Table of Contents

Summary

The website is always the most important element in making money for online stores, and its proper and safe design is definitely effective in the number of sales and improving the experience of users and customers, and ultimately improving the position of the business brand.

An online store needs enough attention to deliver a good and safe experience to the user, and various elements must be observed to improve it. Appropriate graphics, acceptable speed, safe payment gateway, etc. are all among these elements, but their effect is more on the purchase ratio, and although their presence is necessary, it is not sufficient.

To complete these elements, the website must have a suitable number of users, so there must be effective channels to drive traffic to the website. These channels could be advertisements, social media, and many other options, and these channels themselves need to have proper performance.

According to these explanations, the upcoming research examines the factors contributing to the traffic of an online store that sells backpacks, shawls, and hats. According to the guidelines of website managers, the type of advertising email, the type of advertising on other websites, the type of Instagram story theme, and backlinks have been identified as the most effective elements in the channels of directing traffic to the website (apart from SEO).

So, a 2-level factorial experiment with 4 factors has been implemented to examine the different results of treatment combinations in fractional form. The results have been analyzed with and without blocking and then, compared with each other.

1-3- Website

- www.zarinche.com
- Brand: Zarinche (Instagram: @Zarinchecom)

There are 4 qualitative Factors:
1- Advertising email:

- Link in the beginning
- Link in the end

2- Advertising Banner:

- With CTA (Call To Action)
- Without CTA

The theme of the Instagram story

- Theme 1
- Theme 2

Backlinks:

- Website with great traffic
- Website with related traffic

Table 1- experiment factors

High Level	Low Level	Factor
Link in the end	Link in the beginning	Advertising email
Without CTA	With CTA	Advertising Banner
Theme 2	Theme 1	Theme story
related traffic	great traffic	Backlinks

Since Instagram stories are available 24 hours a day, test results are shown for 24 hours. The test has been carried out with 2 repetitions exactly at 7 pm and correctly at the same time (sending emails and stories and changing banners and placing backlinks) and the results were tracked using Google Analytics.
There are an interval between repetitions so each can be considered as a block. In addition, the Instagram story is only available for 24 hours, so it can be identified as a limiting factor and thus a block.
The data is related to a fractional and not a full experiment because, as mentioned, it is not possible to carry out all the repetitions except in about 2 months.

Table 2- experiment data

Repeat 2	Repeat 1	Backlink: d	Theme of Story: c	Advertising Banner: b	Email: a	treatment combination
158	175	-1	-1	-1	-1	(1
183	198	-1	-1	1	1	ab
177	125	-1	1	-1	1	ac
212	91	-1	1	1	-1	bc
207	266	1	-1	-1	1	ad
318	230	1	-1	1	-1	bd
202	174	1	1	-1	-1	cd
176	215	1	1	1	1	abcd

