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HBR - CARVANA: IS BADBUY?

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1.1 UVA CASE STUDY QUESTIONS

1.1.1 What is Data Science?

The word data science refers to the multiple areas which are used to extract meaning and insights from data using statistics, scientific methods, and data analysis. It consist of multistage process of data preparation (collecting, cleansing, aggregating) and manipulating the data to perform advanced data analysis using different tools and techniques. The results are useful to uncover patterns and enable business leaders to draw informed insights.

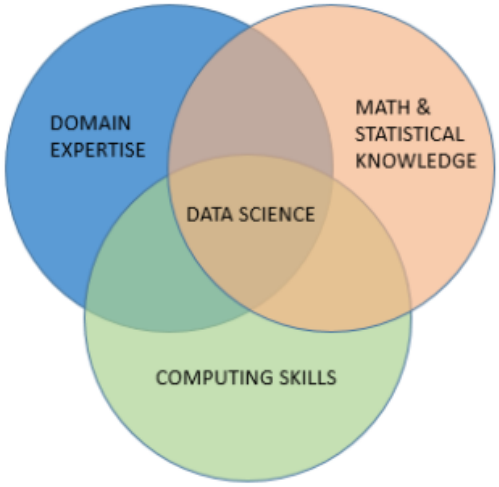

Figure 1 Data Science Scope

Table 1 Data science's lifecycle stages are captured :

Stage	Objective
Capture	Gather raw structured and unstructured data
Maintain	take the raw data and convert to a usable format
Process	Use prepared data to examine its patterns, ranges, and biases to determine how useful it will be in predictive analysis.
Analyse	Perform the various analyses on the data (Exploratory/Confirmatory, Predictive Analysis, Regression, Text Mining, Qualitative Analysis)
Communicate	Prepare the analysis results in easily readable and stakeholder preferred formats such as charts, graphs, and reports

1.1.2 What Do You Think of Carvana's Mission, Business Model, And Achievements?

Carvana is an online platform based car retailer which allows consumers to buy, sell, trade-in, or finance a car with a minimum of hassle. Even though the Carvana operates in small margin industry, Carvana generates its revenue by buying low and selling high. The whole online business model designed in a way to aim at reduce costs and in the process, increase profits by means of price transparency, Inventory Centralization , Dealership costs and streamlined buying process.

Carvana provided a convenient and fast digital buying platform with physical vending locations which enhances the customer buying experiences. This to provide a comparable alternative to traditional car-buying experience. This car vending machines and advertising have helped the Carvana enjoy remarkable revenue growth since 2015 however, the growth rates has been unstable and market is getting saturated.

Figure 2 Carvana's Car Vending Machine in Tennessee

The use of machine learning models and Kaggle competition platform has enabled Carvana to adapt various predictive modelling strategies. However, the Carvana's current business is easily adoptable by other online car retailer competitors and other dealers while leveraging existing inventory and distribution network advantages. Hence Carvana needs to come up with more disruptive innovative strategies to lead this marketspace.

1.1.3 Would you invest in Carvana?

The market study shows Carvana had tremendous revenue growth since 2015. Even though some microeconomic factors and Covid pandemic has boosted the market for used cars, the overall firm growth rate is declining. In addition to that Carvana has already captured almost 73% of USA population, and further expansion in smaller markets may lead to decrease in operating efficiency.

