have higher confidence level (more than 80%), higher rule support (more than 10) and higher lift (more than or equal 1). The screenshot below represents the findings from association rules.

Table 11: Association rules

Consequent	Antecedent	Support %	Confidence %	Rule Support %	Lift
FB_Derive1	Twitter_Derive1	60.0	98.333	59.0	1.003
FB_Derive1	Twitter_Derive1 You tube_Derive1	58.0	98.276	57.0	1.003
You tube_Derive1	Others_Derive1	54.0	98.148	53.0	1.002
FB_Derive1	Others_Derive1	54.0	98.148	53.0	1.002
FB_Derive1	Others_Derive1 You tube_Derive1	53.0	98.113	52.0	1.001
You tube_Derive1	Others_Derive1 FB_Derive1	53.0	98.113	52.0	1.001
FB_Derive1	You tube_Derive1	98.0	97.959	96.0	1.0
You tube_Derive1	FB_Derive1	98.0	97.959	96.0	1.0

## RECOMMENDATIONS

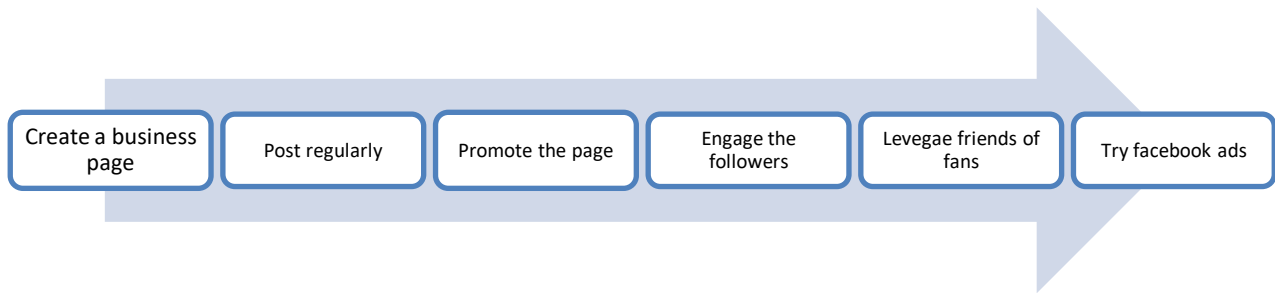
**1. Creating Own Website:** The most important task to promote the business of Mobile Station is to develop its Website first as all of its competitors have their own website. But one thing that Mobile Station should keep in mind while maintaining the website is that the price list has to be cheaper than that of the competitors, otherwise customers will go with competitors that offer the least price. Mobile Station can create and develop the website in two ways; Hiring a Web designer and Using a Website Builder (i.e. Wix). Creating and maintaining a website through hiring a web designer costs around \$6,760, while doing it through website builder costs \$60 only.<sup>12</sup>

<sup>12</sup><https://www.websitebuilderexpert.com/how-much-should-a-website-cost/>



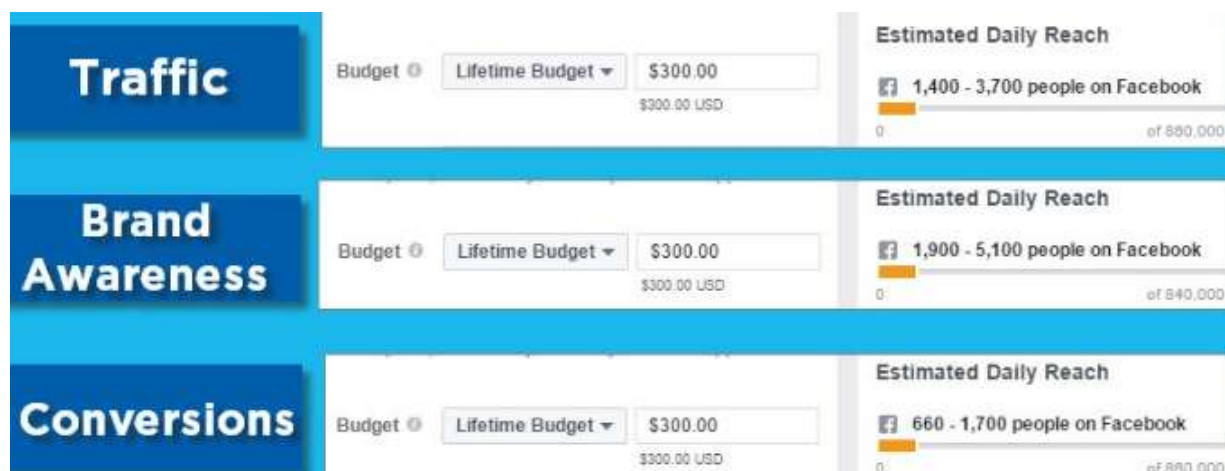
**2. Promoting Business through Facebook:** Nowadays Facebook has become most common media people get connected to each other through. Around 229.9 million people in USA use Facebook.<sup>13</sup> Businesses are taking this advantage to promote their product and services. All of the competitors of Mobile Station such as ifixandrepair, Cellairis, CellFix are using Facebook to promote their business. Promotion can be made through either creating an Ad or creating a page. Mobile Station can follow the steps, given by Saige Driver<sup>14</sup>, shown below to promote its business through.