2- Analysis of the results

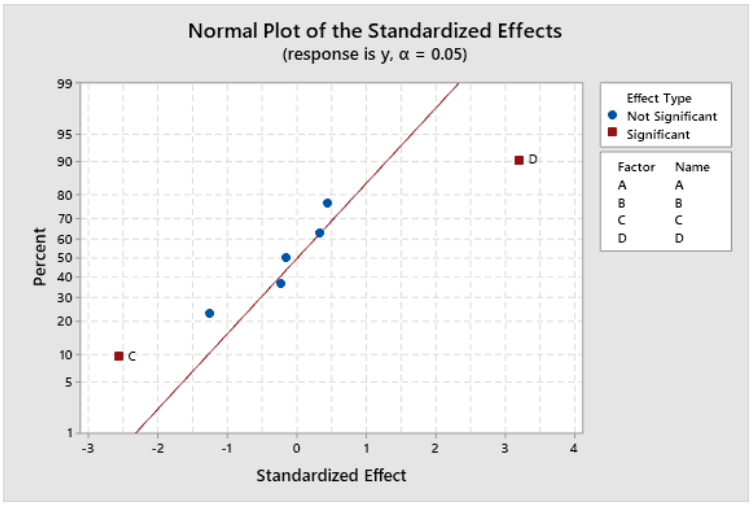
2-1- Factorial design of 2^4

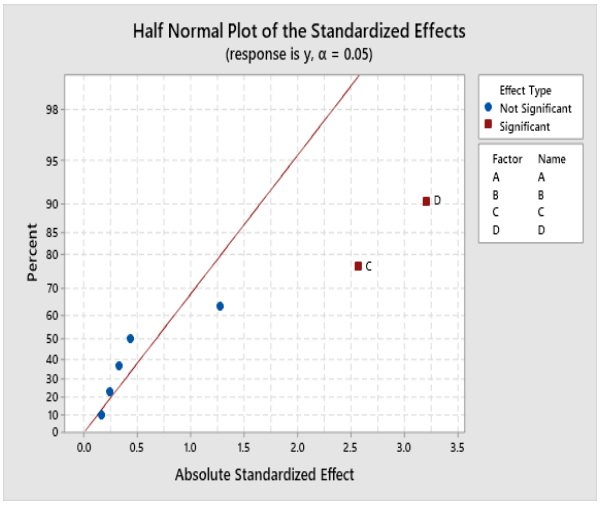
Coded Coefficients

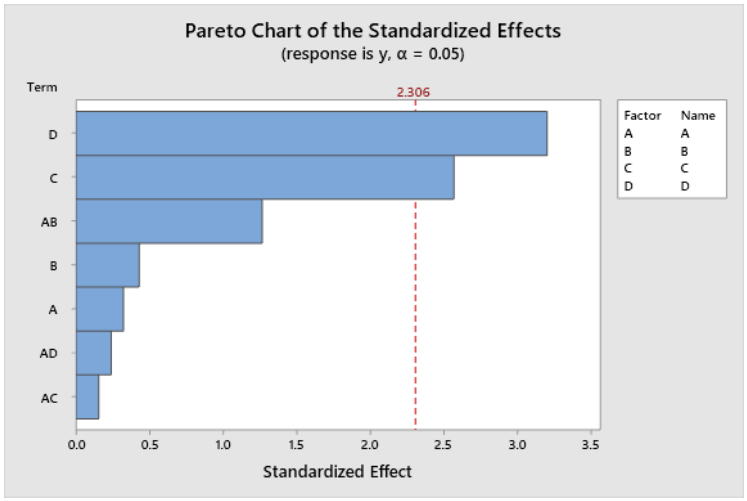
Term	Effect	Coef	SE Coef	T-Value	P-Value	VIF
Constant		198.4	10.5	18.98	0.000	
A	6.8	3.4	10.5	0.32	0.755	1.00
B	9.0	4.5	10.5	0.43	0.678	1.00
C	-53.7	-26.9	10.5	-2.57	0.033	1.00
D	67.0	33.5	10.5	3.20	0.013	1.00
A*B	-26.5	-13.3	10.5	-1.27	0.241	1.00
A*C	-3.2	-1.6	10.5	-0.16	0.880	1.00
A*D	-5.0	-2.5	10.5	-0.24	0.817	1.00

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Model	7	32969.8	4710.0	2.69	0.094
Linear	4	30018.5	7504.6	4.29	0.038
A	1	182.3	182.3	0.10	0.755
B	1	324.0	324.0	0.19	0.678
C	1	11556.2	11556.2	6.61	0.033
D	1	17956.0	17956.0	10.27	0.013
2-Way Interactions	3	2951.3	983.8	0.56	0.655
A*B	1	2809.0	2809.0	1.61	0.241
A*C	1	42.3	42.3	0.02	0.880
A*D	1	100.0	100.0	0.06	0.817
Error	8	13986.0	1748.2		
Total	15	46955.8			





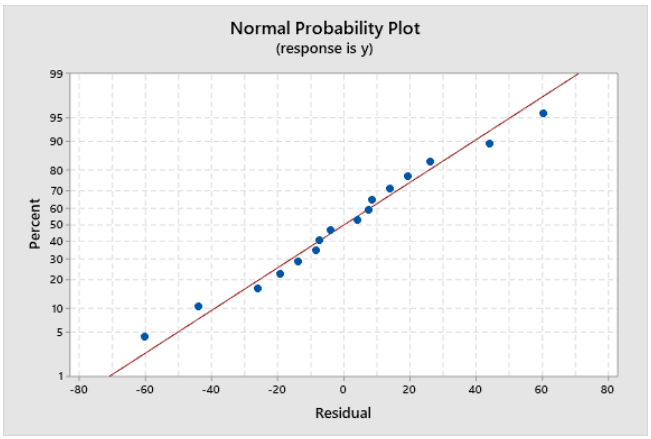


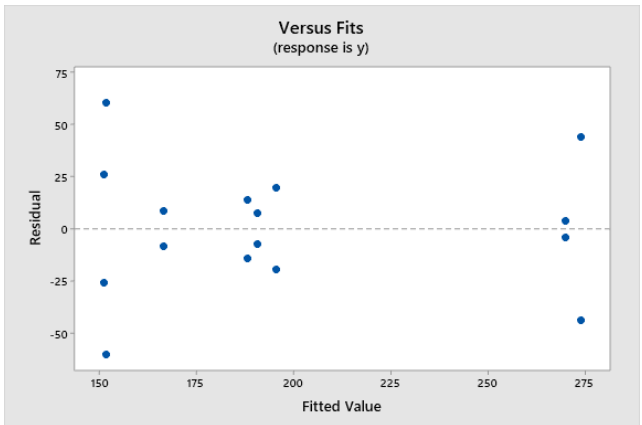
Model Summary

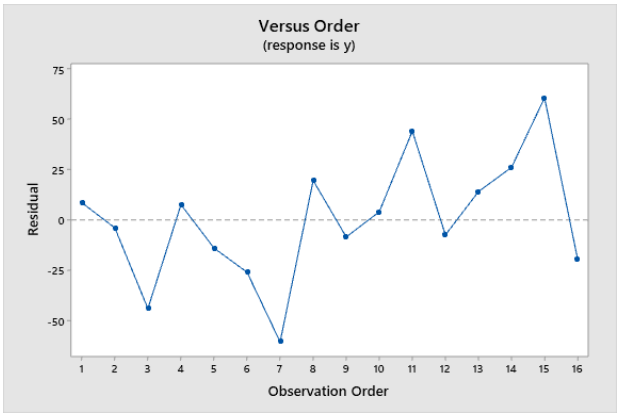
S	R-sq	R-sq(adj)	R-sq(pred)
41.8121	70.21%	44.15%	0.00%

