Credit Card Sales Performance Dashboard

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Abstract

Credit card services are one of the most used services in the banking businesses. It is one of the modern processes of lending money to customers in purchasing goods in which they are committed to paying it in the agreed terms. In this study, we will focus on the sales performance of credit cards of a banking company. The study will also create a dashboard which will be the main tool to identify the performing markets of their credit card services. Also, the study will also include a decision tree model that will classify customers' features that is suitable to drive their credit card sales performance and translate to additional profit.

Keywords
Data Visualization, Dashboard, Business Analytics

1. Introduction

Data visualization is an aid in understanding the data provided by placing visual context or a graphical representation.
It provides the ability to easily identify the connections among multi-dimensional datasets. It allows individuals to directly interact with the data and comprehend information quicker. It provides them an accessible way to understand emerging trends in both business and in the market. It aids to spot outliers that may affect the overall business. Data visualization aids to recognize correlated parameters and identify factors that could affect the overall business goals (SAS, 2020).

Managers incorporate visual, text, and verbal communication to aid their target audience in understanding their message. A study conducted (Horn, 2001) a business study on the effect of data visualization and lead to the following conclusions:

- When written information is combined with visualizations, it is 70% more memorable.
- Solving problems are more effective by 19%
- Visualizations produce 22% higher results
- Time is producing results were lessened by 13%.

Data visualization can help different financial institution in decision making. In this study, we would be focusing on the credit card sales in one of the financial institution in the Philippines. This study focuses on creating a platform containing the key-indicators that will provide insight into the business to create strategies and business decisions in credit card sales. With the creation of data visualizations on their current credit card sales, it will aid the business to monitor the credit card applications and create insights and strategies.

The financial institution for this study has a Business Intelligence team that is responsible for providing reports on their credit card sales to the sales agent. Currently, their reports are manually processed in Microsoft Excel where their data is sourced in SAS. With their current manual process, their credit card sales report is cumbersome and could lead to discrepancies in doing their calculations that could cause inaccuracies in their recommendations for the credit card sales team.

The creation of data visualization aims to aid the credit card sales agent to identify the following marketing strategies:

- Focus on the performing markets: the dashboard aims to identify the best-performing markets where they could get more customers that are capable of avail of their products and services. The dashboard will highlight the following factors:
- Channels of Credit Card Application: this shows the different sources that aided the customer with their credit card application. The credit card sales agent could then determine which channels had the most applications for them to capitalize.
- Credit Card Branches: the credit card sales agents are deployed to branches to sell credit card products to potential customers. They aim to determine the performing branches to allocate the right number of staff to perform direct sales to customers. They could then focus on the locations that will get more customers such as mall branches, office buildings, and other commercial establishments.
- Cross-Tabulation: the cross-tabulation matrix aims to identify the right offer to the right market by identifying the quantitative relationship of different variables.
- Focus on the best performing offers: the dashboard aims to identify the most marketable and performing products/services to the customers. This aims to aid the business to strategize in the matching of their product/service to their customers. The business aims to have products that can cater to every customer by identifying their needs and behaviors.
- Maintain and improve their credit card sales performance: the dashboard aims to identify key indicators that will provide ideas to the business to improve their performance in credit card sales. They compare their current performance with their previous performance and then formulate strategies to improve their future sales.

The project includes all decided credit card applications that pass through the Loan Origination System (LOS) and the card system ASCEND. The scope of the project covers data including customer information and their banking information and credit information. The dashboard itself would mainly focus on the count of applications per profile.

2. Related Studies

There are different data visualization tools used in implementing for Business Intelligence for business analysis of different organization. Although, all tools have the same objective which is to create data visualization, to explore and analysis, but each tool is still different from each other. A study was done to determine which among the tools is the most efficient and most effective in fulfilling the user demands (Shukla and Dhir, 2016). This study assessed data visualization tool Qlikview. Using a hypothetical data of the last 5 years are used to analyze the placement record of the university, it is proven that the tool is helpful in creating data visualization. The data visualization meet the requirement of the users.