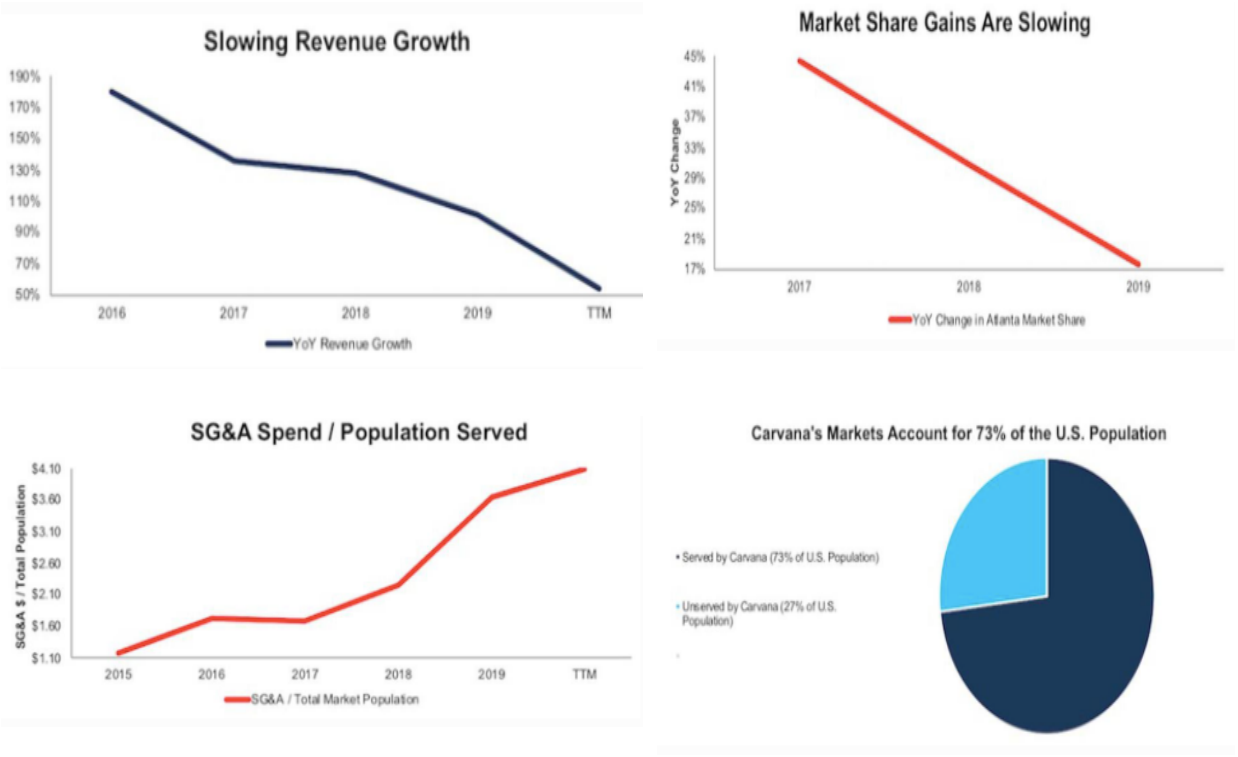

Figure 3 Carvana Financial Analysis

Additionally, the competition has been increased in this marketplace. I believe that the financial valuation of Carvana needs to be re-evaluated. Hence, I would prefer to watch first the post pandemic business strategy of Carvana to beat the competition and to acquire leader position in this business before investing in the Carvana.

1.1.4 Have Carvana's Algorithms Been Effective in Predicting Which Cars Are Kicks and Not Kicks?

One of the biggest challenges faced by resale auto market is to identify if the purchase is worth the investment or not. This risk can affect customers as well as to the dealers in terms of transportation cost, repair work, and resale market losses. The objective of Carvana's algorithm is to predict if the car purchased at the Auction is a Kick (bad buy). Some of the important predictors that can be tracked down by this algorithm can be the percentage distribution of kicked cars by Age, impact of Vehicle Make on bad buys, etc.

It has been observed, few business insights about vehicle auction can be used by for used car dealers. For example, the age of the used vehicle plays can be important indicator since older cars most likely also have higher mileage, older engines, and outdated technical designs. Hence, this analysis may help dealers to make right decision. Hence older cars typically will have higher maintenance cost and have lower retail value.

By tracking down predictors for kicked cars, Carvana can make better purchase choices and avoid more bad buys which is reflected in business growth and revenue numbers of Carvana. Carvana was able to gain a quick turn-around at good retail price and able to make good profits considering other expenses due to this algorithm. Using this algorithms, Carvana can predict the most accurate price and reduce the losses if these resale cars turn out to be kicked cars.

1.1.5 What are Visual Analytics? How Can It Been Applied in Carvana's Data Set in Kaggle? What Makes Hans Rosling's Visualization So Effective?

Use tools and processes on dataset for analytical reasoning is called Visual Analytics. In this the data is represented in the forms of in graphs, charts, and maps which can be used to identify patterns and thereby develop actionable insights to make better, data-driven decisions.

Some of the key benefits of Visual Analytics are:

1. Share key insights and key findings in the form of interactive reports and dashboards.
2. Make faster decision due to easily understandable data visualization
3. Easy tracking of hidden patterns and relationships among data

The visual analytics can be used to Carvana's dataset to identify useful patterns and insights about used cars. This can be used to predict the most accurate price of cars and reduce the losses if these resale cars turn out to be kicked cars. For example is there any relationship between age of car, make of car and its milage, its maintenance cost, etc.

In the Ted talk by Hans Rosling , he showcased the overall global trends in health and income over the last 200 years, the development of the HIV/AIDS-epidemic and how China is catching up on the richest countries with powerful visualizations. He used Gap minder that shows all of the insightful data in a colourful and easy-to-read format. It was interesting to watch building a story leveraging the data. The powerful visual animations transform development statistics and numbers over years into moving bubbles and flowing curves that make global trends engaging, intuitive and even playful. The Figure 4 indicates the relationship between vehicle age and Car make model with the bad buy. The figure 5 showcases the correlation between Make of Car and average warranty cost of vehicle.

