**OBJECTIVE**:

Based on the data provided on descriptive variables of marketing and operational activities of various fast food branch location we are required to gain insights through mining about improving the sales and potentiality of new released locations.

**STEPS TO PERFORM REGRESSION ANALYSIS:**

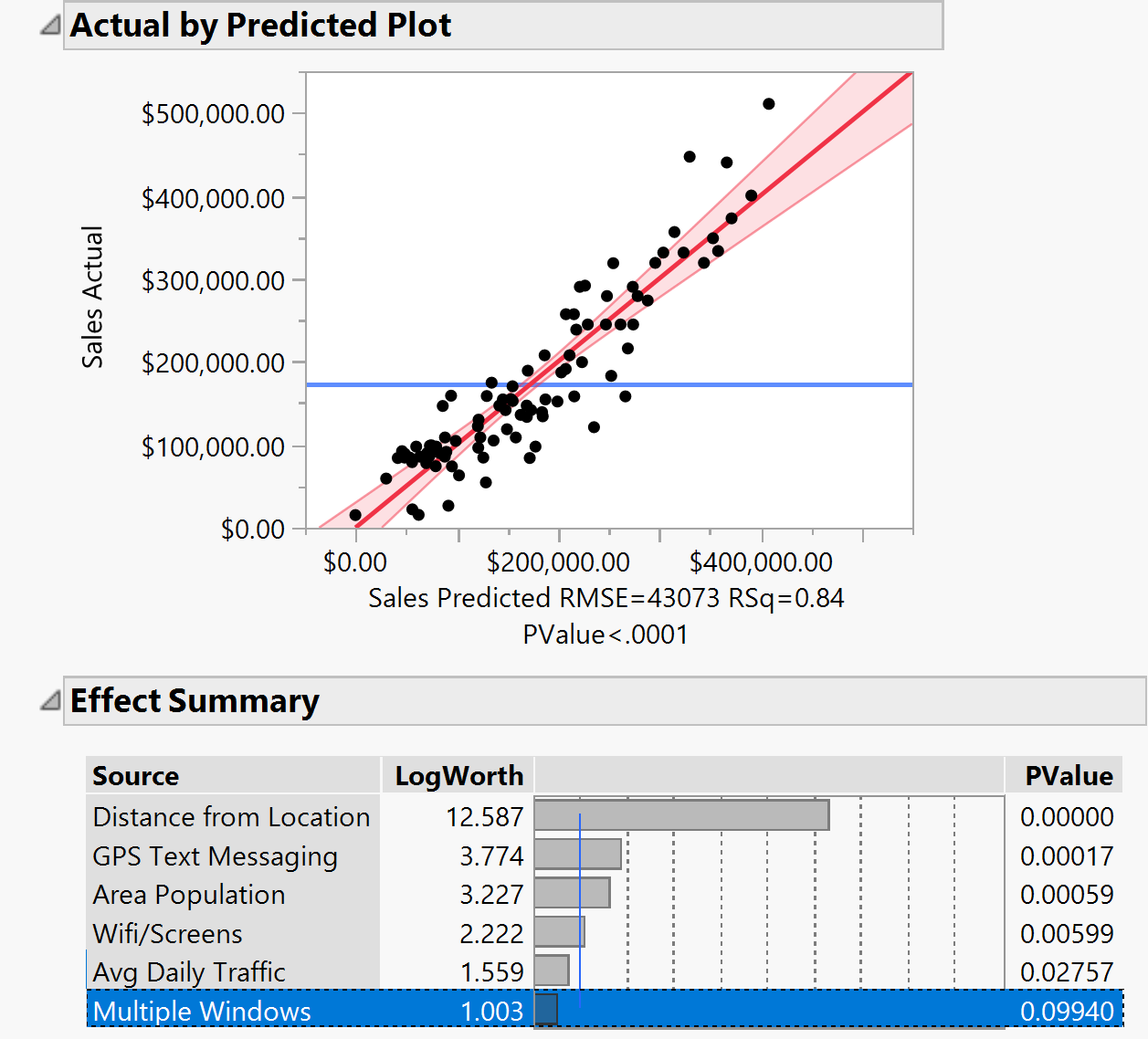
* Dataset is imported into JMP and a linear regression model is built based on the data.
* The target variable(dependent variable) that has been set  based on our objective is “Sales”.
* Driver variables(independent variable) that explain our target are as follows:

1. Wi-Fi/Screens
2. Area Population
3. Multiple Windows
4. Average Daily Traffic
5. GPS Text Messaging
6. Distance From Location

Statistical model is built to check for significant and insignificant variables in the dataset and the impact of each explanatory variable on target variable.