Another study (Diamond and Mattia, 2019) used data visualization in hiring employees. Using data visualization, the researchers examined the skills employers are looking for an applicant and the skills of the applicants. The researchers used different tools in developing the data visualization. Based on the assessment, regardless of the tool used, data visualization helped them in decision making.

Some researchers (Dupin-Bryant and Olsen, 2014) introduced data visualization tutorial in Information System class. Their objective is to determine the effect of data visualization in decision making. They are expecting that the tutorial will help the students in decision making.

3. Methodology

The researchers were guided by the process workflow as shown in Figure 1.

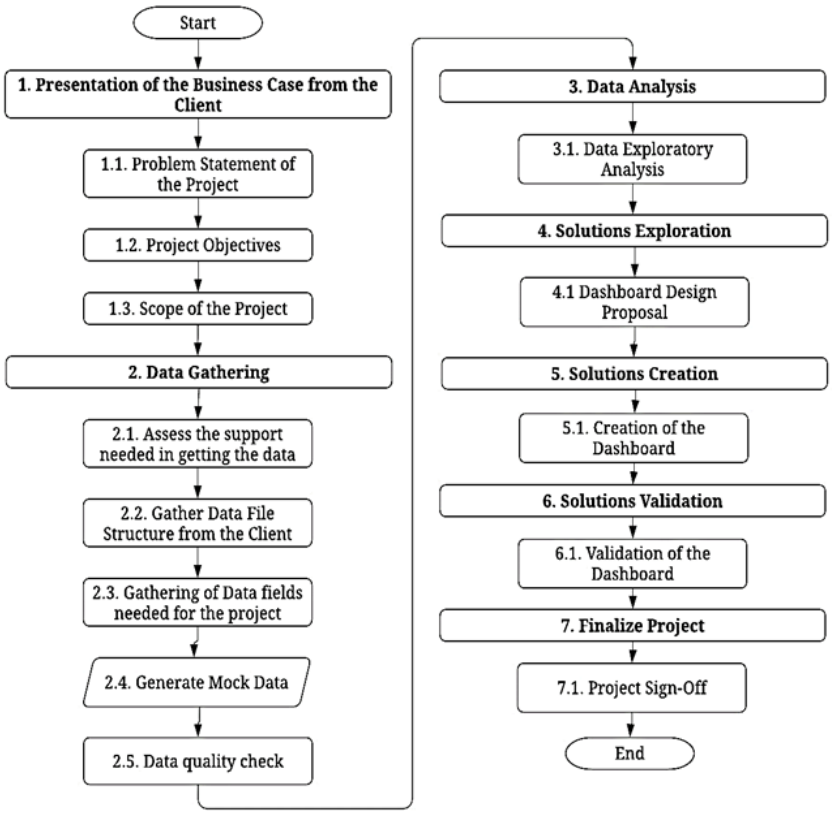


Figure 1. Project Workflow

3.1 Presentation of the Business Case from the Client

1. **Problem Statement of the Project**: The client presented their current projects from the Business Intelligence team. The project focuses on the credit card sales dashboard. They currently use Microsoft Excel. They extract the data from the source and create a report that is viewed by the credit card sales agent. As the data grows, the amount of Excel reports increases which makes it more difficult to create insights.
2. **Project Objectives**: The client presented the objectives of the Credit Card Sales team. They provided the metrics that they monitor in the reports provided by the Business Intelligence team. The business needs a platform to monitor if the Credit Card Sales team is aligned with the larger business objectives.
3. **Scope of the Project**: The client presented the scopes and limitations of the credit card sales report. The client also indicated that the data sharing policy is very strict thus they only provided the field names of the data and suggested using dummy data for the project.

