Marketing Promotion: TV vs. Radio vs. Social Media

Objective

This analysis provides an overview of the effectiveness of marketing promotion across three primary channels: TV, radio, and social media with influencers.

Tool Used: Excel

Dataset

This dataset is retrieved from Kaggle (<u>link</u>). It contains data collected from different marketing promotions to boost sales via different channels. Each row corresponds to an independent marketing effort.

There are 4 features and 1 target variable in the data:

- <u>Sales</u>: numeric, target variable
- <u>TV</u>: ordinal (Low, Medium, High), TV promotional budget
- <u>Radio</u>: numeric, radio promotional budget
- <u>Social Media</u>: numeric, social media promotional budget
- <u>Influencer size</u>: ordinal (Mega, Macro, Micro, Nano)

Note: all numeric variables in this dataset are presented in millions of dollars

Analysis

Here is what the data looks like in Excel:

TV	- Radio	Social Med	Influencer	🗸 Sales	-
Low	3.51	81 2.293	8 Micro	55.261	13
Low	7.75	2.572	3 Mega	67.574	19
High	20.349	90 1.227	2 Micro	272.250)1
Medium	20.10	85 2.728	4 Mega	195.102	22
High	31.65	32 7.777	0 Nano	273.960)4
Low	5.56	16 3.530	2 Nano	39.992	21

Figure 1.The first 6 rows of the original data

By an initial inspection of the data, I first performed the following data cleaning:

- Decreased the number of decimals of radio, social media, and sales variables (8 to 3, in millions of dollars)
- Removed 1 row with incorrect social media budget input

An exploratory data analysis was then conducted to delve deeper into the dataset.



There is a surprisingly high linear relationship between the radio budget and sales. More investment in radio marketing corresponds to higher sales of products.



While we did observe that a higher social media budget can have some impact on sales, it doesn't seem to be as effective compared to radio channels. There are also a few outliers in this plot. For example, in the lower right corner, a promotion with a 10 M social media budget only had 150 M sales in return.



TV budget comes in three categories: low, medium, and high. There is a clear positive relationship between TV budget and sales. As the TV budget increases, sales also increase.



The last variable examined is influencer type categorized by the extent of influence. Differences in sales among different influencer types are not as significant (max = 13 million dollars). However, it is interesting to observe that having influencers with higher influence doesn't necessarily correspond to higher sales, which contradicts my hypothesis.

Following the visualizations, I fitted a simple linear regression model to further quantify the impact of different promotion channels on sales. The following were used to prepare the dataset for modeling:

- Used label encoding to encode 'TV' and 'Influencer' variables
- Removed outliers from 'Social Media' column
- Normalized 'Radio' and 'Social Media' features

TV(Encoded) 🔽 Radio (N)	🔽 Socia	l Media (N) 🛛 🔽 Influence	r(Encoded 🗾 Sal	es 🔽
1	0.081	0.201	2	55.261
1	0.181	0.226	4	67.575
3	0.480	0.108	2	272.250
2	0.474	0.239	4	195.102
3	0.748	0.682	1	273.960
1	0.129	0.310	1	39.992

After data cleaning and encoding

Here is what I got:

	Coefficients	P-value
Intercept	-12.77	0.0014
TV(Encoded)	77.10	2.3049E-126
Radio (N)	125.39	6.0109E-33
Social Media (N)	0.42	0.9569
Influencer(Encode	0.32	0.7542

Findings

Setting the significance level aside, all four features are positively correlated with sales despite the variations in magnitude. However, when considering a significance level of 0.05, it becomes evident that only TV and Radio Budget exhibit statistical significance, suggesting a real impact on sales. In contrast, both 'Social Media' and 'Influencer' do not

demonstrate significant contributions to sales. Among these variables, 'Radio' exhibits the highest impact on sales followed by 'TV'.

In conclusion, higher TV and radio are shown to be more effective channels by this dataset (see reflection for discussion of this conclusion).

Reflection

While findings from this dataset are interesting, the lack of information has made it less generalizable, that is we can't use what we've found here to set marketing strategy for everything. Here are a few things I wish the dataset or data source contained to make the analysis more 'flavorful' and potentially useful:

- 1. **Including information on the products or services promoted** (categories) could enhance the analysis as different target audiences may react differently to these channels. For instance, the younger generation might engage more with social media and influencer promotions.
- 2. **Incorporating a 'Region' variable** would be beneficial, considering varying shopping and purchase behaviors among different regions. Understanding regional differences, such as the divergence between behaviors in China and the United States, can provide valuable insights into more effective marketing strategies for specific locations.
- 3. It would be more informative if we had **'TV' in numeric values** similar to ' Social Media' and 'Radio' and **some details about how 'influencer type' was categorized**.