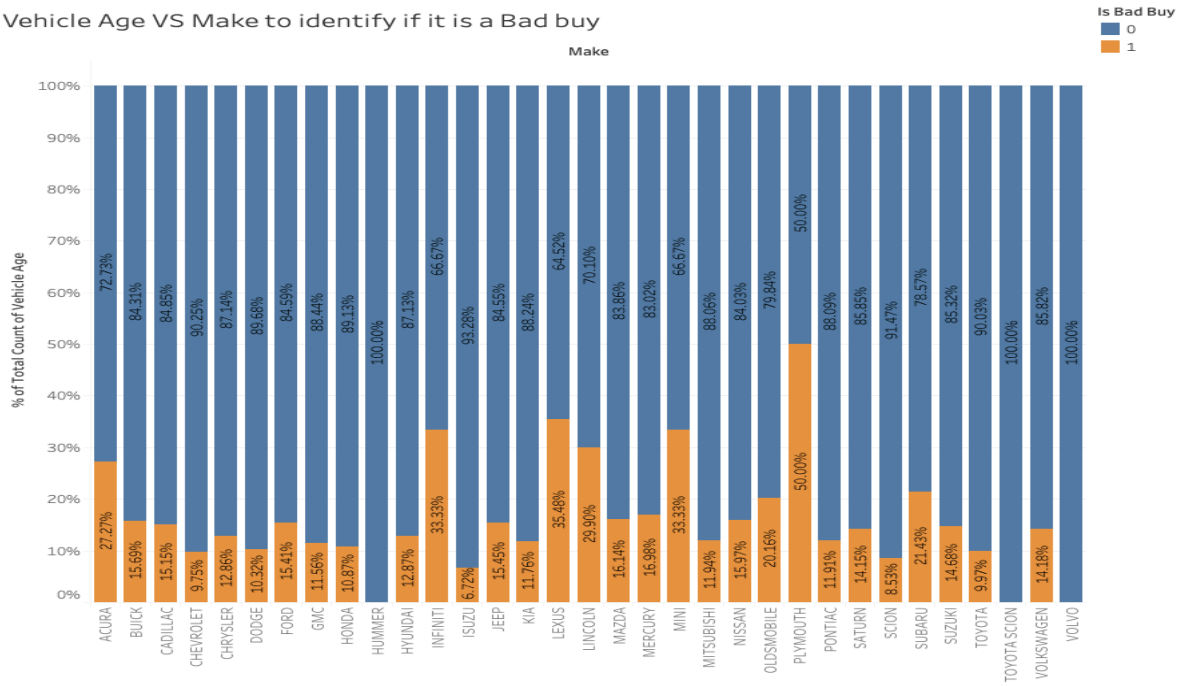

Figure 4 Vehicle age Vs Make indicating percentage of bad buy

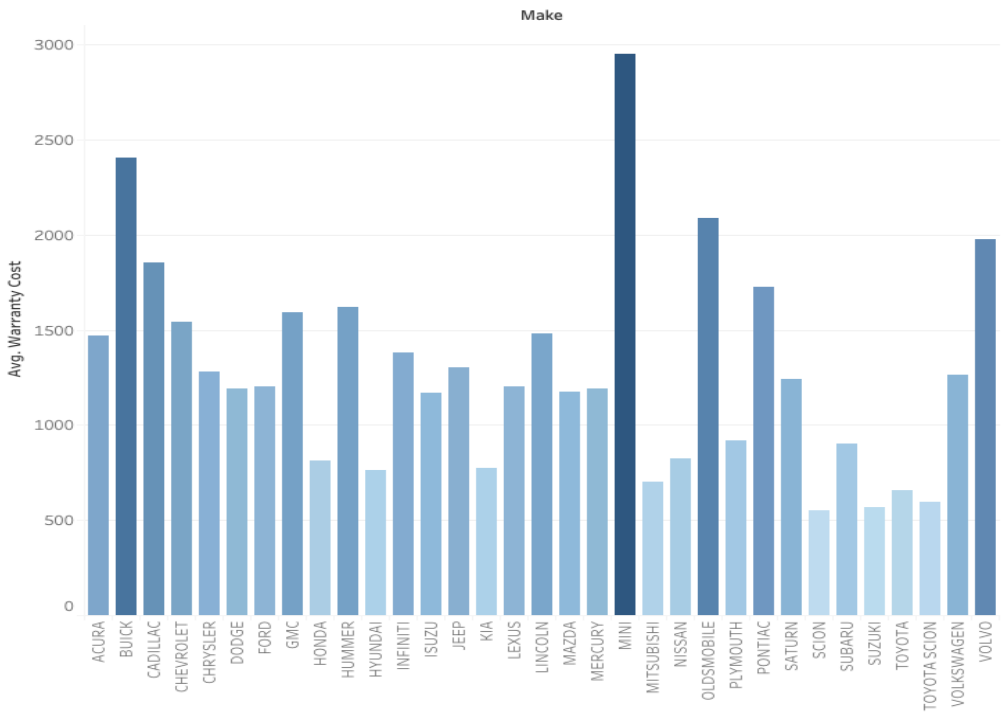

Figure 5 Vehicle Make Vs Average Warranty Cost

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