3.2 Data Gathering

1. **Assess the support needed in getting the data**: The client shared their knowledge in the current credit card sales report. The client discussed the data file structure that contained all the field names of the data and provided the list of the field names that the Business Intelligence team used in creating the report. The Business Intelligence team discussed the workaround of a dummy dataset.
2. **Gather the data file structure from the client**: The business sent out the data file structure for Credit Card Sales. The definition of each column field was also indicated to identify which are useful for the credit card sales reports. Possible scenarios/values were also shared by the team for some of the column fields.

3. **Gathering of data fields needed for the project**: The proponent discussed the column fields that will be used for the dashboard creation. The selection of the column fields is based on the definition provided by the client.
4. **Generate mock data**: A web application will be used to generate random data that is in-line with the data dictionary for the credit card sales report.
5. **Data quality check**: The Business Intelligence team will validate if the data has the correct formatting and if it is logical for the dashboard.

3.3 Data Analysis

Data Exploratory Analysis: Descriptive analysis was done to the data which is in-line with the goals of the project. The proponent explored the column fields and confirmed with the client if the analysis aligns with the objectives of the Credit Card Sales team.

3.4 Solutions Creation

Creation of the dashboard: The proponent developed the dashboard that was agreed with the Business Intelligence team using Microsoft Power BI (Free Version).

3.5 Solutions Validation

Validation of the Dashboard: The client will check the dashboard if it aligns with the proposed design and validates if the data and dashboard are displaying the correct data using the mock data created. The Credit Card Sales team validates the dashboard if it is aligned with their objectives.

3.6 Finalize Project

The dashboard will be turned over to the Business Intelligence team and will sign-off the project.

4. Results and Discussion

The objective of the project is to create a platform that will aid credit card sales agents to accomplish their business objectives using the count of customers as their primary metric. The researcher determined first the current workflow of the financial institution. The current workflow will guide the researcher on how to create the data visualization.

4.1 Credit Card Sales Team Current Workflow

The credit card sales team receives reports from the Business Intelligence Team. The Business Intelligence Team extracts the data from the source and creates reports in excel format. The reports generated contain the list of the applicants, detailed information of the applicants, the detailed information about the product they applied for, and the channel of their applications.

The credit card sales team then checks these reports and create insights from these reports by checking the following metrics:

- **Performing Branches:** Most of the credit card applicants are from direct sales where the applicant walks-in to their branches to apply for credit card services. The sales team identifies which branches had more applicants which will also require more deployed direct sales agents to be able to process more applications.
- **Performing Brands/Products:** the sales team identifies which among their brands and products should capitalize to get more approved customers.
- **Performing Customers:** the sales team monitors the information on each applicant such as their residential address, employment status, age, and marital status for them to strategize their branch locations and their availability of their brands/products. They also want to focus on getting more customers by capitalizing on new-to-credit customers.

Overview of the Dashboard - The page shows a high-level summary of the credit card sales performance. It contains the following visualizations:

- **Credit card sales profile by Brand:** this visualization monitors the number of applications of credit cards per brand.
- **Credit card sales profile by Product:** this visualization monitors the number of applications of each product type.
- **Credit card sales profile by Channel:** this visualization monitors the channels that a customer was referred to avail for their credit cards.
- **Total count of approved credit card applications:** these visualizations track the total approved credit card applications per month and year-to-date figures.
- **Total count of rejected credit card applications:** these visualizations track the total rejected credit card applications per month and year-to-date figures.
- **The approval rate of credit card applications:** this visualization tracks the overall approval rate of their credit cards.
- **Second Card Rate:** these visualizations show the percentage of the approved customers to obtain another credit card.
- **Total count of the Carded/Non-Carded credit services:** this visualization shows the count of carded and non-carded credit applications.
- **New to Credit card application rate**: this visualization shows new applicants for the credit card.
- **Credit card sales profile by Branch:** this visualization monitors the card sales activities for each Branch.
- **Rejected credit card application table:** this visualization monitors the reasons for rejected applicants for their credit cards.
- **Year-on-Year Comparison of credit card sales:** this visualization monitors the sales comparison of credit cards.

