**Algorithm**

1. Formatting and tiding data, (variable date added for easier visualizing).
2. Searching for and downloading macrofactors (average salary, holidays, and exchange rate).
3. Analysis in R Studio:
   1. Correlations between Traffic and investigated factors
   2. P-value, R-squared, F-statistic
   3. Residuals normality tests (Shapiro-Wilk, Kolmogorov-Smirnov, Cramer-von Mises, Anderson-Darling)
   4. Autocorrelation Darbin-Watson`s test
   5. Homoscedastity Breush-Pagan `s test
   6. Correctness of specification Ramsey`s test
   7. For multivariables (such as TRP OOH factor) I explored only correlations
   8. For competitors I explored correlation, P-value, R-squared, F-statistic
4. Visualizing basic dependencies (Traffic vs TB TRP, TRP OOH, Radio TRP, average salary, holidays and exchange rate) in Power BI
5. Exporting Power BI report to Power Point and combining R Studio`s results with plots in Power BI.

The text below is information of **my analysis using the algorithm in R Studio**.

Correlations

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Traffic | Brand (Radio TRP) | Brand Promo (TB TRP) | Holidays | Exchange rate | Ave salary |
| Traffic | 1.00 | -0.04 | -0.16 | 0.27 | 0.10 | 0.58 |

As we can see, Traffic correlates with Holidays and Average salary.

Exchange rate doesn`t correlate. Radio and TB TRP we need more exploration.

Traffic ~ Average Salary

pr (>|t|): 6.21e-11 \*\*\*

R-squared: 0.341

F-statistic: p-value: 6.214e-11 so model is adequate

Shapiro-Wilk 0.0000 -

Kolmogorov-Smirnov 0.0349 -

Cramer-von Mises 0.0000 -

Anderson-Darling 0.0000 –

Residuals are not normally distributed.

Darbin-Watson test p-value = 4.276e-06 – there`s autocorrelation

Breush-Pagan test p-value = 0.3363 – is homoscedastic

Ramsey test p-value = 0.01248 – almost right specification.

Therefore, we can assume that average salary is significant influencer of traffic.

Traffic ~ Holidays (linear)

pr (>|t|): 0.00562 \*\*

R-squared: 0.07207

F-statistic: p-value: 0.005624 so model is rather adequate

Shapiro-Wilk 0.0000 -

Kolmogorov-Smirnov 0.1884 +

Cramer-von Mises 0.0000 -

Anderson-Darling 1e-04 –

Residuals are not normally distributed.

Darbin-Watson test p-value = 3.433e-09 – there`s autocorrelation

Breush-Pagan test p-value = 0.0001767 – is heteroscedastic

Ramsey test p-value = 1 – right specification.

Therefore, we can assume that holidays influences traffic.

Traffic ~ Exchange rate (linear)

pr (>|t|): 0.542

R-squared: 0.003613

F-statistic: p-value: 0.5425 so model is not adequate

Shapiro-Wilk 0.0000 -

Kolmogorov-Smirnov 0.0526 +

Cramer-von Mises 0.0000 -

Anderson-Darling 0.0000 –

Residuals are not normally distributed.

Darbin-Watson test p-value = 1.368e-10 – there`s autocorrelation

Breush-Pagan test p-value = 0.08276 – is (maybe) homoscedastic

Ramsey test p-value = 0.3292 – right specification.

So we can assume that exchange rate doesn`t influence traffic.

Traffic ~ Brand Radio TRP

pr (>|t|): 0.0438 \*

R-squared: 0.08728

F-statistic: p-value: 0.04378 so model is not strongly adequate but possible

Shapiro-Wilk 0.0073 -

Kolmogorov-Smirnov 0.3964 +

Cramer-von Mises 0.0000 -

Anderson-Darling 0.0275 -

Residuals are rather not normally distributed.

Darbin-Watson test p-value = 1.457e-10 – there`s autocorrelation

Breush-Pagan test p-value = 0.02744 – heteroscedasticity exists

Ramsey test p-value = 0.963 – right specification

So we can assume that radio don`t influence traffic.

Traffic ~ Brand Promo TB TRP

pr (>|t|): 0.0981.

R-squared: 0.02633

F-statistic: p-value: 0.09814 so model is rather not adequate

Shapiro-Wilk 0.0000 -

Kolmogorov-Smirnov 0.1093 +

Cramer-von Mises 0.0000 -

Anderson-Darling 0.0000 -

Residuals are not normally distributed.

Darbin-Watson test p-value = 2.295e-09 – there`s autocorrelation

Breush-Pagan test p-value = 0.9973 – is homoscedastic

Ramsey test p-value = 0.1186 – rather right specification

So we can assume that tb trp just slightly influence traffic.

Traffic ~ OOH TRP

Correlations:

Volynska -0.73

Dnipropetrovska -0.12

Zhytomyrska -0.22

Zakarpatska -0.78

Zaporizka -0.06

Ivano-Frankivska 0.34

Kyivska -0.12

Kirovogradska -0.42

Lvivska 0.43

Mykolaivska -0.09

Odeska -0.36

Poltavska -0.07

Sumska -0.42

Ternopilska 0.65

Kharkivska -0.49

Khmelnytska 0.41

Cherkaska -0.44

In addition, we researched Competitors of our brand in Radio TRP.

Correlation:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Traffic | Competitor 1 | Competitor 2 | Competitor 3 |
| Traffic | 1.00 | -0.4 | 0.21 | 0.18 |

The Pr(>|t|) of our model are next:

Competitor 1 0.000458 \*\*\*

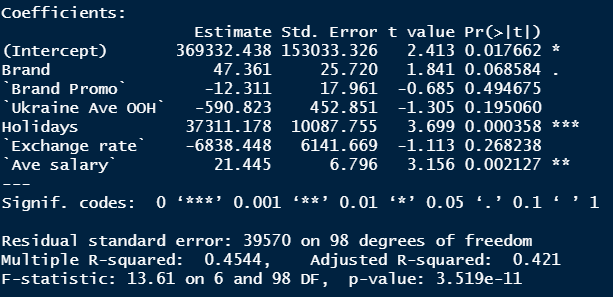
Competitor 2 0.730510

Competitor 3 0.530171

We can assume that the first competitor badly influences our traffic. Other two ones don`t influence brand`s traffic at all.

MODEL

Our model is linear and it shows the dependency of Traffic of factors Brand (Radio TRP), Brand promo (TB TRP), Ukraine Ave OOH (OOH TRP – average of all provinces), Holidays, Exchange rate and Average salary.



As we can see, model is adequate (judging by Multiple R-squared and p-value of F-stats). Significant factors are holidays, average salary and Brand (Radio TRP).