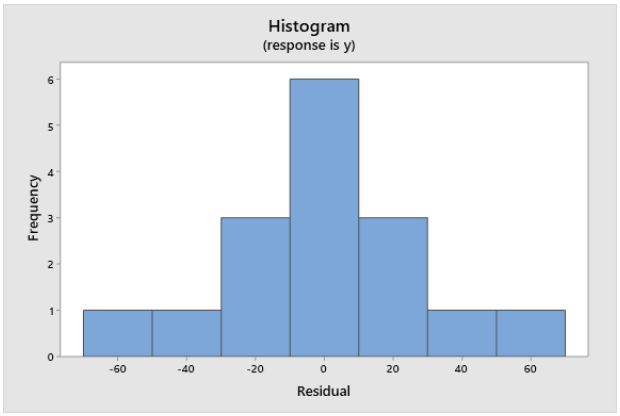
Regression Equation in Uncoded Units

y = 198.4 + 3.4 A + 4.5 B - 26.9 C + 33.5 D - 13.3 A*B - 1.6 A*C - 2.5 A*D









Ineffective factors have been removed (there are only C and D):

Coded Coefficients

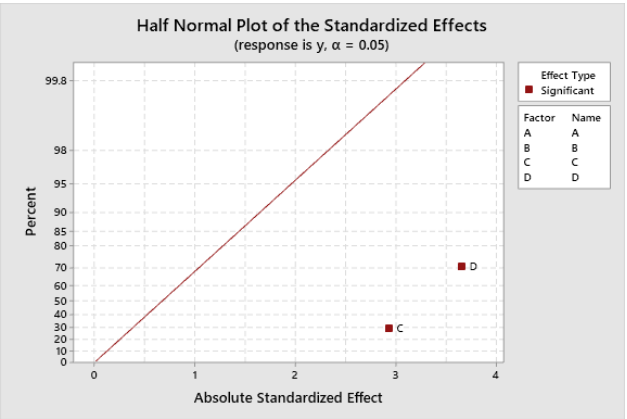
Term	Effect	Coef	SE Coef	T-Value	P-Value	VIF
Constant		198.38	9.16	21.66	0.000	
C	-53.75	-26.88	9.16	-2.93	0.012	1.00
D	67.00	33.50	9.16	3.66	0.003	1.00

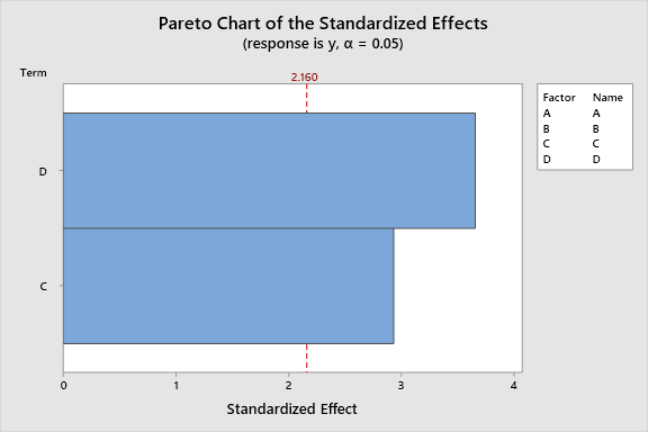
Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Model	2	29512	14756.1	11.00	0.002
Linear	2	29512	14756.1	11.00	0.002
C	1	11556	11556.2	8.61	0.012
D	1	17956	17956.0	13.38	0.003
Error	13	17444	1341.8		
Lack-of-Fit	5	3458	691.5	0.40	0.839
Pure Error	8	13986	1748.3		
Total	15	46956			

Model Summary

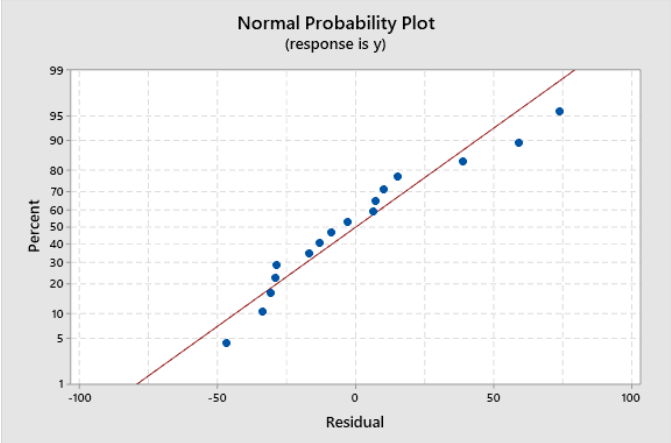
S	R-sq	R-sq(adj)	R-sq(pred)
36.6307	62.85%	57.14%	43.73%