Customer Demographics Dashboard - The page shows the analysis of the customer profiles who applied for the credit cards:

- **Customer by Employment Years:** this visualization monitors the count of customers in their years of employment.
- **Customer by Net Income:** this visualization monitors the count of customers in their Net Income.
- **Monthly Customer Count:** this visualization monitors the total number of customers and their Employee Type monthly.
- **Customer by Education:** this visualization monitors the count of customers in their Educational Attainment.
- **Customer Residential Address Map:** this visualization displays a map of customer count per residential address.
- **Customer Residential Address Table:** this visualization monitors the count of customers per residential address.
- **Approval Rate:** the visualization shows the approval rate of the customers.
- **Approved/Rejected Count:** this visualization shows the count of approved and rejected customers.
- **Employed/Unemployed Count:** this visualization shows the count of Employed and Unemployed customers.
- **New to Credit Count:** this visualization shows the count of new-to-credit card customers.

4.2 Credit Card Sales Dashboard New Workflow

Credit Card Sales Performance Overview. The dashboard displays the overview performance of the dashboard. The credit card sales team will be able to monitor the overall credit card sales performance on one page. Credit card sales will be able to determine which product Brand and products marketable. They can determine which Branches are performing and be able to strategize their deployment of direct sales agents. The credit card sales team can briefly check now the count of customers that are approved, rejected, new applicants, applicants that will be granted another card, and the reasons the applicants were rejected.

Customer Demographics Dashboard. The dashboard displays customer information that will aid them in decision making. They can identify the type of applicant who applies for which product. They will be able to identify which

branches should be put to focus because there are more applicants which have a residence address or work address near their branches.

Cross-Tabulation Page. The credit card sales team will be able to create more analysis and comparisons by cross-tabulation between charts and dashboard pages. This functionality reveals additional details of the charts and displays additional records that contain specific characteristics described from other charts. The Cross-Tabulation is in a matrix table that can expand their rows or columns to identify quantitatively the relationship of multiple variables.

4.3 Dashboard for Visualization

The generated data are loaded to a dashboarding tool (Microsoft PowerBI) and create the report in which we would determine if it is in line with the objectives. The date is filtered from January 1, 2018, to the latest data to get the comparison of the sales performance from the current year (2019) to last year (2018). The results displayed in Credit Card Sales Performance Overview are using mocked up data.

Credit Card Sales Performance Overview

Figure 2. Credit Card Sales Performance Overview

Figure 2 shows the Overview Dashboard of the credit card sales performance. This displays the figures which they are primarily monitoring. The business would like to monitor the count of the applicants (approved or rejected). The overview dashboard displays the overall count of applicants in different profiles.

Profile by Channel

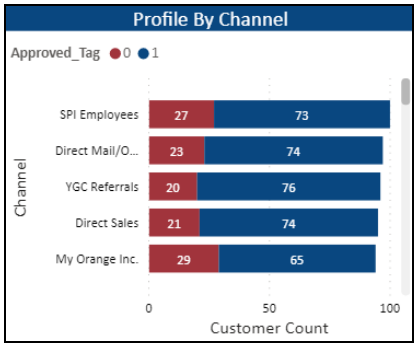


Figure 3. Profile by Channel (Bar Chart)

The business wanted to determine which channel that is mostly utilized by the customers. This would identify which channel should the business focus on in catering their credit card services. Figure 3 shows chart counts of approved/rejected customer per channel.

Profile by Branch

As shown in Figure 4, the performing branch can be determined in the Overview Dashboard. The basis will be the branch with the greatest number of customers and the branch with the most approved customers. The business wants to identify which branches would they still maintain to cater services for one of the top channels of inquiring for credit cards is Branch referral.