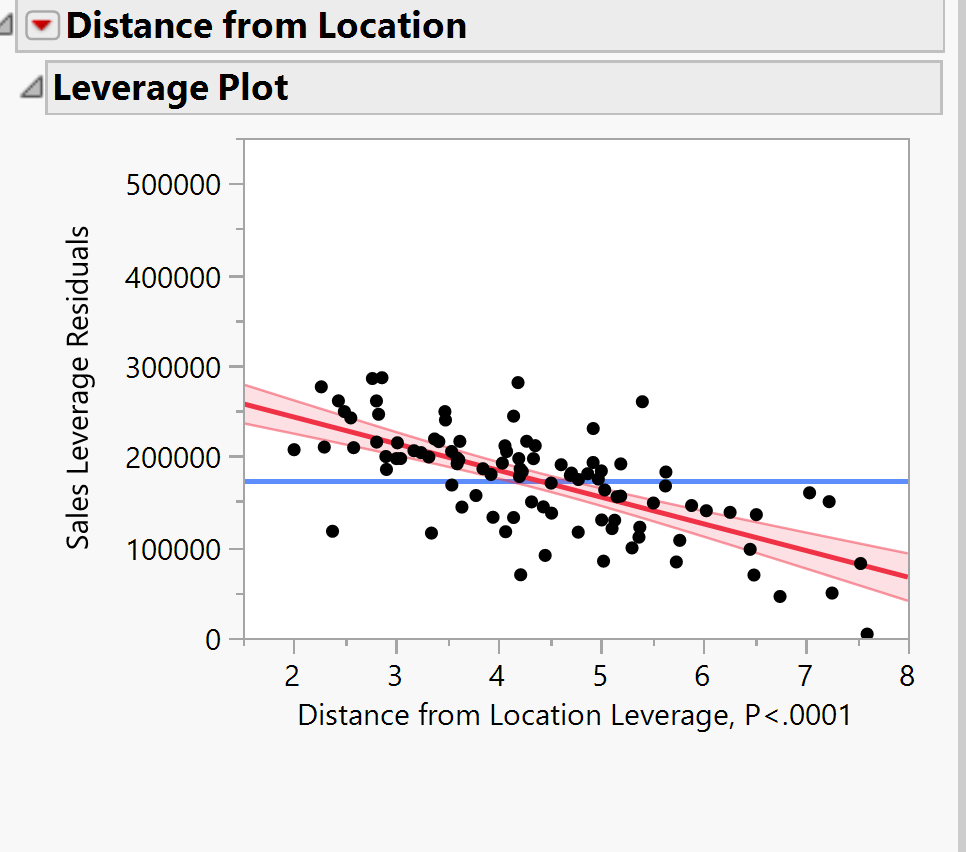
**ANALYSIS TO GAIN INSIGHTS:**

1. Dataset is imported and minimal report is displayed using Sales as target variable. Any variable with p-value greater than 0.05 is insignificant. As according to the analysis of variance(ANOVA), the P value of variables greater than 0.05 signifies that there is no linear relationship between following independent variable and the target variable. Thus for better analysis we can exclude the variable “Multiple Windows”.

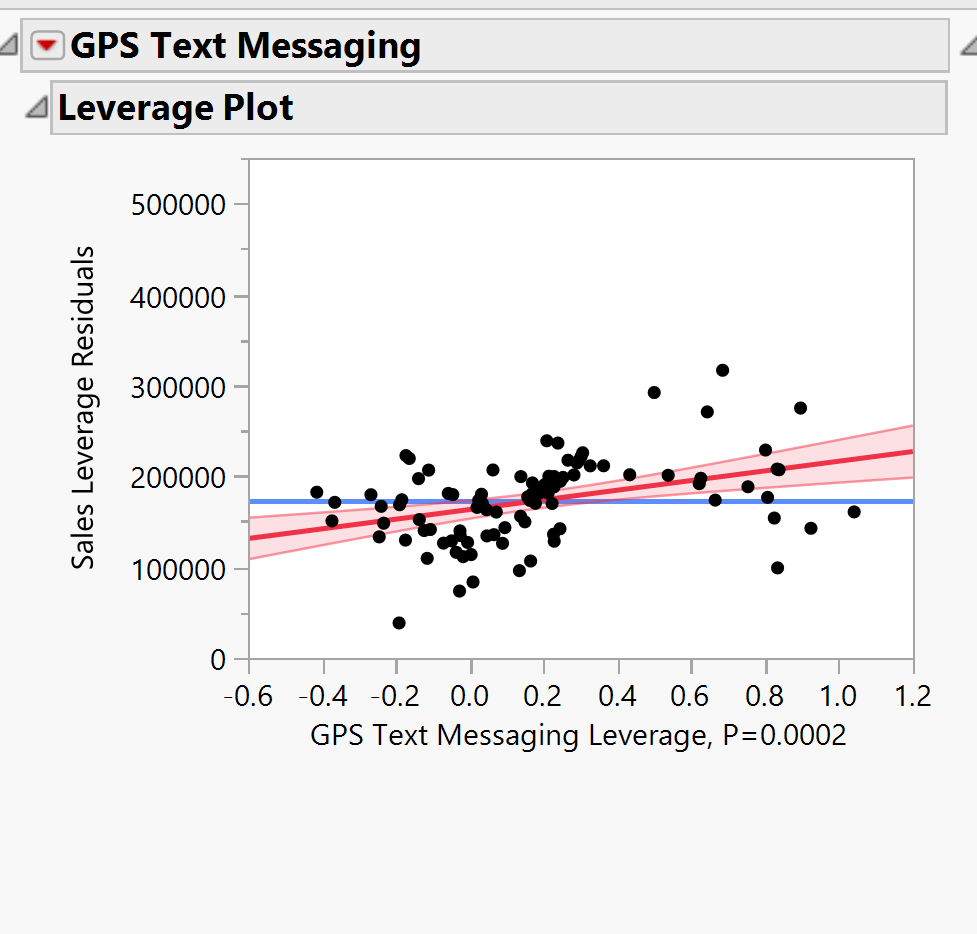


Hence we can conclude that “Multiple windows” does not play a significant role in forecasting and estimating the monthly revenue.