Figure 20: Promotional options



Mobile Station should think of the costs associated with advertising through Facebook. Advertising through Facebook does not require hiring any people but paying third party for advertisement. Advertising budgets depend on ad objectives. The following picture demonstrates three identical budgets for three different ad objectives.<sup>15</sup>

Figure 21: Three identical budgets



<sup>13</sup><https://www.statista.com/statistics/398136/us-facebook-user-age-groups/>

<sup>14</sup><https://www.businessnewsdaily.com/5453-how-to-promote-your-small-business-on-facebook.html>

<sup>15</sup><https://www.bluecorona.com/blog/how-much-facebook-advertising-costs>

Since the objective of Mobile Station is to increase brand awareness, it should make lifetime budget of \$300. This will ensure daily reach to around 1,900-5,100 people on Facebook.

**3. Promoting through YouTube:** Around 184.7 million people in USA are using YouTube in 2018.<sup>16</sup> The most important benefit that Mobile Station can extract from advertising in YouTube is that none of its competitors is using YouTube to promote its business. There are some people who watch videos on phone reviews and on how to fix phone. If Mobile Station connects its ads with such related videos, it can attract customers who don't have any intention to visit the store otherwise.

Mobile Station can make its own customized budget for creating ads in YouTube. Businesses usually start with at least \$10 per day for local campaigns.<sup>17</sup> Mobile Station should spend around \$20-\$30 per day on YouTube advertising.

### **Managerial Implications**

Failing to compete successfully in the Mall, the store manager is currently looking for ways to promote its products and services. After evaluating our solutions, he says, "as long as cost doesn't outweigh the revenue, he can implement whatever system is required to promote the business."

### **Technical and Infrastructural Implications**

Promoting through above mentioned media doesn't require any major infrastructural or technical changes because all of the promotional activities will be done by third party. But Mobile Station has to buy a new computer and hire a new employee to maintain the promotional media daily.

### **Financial Implications**

As mentioned above promoting the business through Facebook, YouTube, and Website requires some level of investment. But the investment will bring more customers who currently go with other competitors. The owner of this mobile station provides some projected financial information. Based on the information of owner, the following table (projected) demonstrates the cost-benefit analysis of implementing the promotion systems.

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<sup>16</sup><https://www.statista.com/statistics/469152/number-youtube-viewers-united-states/>

<sup>17</sup><https://www.youtube.com/yt/advertise/pricing/>

Table 12: Cost-benefit analysis

Description	Revenue/(Costs) per month
Creating and Maintaining website	(\$60)
Promoting through Facebook	(\$300) <sup>18</sup>
Promoting Through YouTube	(\$600) <sup>19</sup>
Hiring a technical employee	(\$3,000) <sup>20</sup>
Skilled development of employee	(\$500) <sup>21</sup>
Buy a new computer	(\$500) <sup>22</sup>
Increase in sales	\$15,000 <sup>23</sup>

This calculation is based on current sales analysis on Mobile Station and its competitors.

## CONCLUSION

Mobile Station is a franchise retail store providing phone repair services as well as phone accessories. It has an appeal which attracts a lot of franchisee business owners by setting up stores in malls and premium outlets to attract the customers.