Profile By Branch

Branch_Code	Customer Count	Approved	Rejected
328	16	11	5
481	14	13	1
23	13	8	5
46	13	9	4
200	13	8	5
304	13	11	2
365	13	12	1
405	13	10	3
468	13	8	5
81	12	6	6
Total	**3,246**	**2,398**	**848**

Figure 4. Branches with most applicants

Profile by Brand

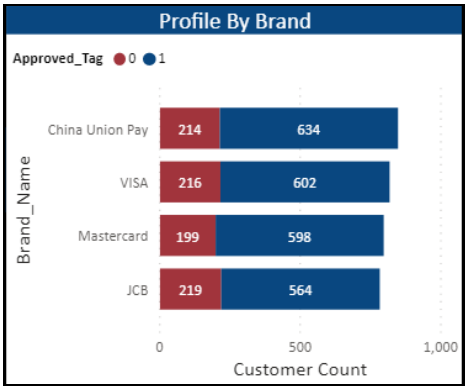


Figure 5. Profile by Brand Stacked Column Chart

The business wants to identify which brands should be maintained that are performing well in terms of sales. The financial institute has 4 brands for their credit card services which are VISA, Mastercard, JCB, and China Union Pay. Figure 5 shows the column chart of Approved and Rejected applicants.

Profile by Product

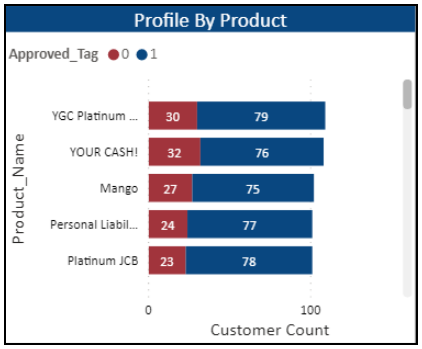


Figure 6. Profile by Product bar Chart

The business had different product lines offered for the customers. The business wants to identify the most performing products and be able to strategize in selling them, refer to Figure 6.

Year By Year Comparison

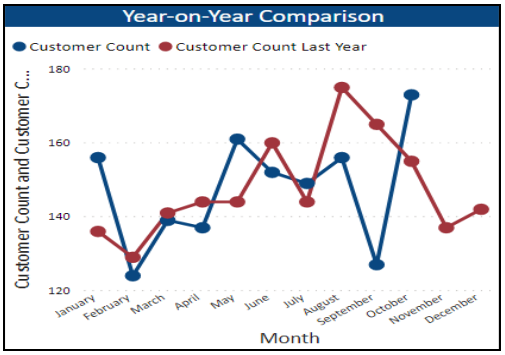


Figure 7. Line Chart of Current Year vs Last Year Credit Card Sales

The business monitors the sales performance of their credit card services by comparing the sales count from last year. The business should improve if not maintain their sales performance. As shown in Figure 7, line chart is used to show the sales performance for the current year and last year. The sales performance of last year is higher than the current year's sales performance in most of the months.

Profile of Rejected Applicants

Profile By Reject Reason

Reject_Reason	Count
Low income	633
Delinquent	40
Several inquiries in credit report	30
too many credit cards	25
Too high load balance	23
lack credit history	22
not enough tenure in current job	22
Total	**848**

Figure 8. Table of reject reasons and its customer count

The business identifies the reasons for rejecting applicants. They also monitor these figures to strategize their selling strategy to the customers. For instance, if a branch has a huge number of rejected applicants, they would consider finding another branch to operate or offer a product that may meet the customer's requirements. Figure 8 shows the different reasons of rejects.

Customer Demographics

The business wants to maximize its sales performance by identifying approvable customers. By studying the demographics, the business would be able to identify what type of customers would help them get most of the approved customers.