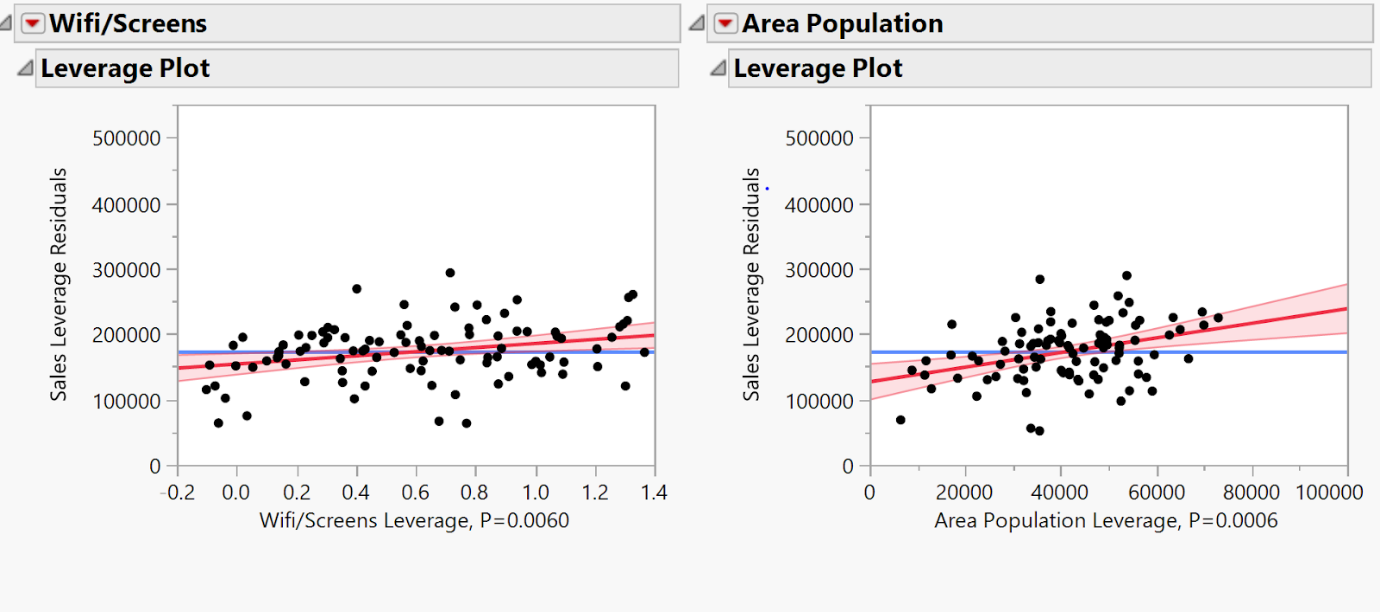
2. According to our analysis and graph shown below we infer that explanatory variable “Distance from location” plays the most significant role in estimating the sales of the fast food restaurant. We observed that there is an inverse relationship between the independent and dependent variable which means that as the amount of miles the consumer who receive the text from food location decreases , the sales surges.



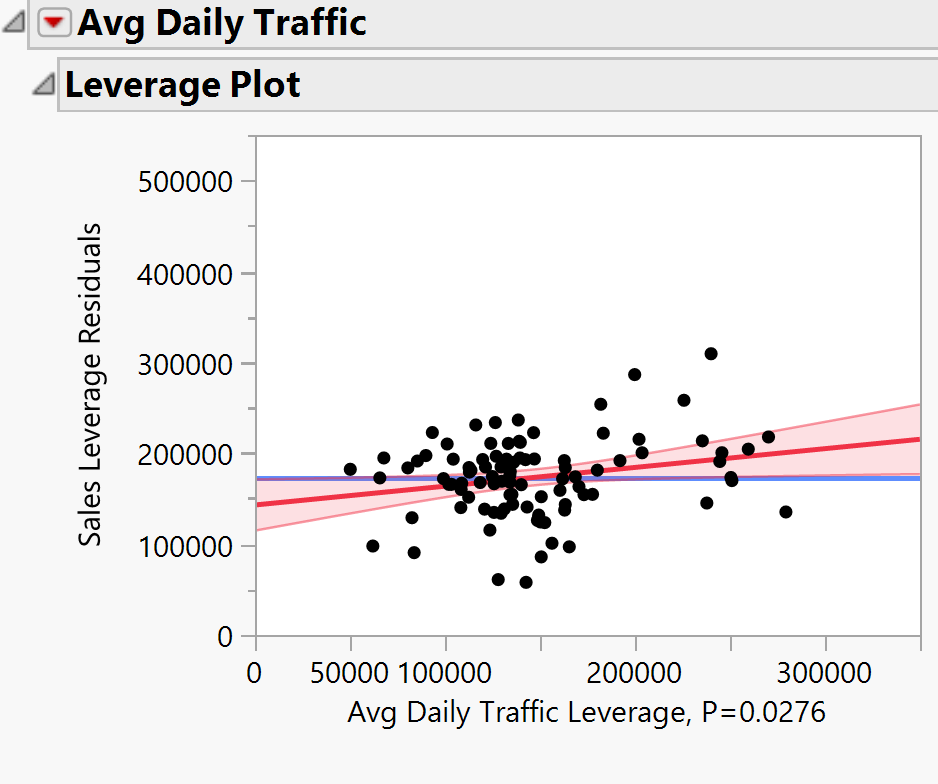
3. As per the analysis and graph shown below we can infer that variable ”GPS Text Messaging” holds the second most important factor in increase in sales. We observe that GPS text messaging is directly proportional to increase in sales for a particular food outlet. This factor deals with the targeted consumer who have received a text message alerting them to specific branch location and we can conclude that the likelihood of consumers to visit stores to whom  GPS text messages have been sent is relatively more which results in escalation in sales.



4. While considering the variables “Area Population” and “Wifi screens”, we observe that these factors can be considered as relevant and important features to improve sales. However, they don’t impact on sales significantly as features “ Distance from Location” and “ GPS text messaging”. From the graphs displayed below it is clear that the stores who have successfully installed Wifi screens in their stores have positive impact in sales. Moreover, the stores located in the town having more population are more likely to have high sales.