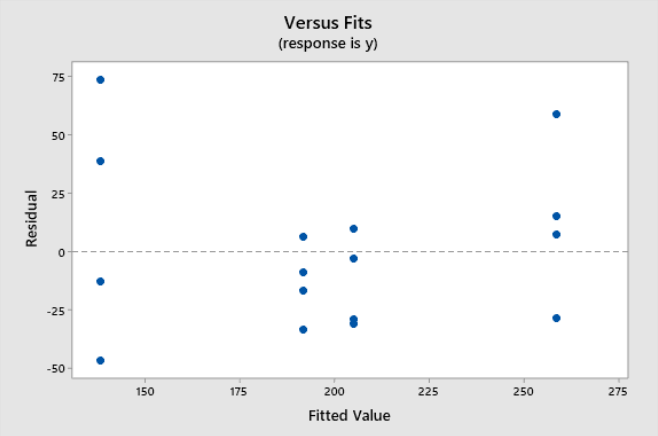


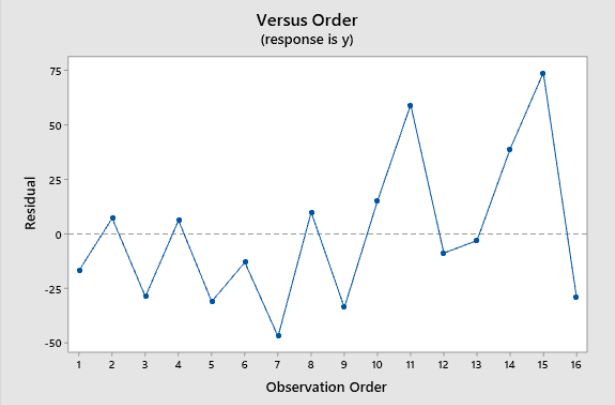


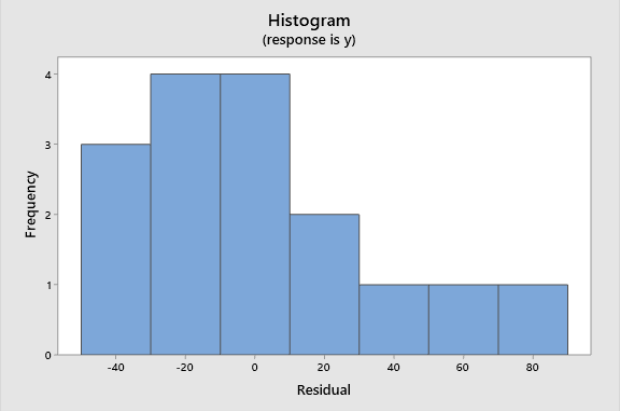
Regression Equation in Uncoded Units

y = 198.38 - 26.88 C + 33.50 D









2-2- design of 2^4 with blocking

Each repeat is a block

Coded Coefficients

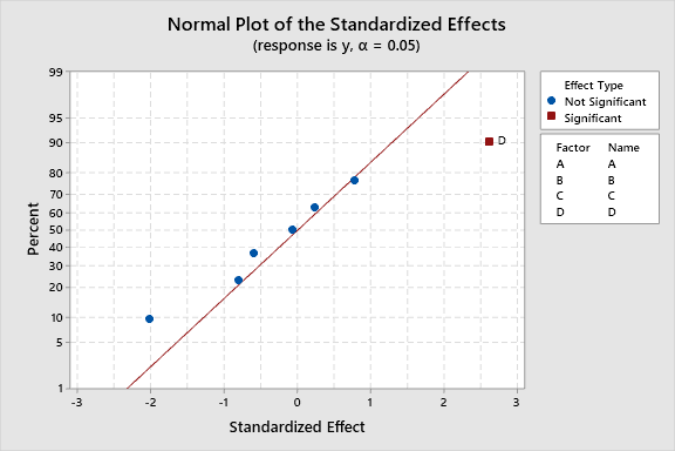
Term	Effect	Coef	SE Coef	T-Value	P-Value	VIF
Constant		194.2	11.2	17.30	0.000	
Blocks						
1		-9.9	11.2	-0.89	0.405	1.00
A	-1.6	-0.8	11.2	-0.07	0.944	1.00
B	17.4	8.7	11.2	0.77	0.464	1.00
C	-45.4	-22.7	11.2	-2.02	0.083	1.00
D	58.6	29.3	11.2	2.61	0.035	1.00
A*B	-18.1	-9.1	11.2	-0.81	0.446	1.00
A*C	5.1	2.6	11.2	0.23	0.826	1.00
A*D	-13.4	-6.7	11.2	-0.60	0.570	1.00