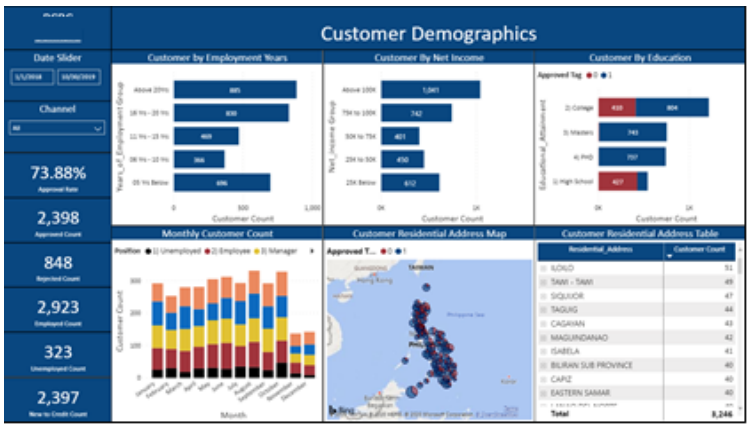


Figure 9. Customer Demographics

The Customer Demographics (shown in Figure 9) dashboard displays the demographics of the customers. The business could identify the details of their customers such as which among the customers are employed, which among the customers are tenured to their occupation, what are their educational attainment and where do they live to identify which branches could be maintained due to the high volume of applicants.

Customer by Employment Years

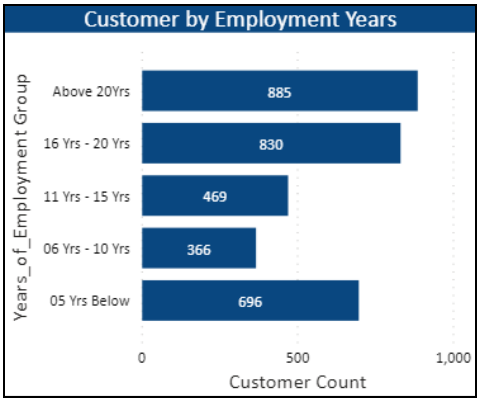


Figure 10. Bar Chart of the customer by their employment years

The business monitors the employment years of the customers (as shown in figure 10). This would help them identify if the applicant has a stable occupation that could be a factor if they would be able to continuously settle their credit balance. The bar chart identifies the work tenure group of customers.

Customer by Net Income

The business approval for the customer is also based on their net incomes. Their monthly income could also be a factor if they could easily settle their credit balances (as shown in figure 11).

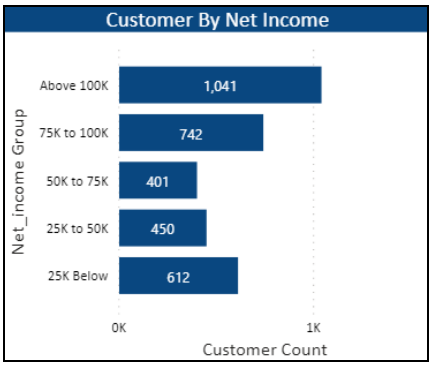


Figure 11. Funnel Chart of Customer Net Income

Customer By Education

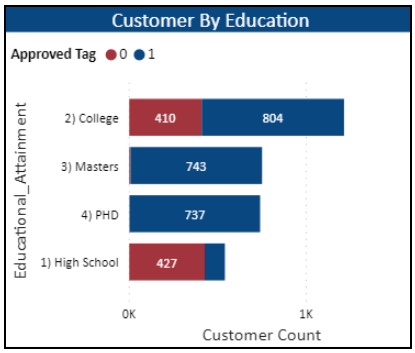


Figure 12. Customer by Education Column Chart

Figure 12 shows the educational attainment of the customers. The business checks the educational background of the applicants. The business would like to identify what education were they able to attain to aid the business to know if the applicant is responsible or literate enough to handle credit card services.