5. Upon considering the driver variable “Average Daily Traffic” which states the amount of auto traffic that passes by the location on a given day, from the graph displayed below we have enough evidence that the relationship between the driver variable and the target variable is weak as p value is very near to 0.05. This signifies although it is directly proportional to sales of a particular fast food branch but it does not hold much of the significance in estimating sales.



6. According to analysis, Distance from location and GPS text messaging directly impact our target. As shown in graph, with decrease in distance from location, sales increases. There is negative relationship and it is the most significant feature that impacts sales. Also With increase in GPS text messaging, sales also increases gradually.

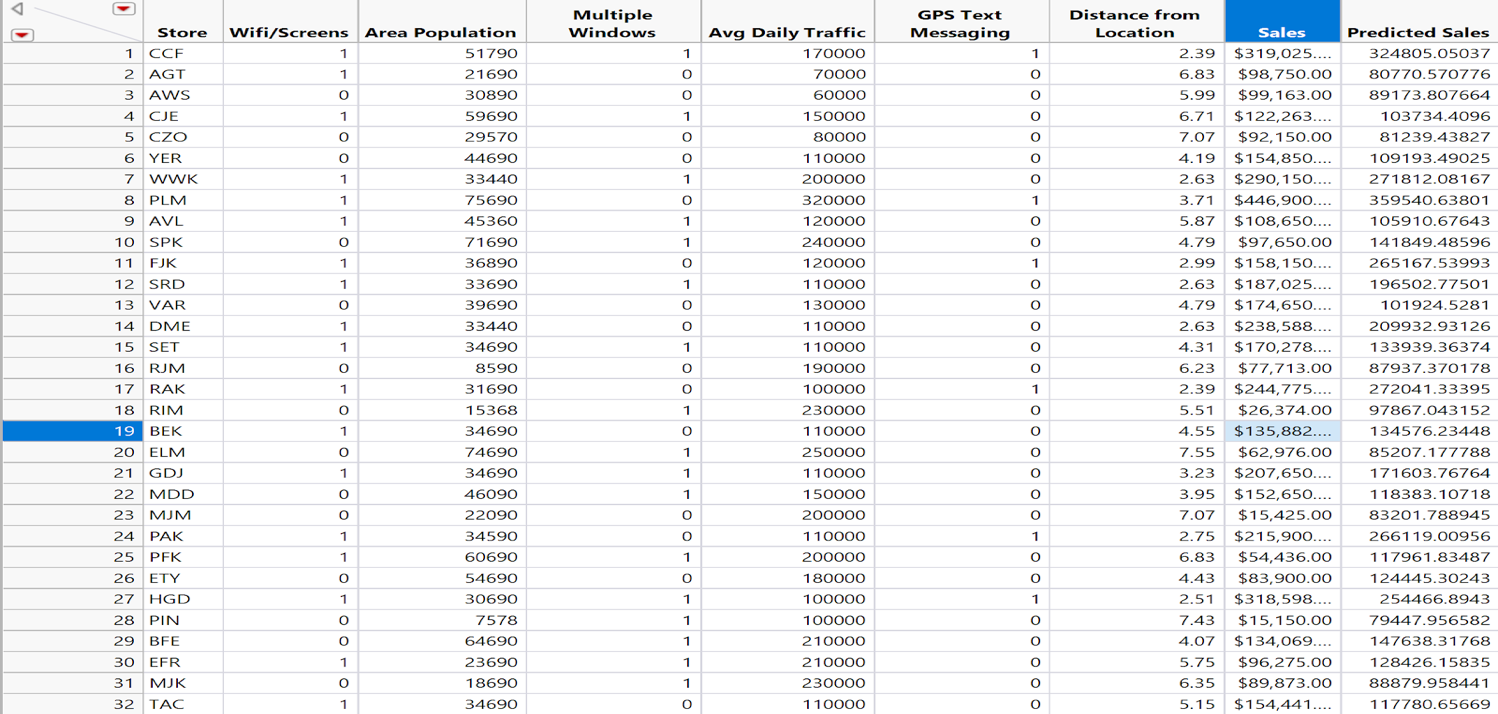
**PROPOSED BUSINESS PLAN:**

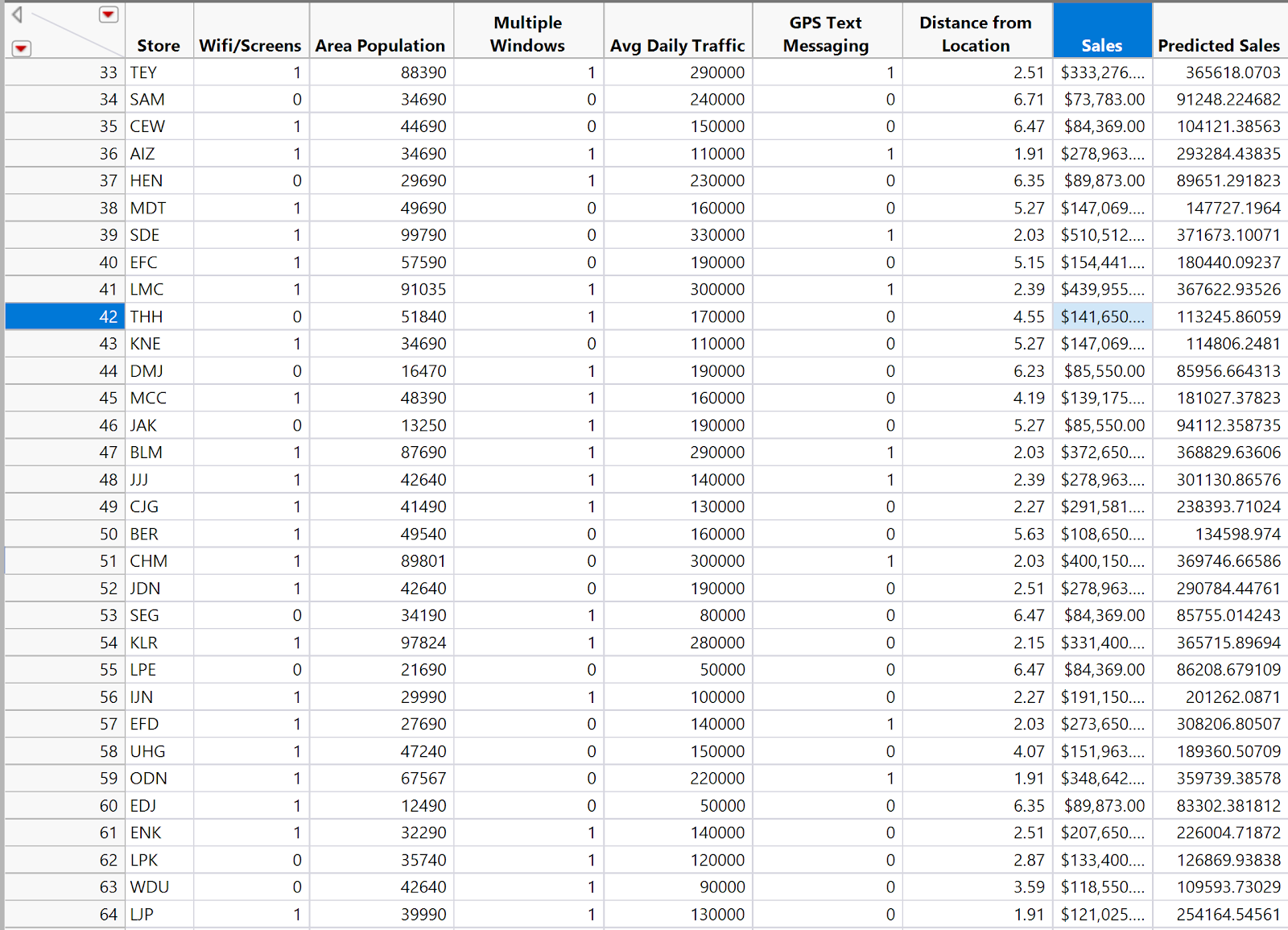
On Analysing the regression results on the data provided, here are few business strategies we propose to the business stakeholders of the fast food outlet owners to implement in order to increase the revenue.

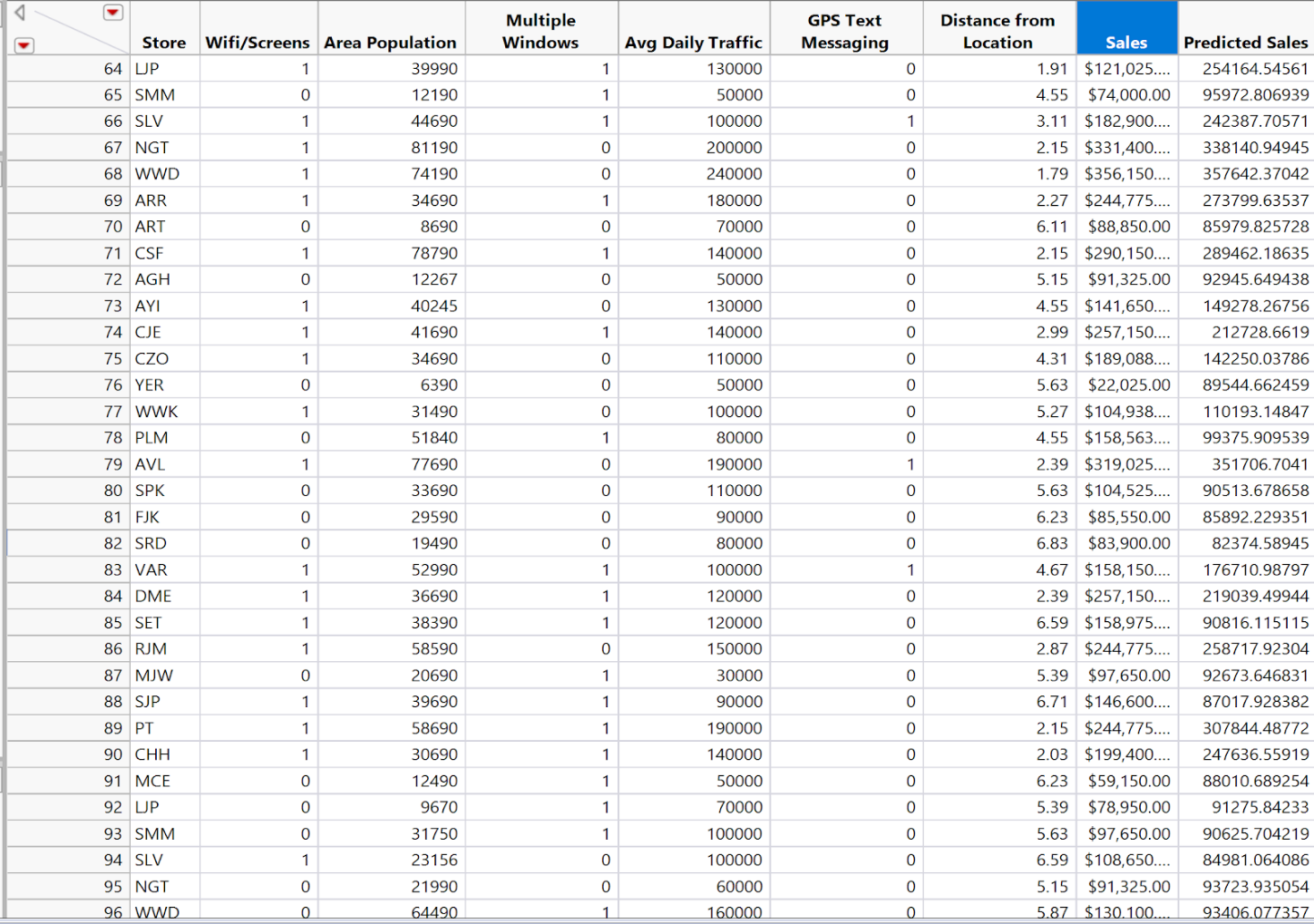
1. Firstly from the above mentioned interpretations, the factor distance  of an outlet from the consumer holds most significance for increasing sales. To increase the affinity of customers to their outlets they need to commission more outlets  to reach to more consumers. This strategy would definitely rule out the resistance of customer tp long distance travelling and improve the accessibility of fast food outlet. Moreover, while considering the strategy of commissioning of more outlets business stakeholders should consider the population of the area in order to target larger number of customers.
2. Secondly in order to consider the improvement in sales we propose business stakeholders to definitely consider the strategy of sending GPS text messages alerting them to the branch location as we have observed the consumers receiving the text messages are more inclined to visit their specific branch location. Moreover a  fixed radius should be set within which the consumers would receive the alerts and upon arrival at close proximity to their branch location , the frequency of the alert should be strategically increased to a certain level considering the fact that it is not hindering their GPS navigation. This strategy would attract their attention to the nearest fast food recreation outlet. In addition to the previous strategies the concept of distribution of promo codes for discount can be introduced for the consumers who chose to acknowledge the text alerts. Although, after observing model results we have inferred that  average daily traffic holds very limited impact to the sales but the sales do get positive escalations. Hence the strategy of increasing the frequency of text alerts in locations of heavy traffic will be beneficial.
3. On analysis of our model we strongly suggest the stakeholders to provide free wifi and and big display screens. Moreover important games and events should be screened to target young generation to their outlets. This strategy will be beneficial as in addition to fast food services the outlet could also be considered as a place to hang out and relax.This would result in increase in the overall sales of outlet.