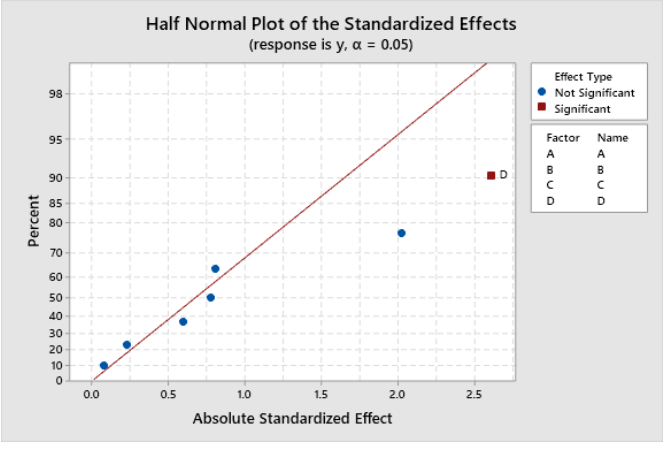
Analysis of Variance

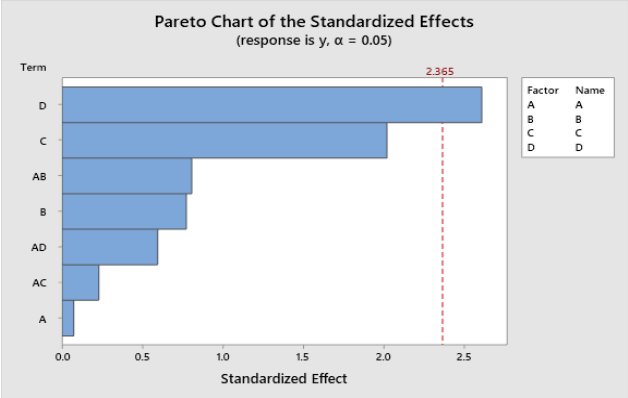
Source	DF	Adj SS	Adj MS	F-Value	P-Value
Model	8	26916.0	3364.5	1.67	0.257
Blocks	1	1580.1	1580.1	0.78	0.405
Linear	4	23201.3	5800.3	2.88	0.106
A	1	10.6	10.6	0.01	0.944
B	1	1207.6	1207.6	0.60	0.464
C	1	8235.6	8235.6	4.08	0.083
D	1	13747.6	13747.6	6.82	0.035
2-Way Interactions	3	2134.7	711.6	0.35	0.789
A*B	1	1314.1	1314.1	0.65	0.446
A*C	1	105.1	105.1	0.05	0.826
A*D	1	715.6	715.6	0.35	0.570
Error	7	14114.4	2016.3		
Total	15	41030.4			

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
44.9038	65.60%	26.29%	0.00%



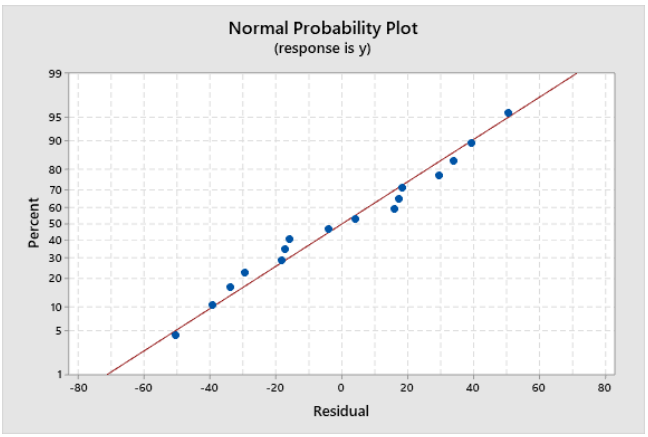


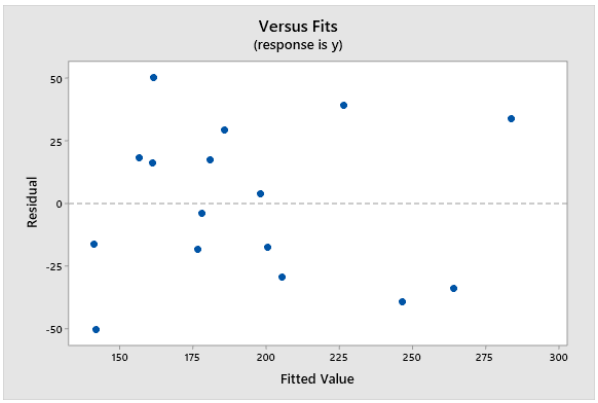


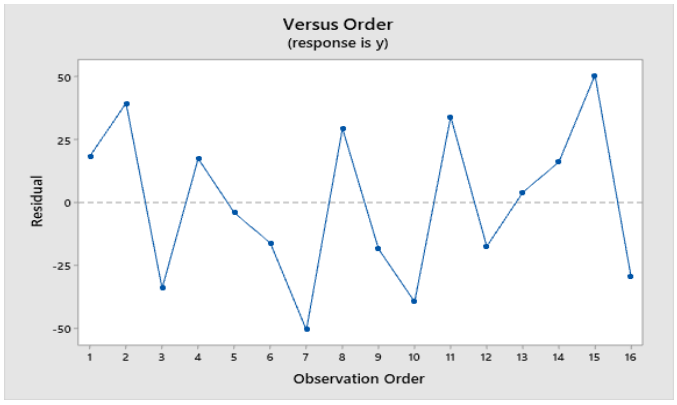
Regression Equation in Uncoded Units

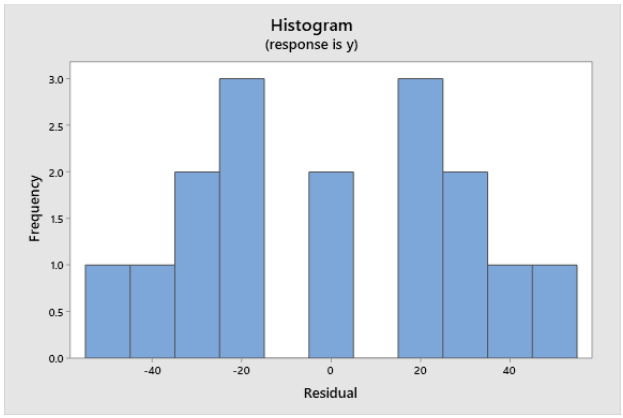
y = 194.2 - 0.8 A + 8.7 B - 22.7 C + 29.3 D - 9.1 A*B + 2.6 A*C - 6.7 A*D

Equation averaged over blocks.