Monthly Customer Count

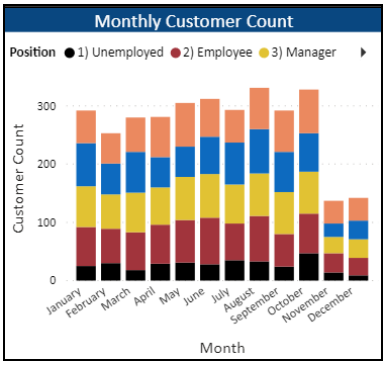


Figure 13. Monthly Customer Count Column Chart

The business monitors the monthly count of customers. The column chart (refer to figure 13) is also divided per Employee Type. The business wants to identify the occupation of the applicants to know the capability of the customers in managing their credit card services.

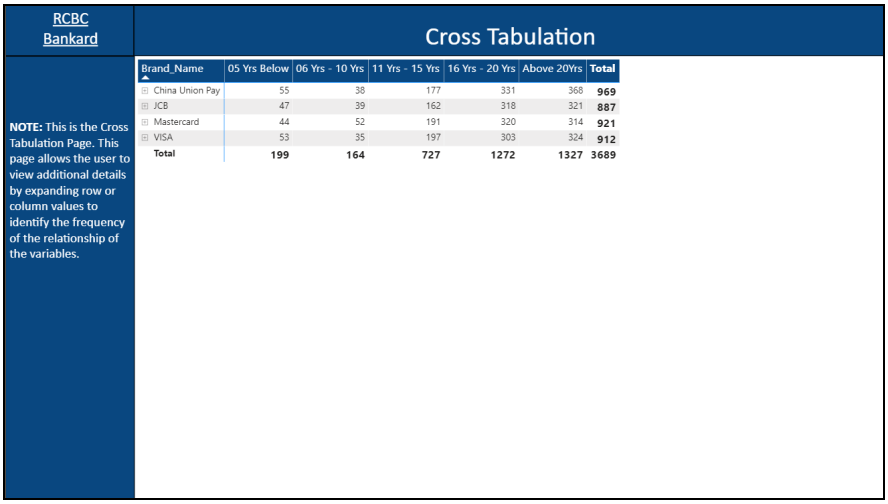
Customer Residential Address Map

Figure 14. Map chart of the customer's residential address

The business wanted to increase the number of customers by strategizing their branch location to offer convenience to the customers to avail of their credit card services (refer to figure 14).

4.4 Cross-Tabulation

The dashboard (refer to figure 15) is also capable of showing other dimensions of the chart that will expand your analysis and comparisons. The matrix table contains a hierarchy of dimensions that can be expanded down or complete expansion to the next hierarchy. This can be done in both row values and column values.



Brand_Name	05 Yrs Below	06 Yrs - 10 Yrs	11 Yrs - 15 Yrs	16 Yrs - 20 Yrs	Above 20Yrs	Total
China Union Pay	55	38	177	331	368	969
JCB	47	39	162	318	321	887
Mastercard	44	52	191	320	314	921
VISA	53	35	197	303	324	912
Total	199	164	727	1272	1327	3689

Figure 15. Cross-Tabulation Page

The matrix table contains a hierarchy of row and column fields that can be expanded to identify quantitatively the relationship of the variables

5. Conclusion

The usage of visualization aids the users to perceive the information needed to effectively generate insights and aids them in making decisions to drive business performance at a faster rate. It allows interaction with the data through graphical representation. Visualization aids the user to analyze by exploring the data in the dashboard. The dashboard developed for a financial institution will aid the business to identify performing markets and formulate strategies for their credit card sales.

With Data Science gaining popularity, several businesses are now gearing up to data visualization and predictive modeling. If the visualization gives the business descriptive information, the models give the business predictive information that aids them to make decisions to optimize their business operations. The decision tree is one of the several models used by the business to classify and make predictions. Several businesses and industries had already recognized the benefits of using data science in their business which is why data science is becoming a trend.

To have a better data visualization, an assessment must be done by the user. Any suggestion from the user's assessment should be integrated, retest and be assessed.

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