**PREDICTION RESULTS:**

Below are the predicted sales after regression modelling  on given data set.As mentioned above, driver variable “Multiple Windows” have been excluded for regression modelling to predict the sales.



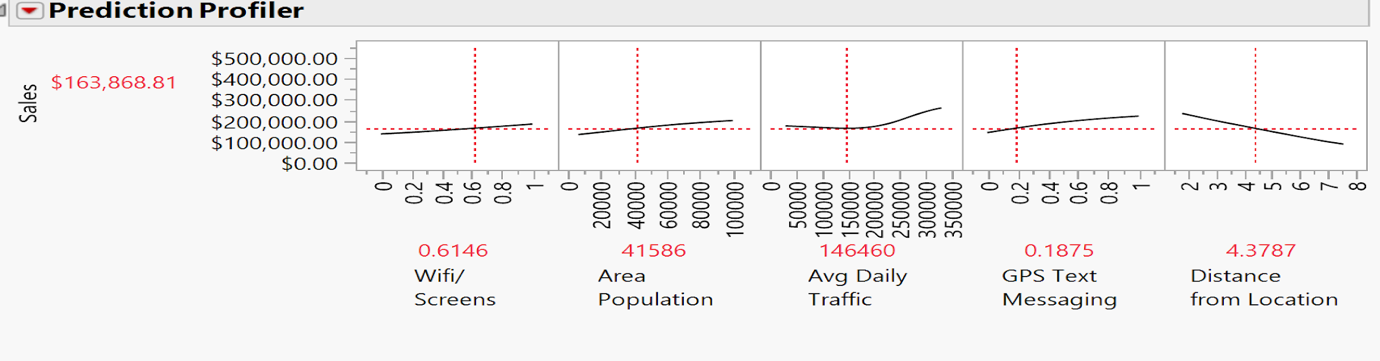


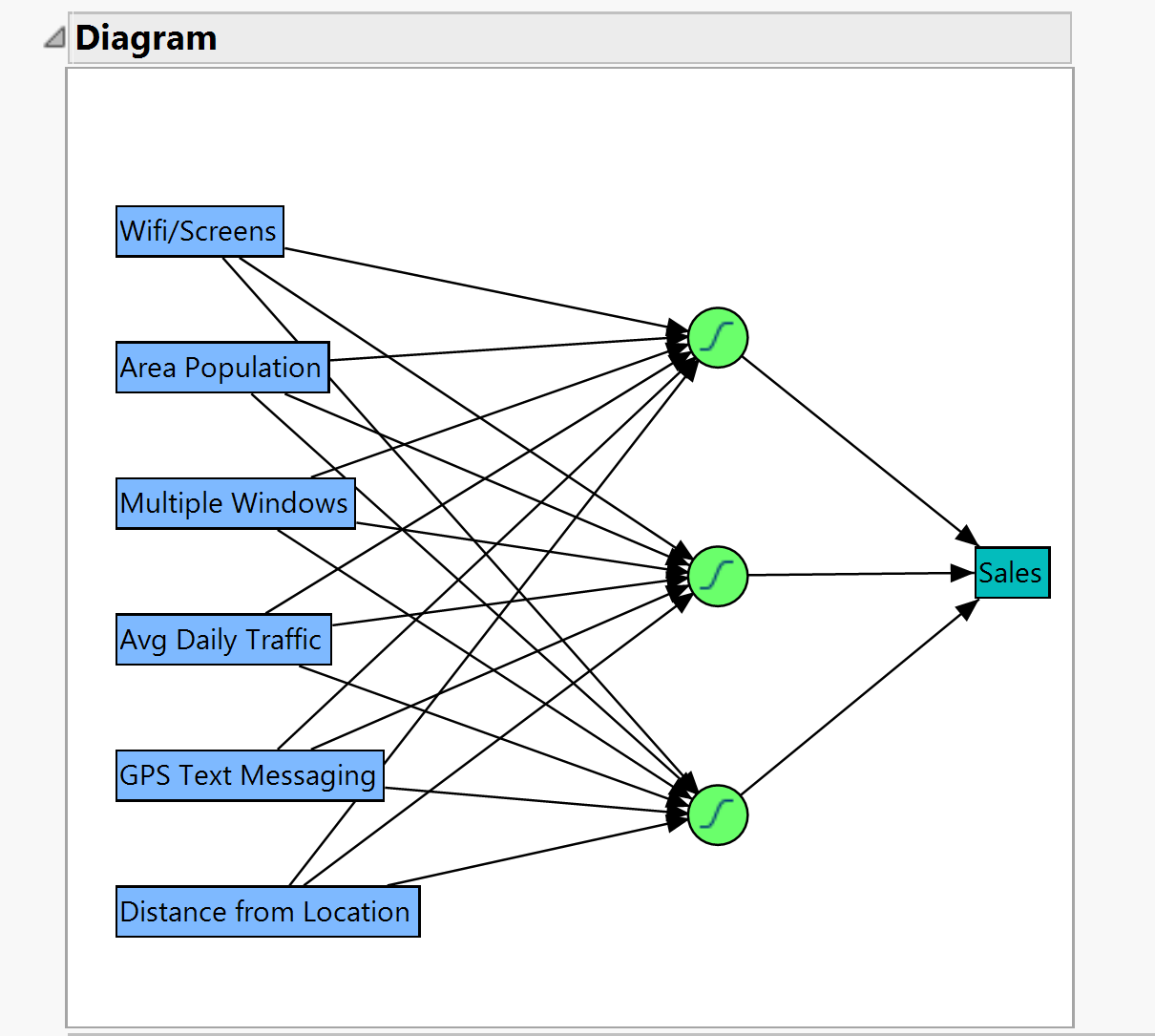


**NEURAL NETWORK ANALYSIS:**

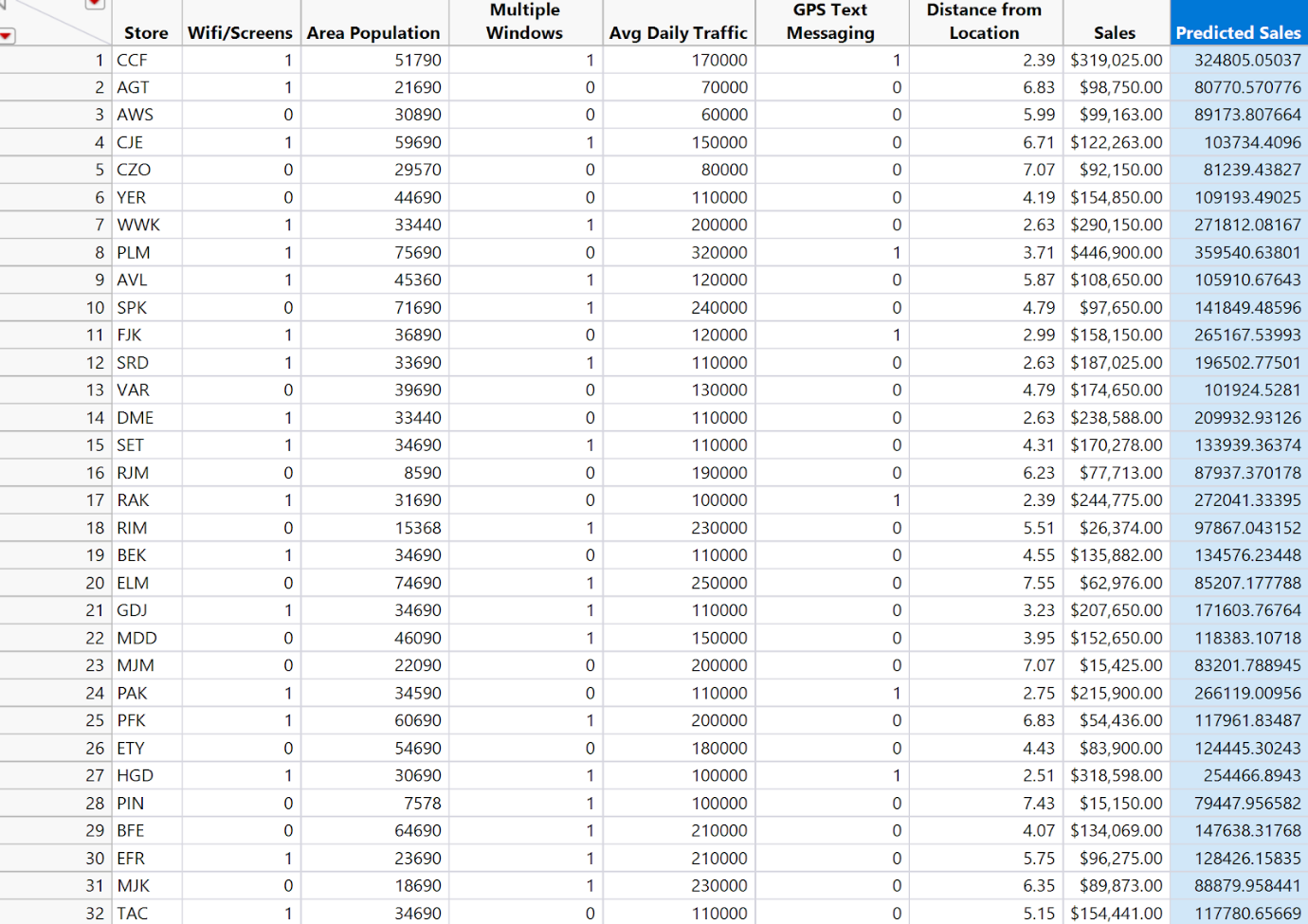
Now we have implemented Neural Network methodology to create data model. Following are our observations:

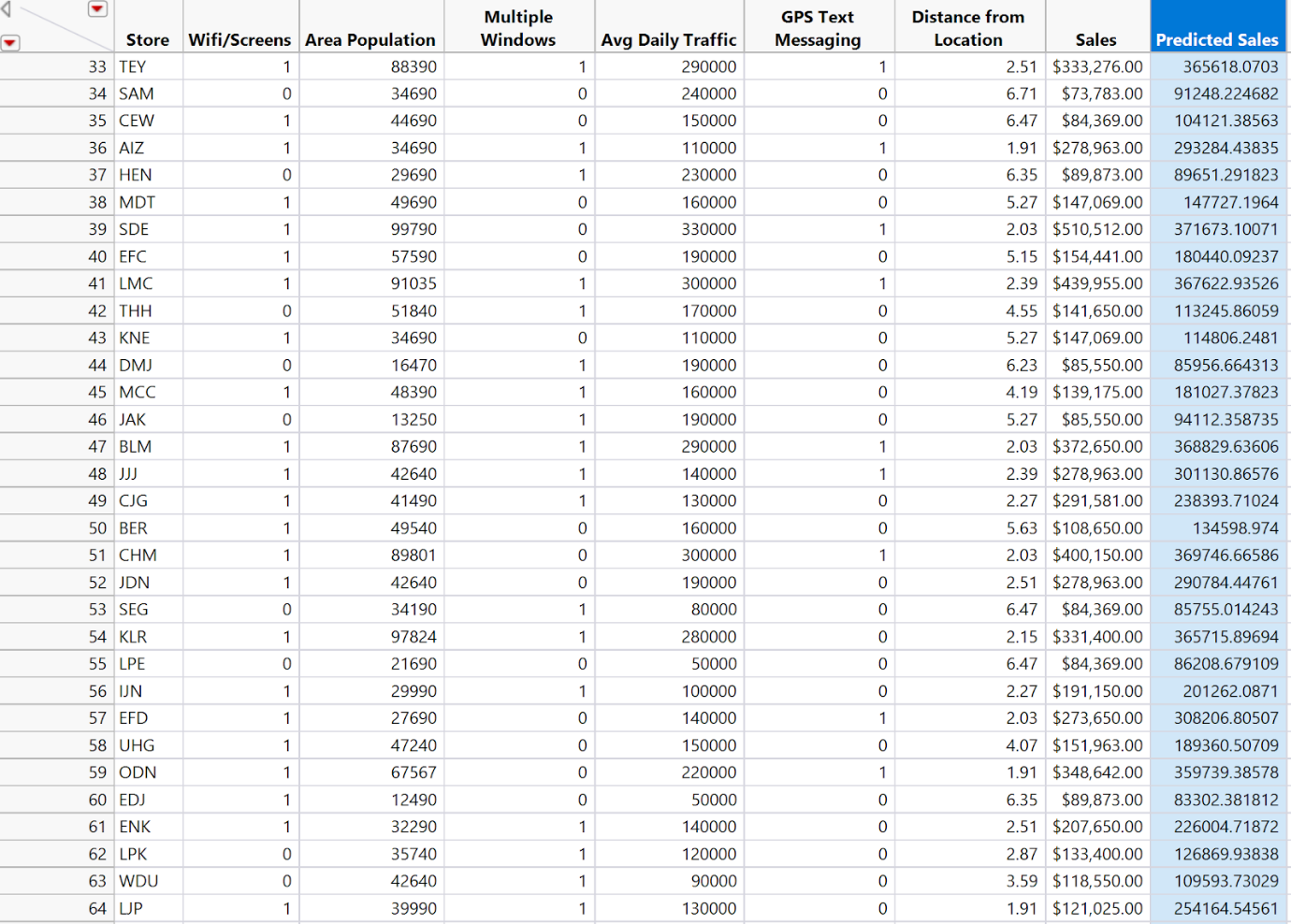
1. **Better Predictions:** After running our model we have observed that neural network gives way better predictions based on our driver variables. On comparing with regression we can state that our error margins are relatively less. Thus we  suggest business stakeholders to consider neural network methodology for preparing better data models and more accurate estimates.
2. **Visualization**: On the basis of below prediction profiler we interpret that neural networks gives us a better visualization of relationship between each driver variable and target variable. Moreover it also helps in estimating the exact value from which the relationship between the independent and dependent variable changes.



****

**PREDICTION FORMULAS:**

****

****

**DEGREE OF FREEDOM:**

● Driver Variables: 5

● Total Rows: 96

● Degree of Freedom =  96 – (5) = 91