The main goal of this project is to maximize the profitability of Mobile Station by solving marketing problems through business analytics approach. From our data analysis we have found a high percentage of customers who have high possibility to visit Mobile Station and purchase from it. From our data analysis we have found that 87%<sup>24</sup> customers take the purchase decision from the visited people. Also, 96%<sup>25</sup> customers visit the store after browsing the website, 97%<sup>26</sup> customers visit the store after seeing ads in YouTube, 97%<sup>27</sup> customers visit the store after seeing the ads in twitter, 98%<sup>28</sup> customers visit the store after seeing the ads on Facebook, and 98%<sup>29</sup> customers visit the store after seeing ads in other media. So, we can say that seeing promotional ads and visiting the store are highly positively correlated.

<sup>18</sup> \$300 is lifetime budget. But it's shown as initial cost and won't occur after first month.

<sup>19</sup> \$20 per day, \$600 per month.

<sup>20</sup> \$100 per day, \$3000 per month.

<sup>21</sup> One time investment

<sup>22</sup> One time investment

<sup>23</sup> Each competitor with all promotional media currently has on average around 40 customers per day.

Hypothetically =, promotion will bring 25% customers from competitors. Total 10 customers spend on an average \$50 per transaction. So,  $10 * \$50 * 30 = \$15,000$ .

<sup>24</sup> Total 97 customers visit the store and 84 of them take purchase decision. So,  $84/97 = 87\%$ .

<sup>25</sup> 76 customers browse website and 73 of them visit the store.  $73/76 = 96\%$

<sup>26</sup> 98 customers see ads in YouTube and 95 of them visit the store.  $95/98 = 97\%$

<sup>27</sup> 60 customers see ads in twitter and 58 of them visit the store.  $58/60 = 97\%$

<sup>28</sup> 98 customers see ads in facebook and 96 of them visit the store.  $96/98 = 98\%$

<sup>29</sup> 54 customers see ads in other media and 53 of them visit the store.  $53/54 = 98\%$

We have also found that 54% customers base their purchase decision on quality, 33% customers base their purchase decision on price, and 13% customers base their decision on styles. Also, 85%<sup>30</sup> customers who have annual income higher than \$60,000 make their purchases. And 78%<sup>31</sup> of service holder and 93%<sup>32</sup> of business people make their purchase decisions. But no clear relationship is found between number of family members and purchase decisions.

From our data analysis finding, we have found that promoting the business through Website, YouTube, Twitter, Facebook, and other media will bring significant number of customers to Mobile Station. Besides promotional activities, Mobile Station must provide both stylish and price-sensitive products as 54% customers focus on style of the product and 33% focus on price of the product. So, failure to sell products from either of these categories will make Mobile Station lose a significant number of customers.

Based on our overall findings, our final recommendation for Mobile Station would be to implement promotional activities such as Website, YouTube, Twitter, Facebook, and other media, and sell both premium and regular products and services. Implementing promotional activities through Website, YouTube, and Facebook will increase the sales \$15,000 per month.

Utilizing methods like Decision Trees and splitting a portion of data in Training and Testing Data sets we concluded that there is a high probability to respond to a promotional activity using the Facebook as almost everyone (98%) in the data set have a Facebook account.

We also found, while conducting a cluster analysis, that a combination of the age group of the customers, their gender and their annual income impact the biggest factors in deciding whether they would purchase or not purchase any product.

We also tested whether the shop should target paying for digital advertisements on Facebook and Youtube and concluded that it should, because it will be a worthy investment for the shop owners to invest in advertisements.

Thus, by conducting all these tests, witnessing the current trend and performing extensive research on the power of digital marketing, we strongly recommend Mobile Station to open up its Facebook and Youtube pages and create their product-based content to attract the customers to their shop and even contribute to increase their revenues by word of mouth.

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<sup>30</sup> Total 67 customers have annual income higher than \$60,000 and 57 of them make purchases.  $57/67 = 85\%$

<sup>31</sup> Among 59 service holder, 46 purchases.  $46/59 = 78\%$

<sup>32</sup> Among 29 business people 27 of them make purchase.  $27/29 = 93\%$

## LIMITATIONS OF THE RESEARCH

We face two constraints at the time of research mainly. Here, we considered only 100 samples. It's so short. For the better research, it's needed to collect the data from more than 100 peoples. Another one is location, we focused on only Tampa area, Florida, USA. All these respondents are from Tampa. So, it's a narrow for sampling.