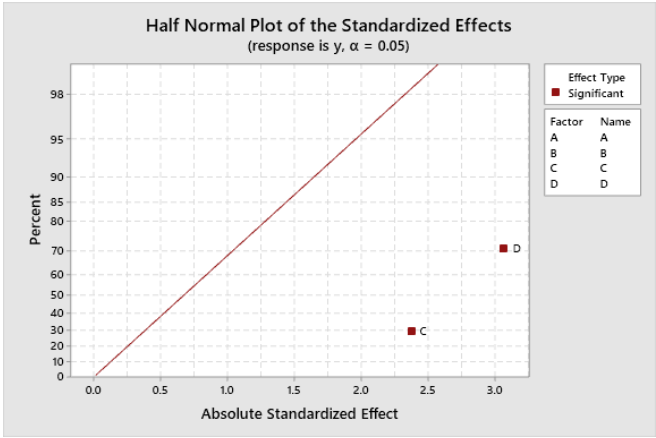
Ineffective factors have been removed:

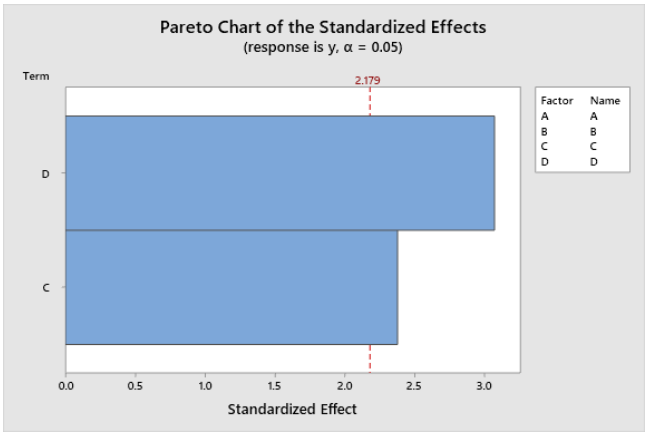
Coded Coefficients

Term	Effect	Coef	SE Coef	T-Value	P-Value	VIF
Constant		194.19	9.54	20.36	0.000	
Blocks						
1		-9.94	9.54	-1.04	0.318	1.00
C	-45.37	-22.69	9.54	-2.38	0.035	1.00
D	58.63	29.31	9.54	3.07	0.010	1.00

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Model	3	23563	7854	5.40	0.014
Blocks	1	1580	1580	1.09	0.318
Linear	2	21983	10992	7.55	0.008
C	1	8236	8236	5.66	0.035
D	1	13748	13748	9.44	0.010
Error	12	17467	1456		
Total	15	41030			





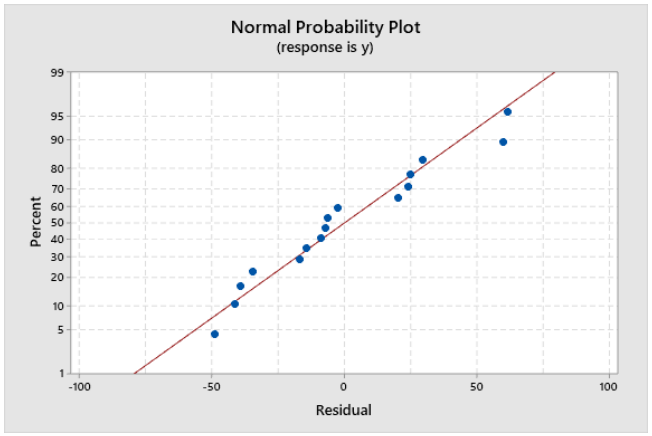
Model Summary

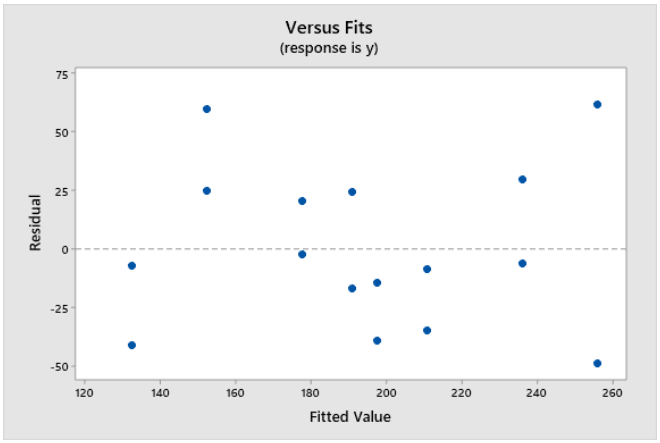
S	R-sq	R-sq(adj)	R-sq(pred)
38.1524	57.43%	46.79%	24.32%