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## APPENDICES

Table: 13

The screenshot shows an Excel spreadsheet with the following columns: Twitter, FB, Others, Visited, Purcha, Factors, Partition, SR-Purchase, SRC-Purchase, and SRRP-Purchase. The rows contain numerical data, with many cells containing '1' and some containing '0'. The 'Partition' column has values like '1 2\_Testing' and '2 2\_Testing'. The 'SR-Purchase' and 'SRC-Purchase' columns have values of '1' or '0'. The 'SRRP-Purchase' column has values of '0.851' or '0.801'. The spreadsheet is titled 'Decision tree - Excel' and has a 'Dataset' tab selected.

Table: 14

Coincidence matrix table		
<b>CRT Model</b>		
'Partition' = 2_Testing	0	1
0	3	5
1	2	43
<b>CHAID Model</b>		
'Partition' = 2_Testing	0	1
0	2	6
1	0	45

Figure 22: Decision Tree models

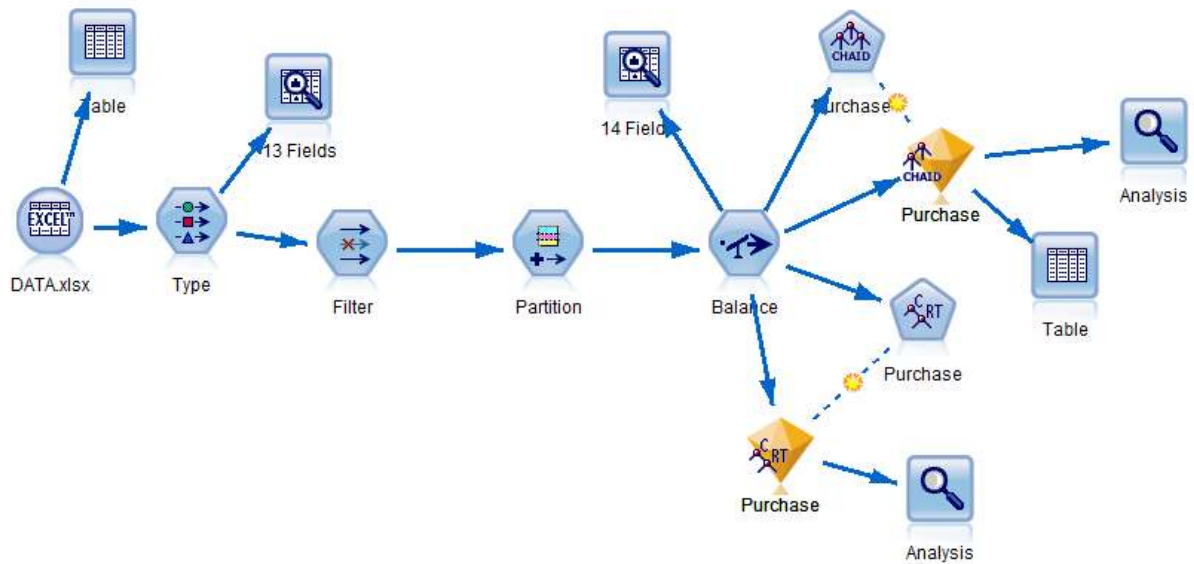


Table: 15  
Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	-.612	.415		-1.473	.144		
Sex	-.088	.074	-.119	-1.201	.233	.847	1.181
Age	-.004	.006	-.091	-.725	.470	.528	1.892
Occupation	.060	.054	.112	1.107	.271	.811	1.232
Y Income	-2.030E-7	.000	-.028	-.238	.813	.616	1.623
Family members	-.007	.051	-.018	-.144	.886	.558	1.792
Website	-.043	.083	-.050	-.516	.607	.899	1.112
You tube	.370	.247	.141	1.499	.138	.945	1.058
Twitter	-.052	.072	-.069	-.722	.472	.907	1.103
FB	.495	.267	.189	1.852	.067	.805	1.242
Others	-.026	.073	-.036	-.358	.722	.847	1.181
Visited	.704	.221	.328	3.189	.002	.794	1.259
Factors (Price, Quality, Style)	.057	.062	.101	.917	.362	.696	1.437

**Table: 16****Model Summary**

Step	-2 Log Likelihood	Cox & Snell R Square	Nagelkerke R Square
1	21.622 <sup>a</sup>	.364	.608

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

**Table: 17****Classification Table**

	Observed	Predicted			
		Purchase		Percentage Correct	
		0.0	1.0		
Step 1	Purchase	0.0	3	5	37.5
		1.0	3	36	92.3
	Overall Percentage				83.0

**Table: 18**

Coincidence matrix table		
Logistic Regression Model		
'Partition' = 2_Testing	0	1
0	5	3
1	7	38
CRT Model		
'Partition' = 2_Testing	0	1
0	3	5
1	5	40



Table: 19

Graph 23: (ROC of Logistic regression)

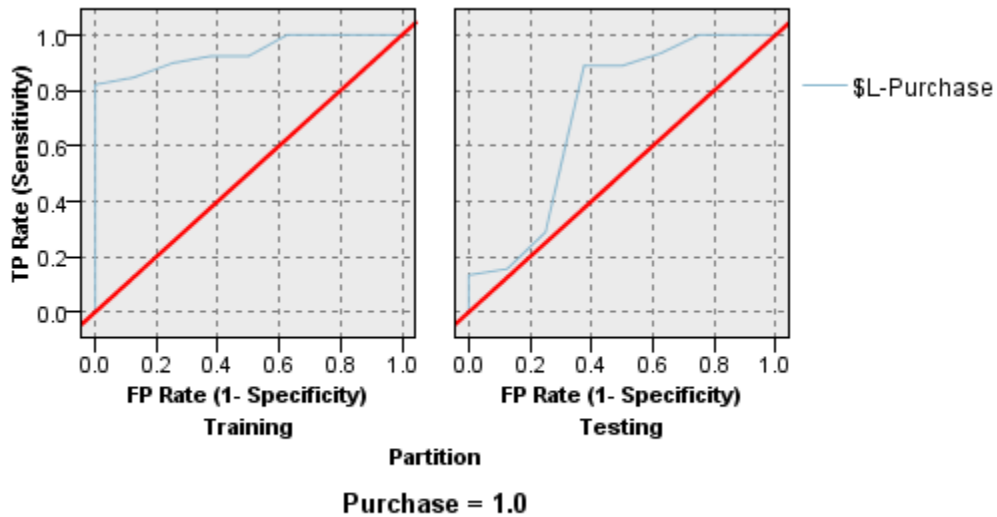




Figure 27: Cluster analysis

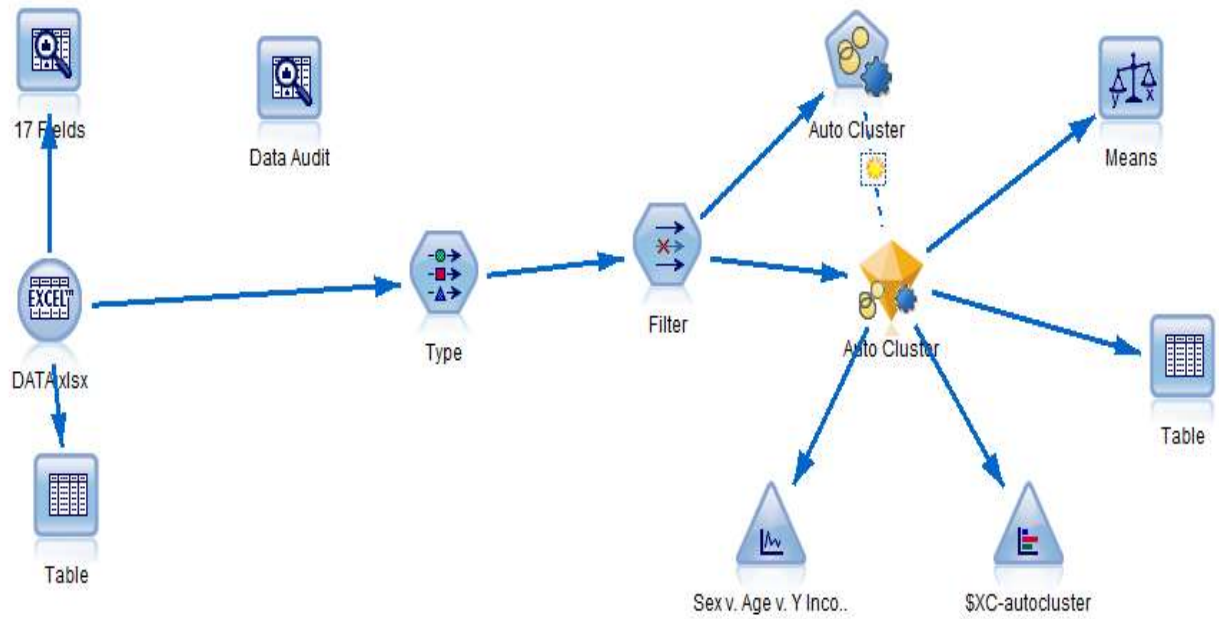
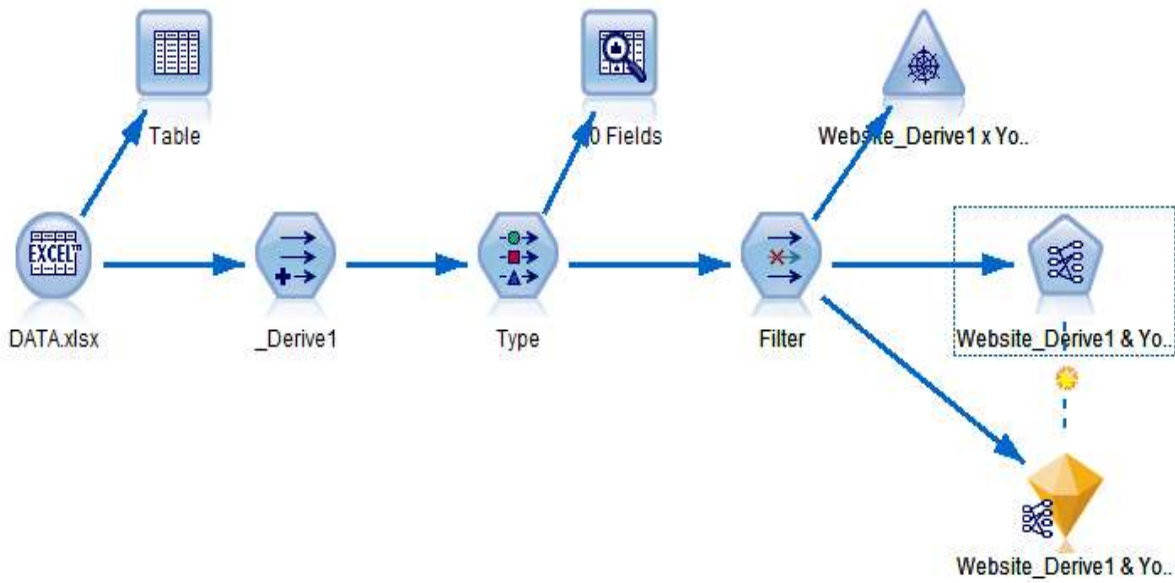


Figure 27: Association rule



**Questionnaire:**

**Mobile Station**  
**Cell Phone accessories and Phone fix**  
Promotional Survey

(N.B: All of your information will be kept confidential. Please answer all the questions but you aren't forced to do so. You can skip question you don't like to answer for.)

1. Name:
2. Sex:
3. Age:
4. Occupation:
5. Annual Income:
6. Email:
7. Phone:
8. How many family members you have:
  
9. Why made you visit Mobile Station: (Circle/put tick mark on the option/s that work/s for you)
  1. Mobile Station Website
  2. YouTube advertisement
  3. Twitter advertisement
  4. Facebook Advertisement
  5. None of the above
  
10. What factors you consider before buying phone accessories or fixing phone? (Circle/put tick mark on the option/s that work/s for you)
  1. Price
  2. Quality
  3. Service
  
11. Do you make purchase all the time you visit the store?
  1. Yes
  2. No