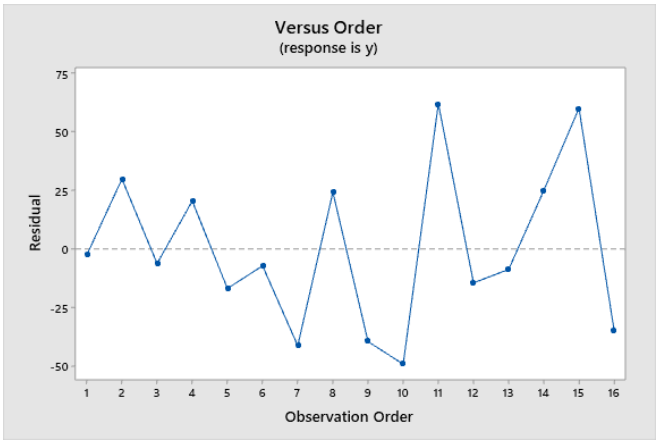
Regression Equation in Uncoded Units

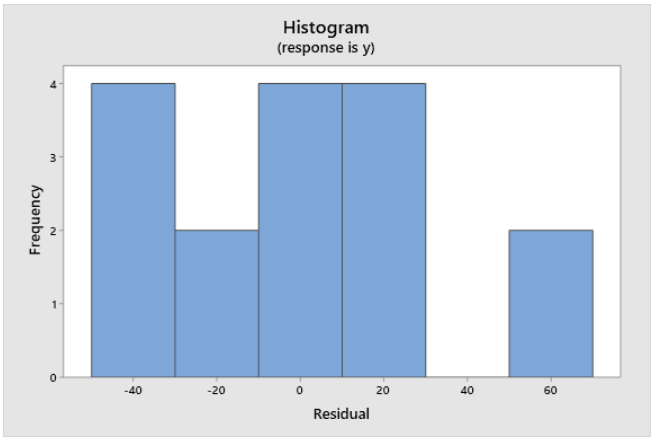
$$y = 194.19 - 22.69\ C + 29.31\ D$$

Equation averaged over blocks.


Normal Probability Plot
(response is y)
Percent
Residual


Versus Fits
(response is y)
Residual
Fitted Value


Versus Order
(response is y)
Residual
Observation Order


Histogram
(response is y)
Frequency
Residual

3- Conclusion

In the non-blocking design, factors C and D were identified as significant, and without considering the interactive effects of a low level of factor C and a high level of factor D, they were considered the optimal response.

In most of the interaction effect plots, a small effect is observed, and the conclusion based on the main effects plots is sufficient. However, interactive effects plots will also be of great help in decision-making.

Since in the field of digital marketing, the focus is usually on the effective factors, the factors with less effect are usually ignored. For example, Zarinche will stop sending advertising emails because even before the experiment, there was an agreement that this method is ineffective, and now this is proved using statistical information.

Knowing all this, we have to focus only on significant factors which are the Story's theme and Backlink. The plots below show that choosing low-level C and high-level D is the right answer to optimize the website traffic.

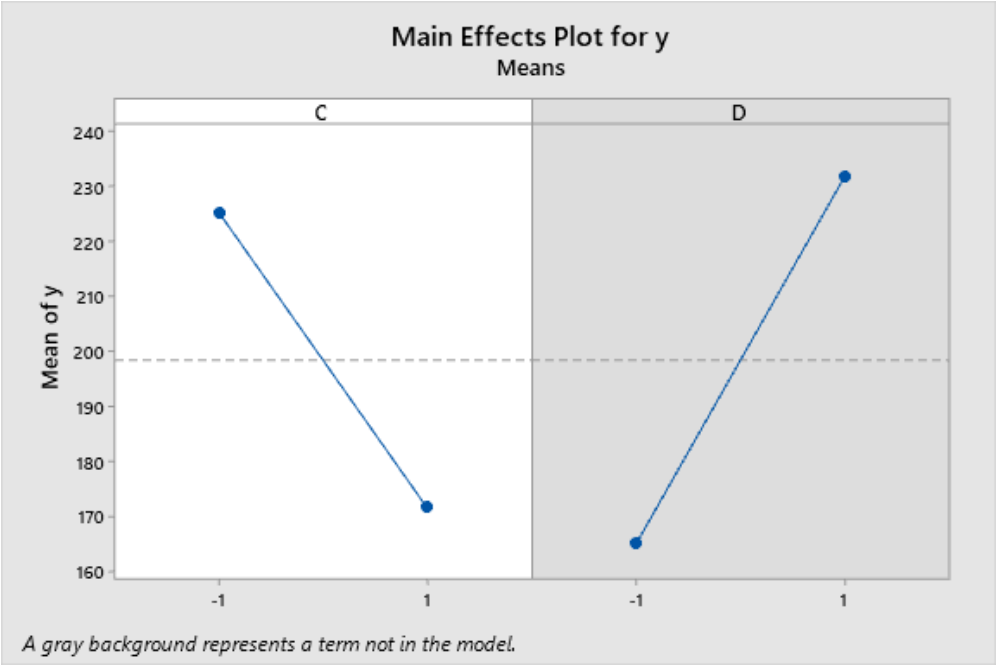


Figure 29- Main effects plots

Figure 30- Interaction plot

In the second case, where one block was considered for each repetition, the results are as follows:

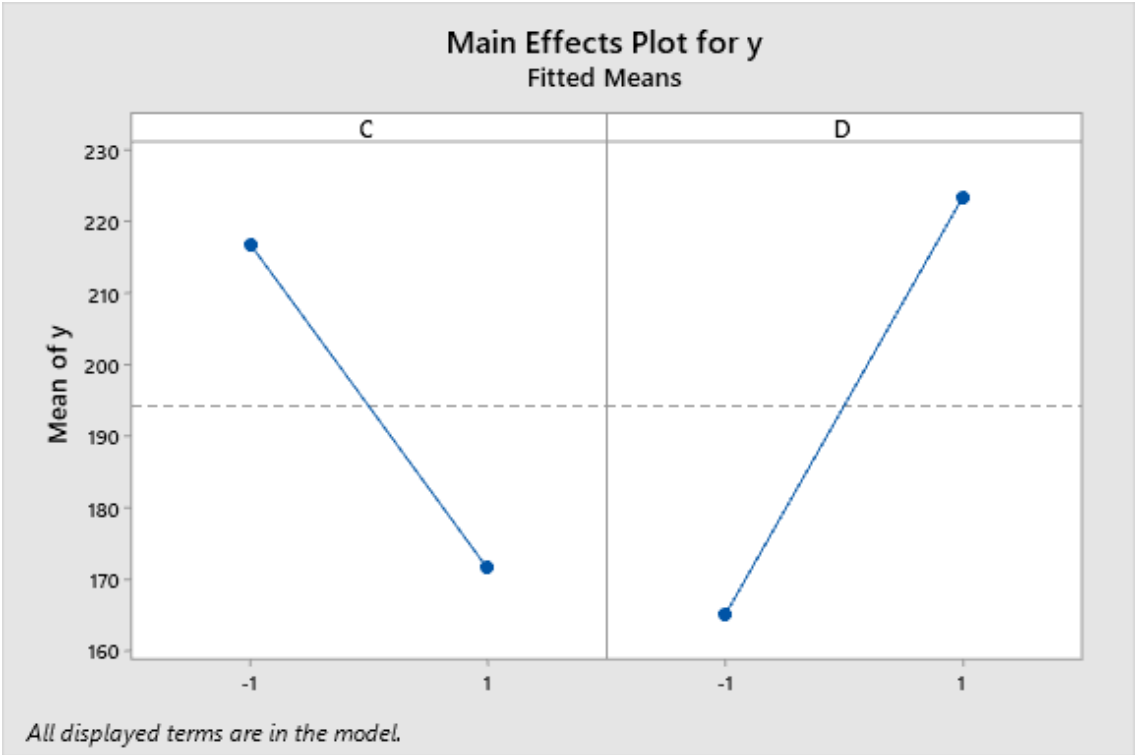


Figure 31- Main Effects plot

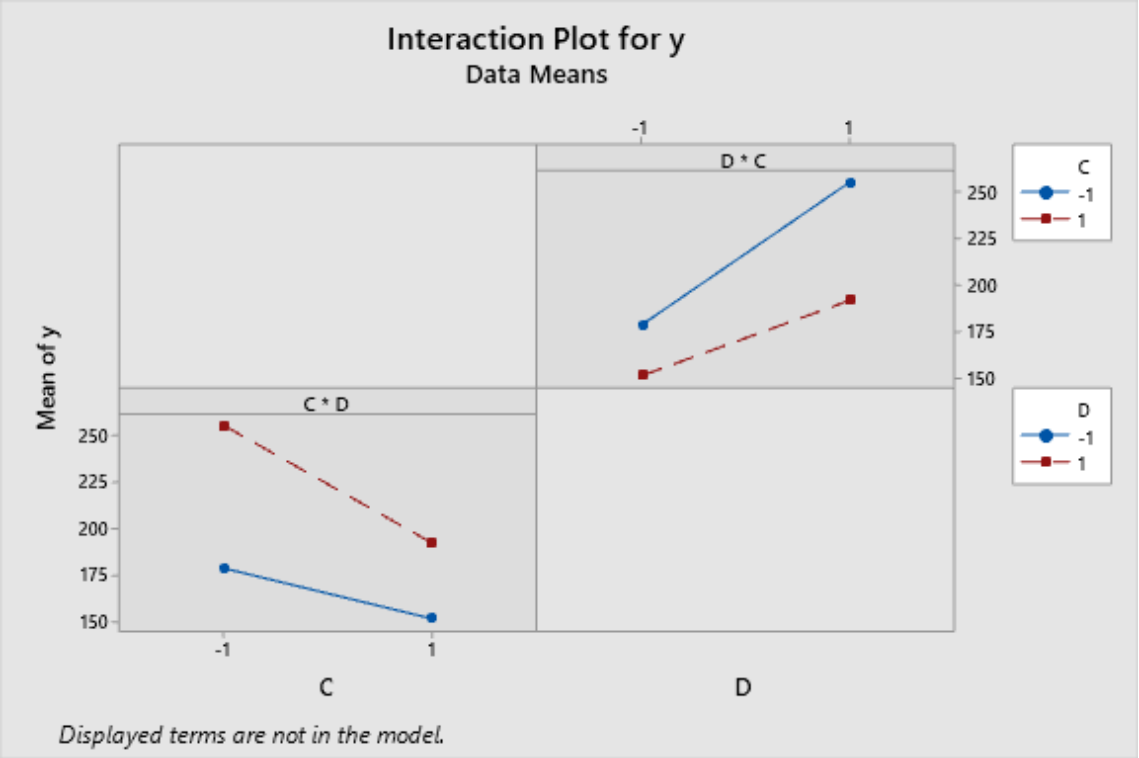


Figure 32- Interaction plot

Again, the lower level of C and the upper level of D are selected as optimal. These results were also shown in section 2. Since only C and D were significant and Pred. R^2 increased by removing ineffective factors, these two (C and D) are identified as the only factors worth spending time and money on.

It is more important for businesses to pay attention to the main factors than to address the less important ones (same as Pareto's law), so the results are acceptable, although, for more accurate results, about 40 to 60 days are needed to determine the effect of a factor such as a backlink (according to the opinion of the website SEO manager).