Applied Marketing Analysis Report

Analysing Key Factors Influencing Spotify's Monthly Active Users in the US Market:

A Regression Analysis

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I. Introduction

Spotify is a leading music streaming service platform that has revolutionised the way consumers experience music. It was founded in 2006 and has since grown to become the market leader with over 489 million monthly active users as of December 2022.

Spotify has a diverse user base in which are mainly young adults with a relatively high income and a strong interest in music, movies, TV shows, and video gaming. Spotify's competitive advantage lies in its vast music library, personalised recommendation algorithms, seamless user experience, and its ability to offer both free and premium subscription options. Spotify's marketing strategies have been successful in reaching and engaging with its audience, building brand awareness, and promoting its services through targeted digital campaigns, influencer marketing, and branded playlists.

In addition to music streaming, Spotify has also placed significant emphasis on podcasting in recent years with the aim of becoming the leading platform for audio content. This direction has been reflected in its marketing campaigns, which have focused on promoting and producing exclusive podcasts.
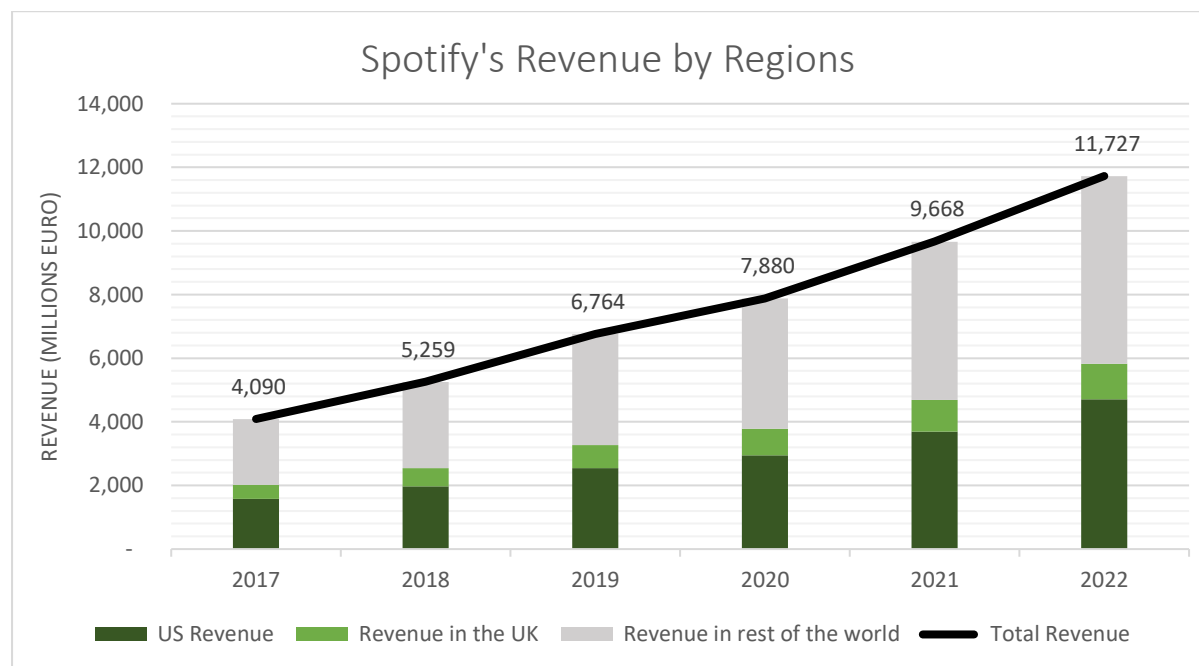

Figure 1 Spotify's revenue by region 2017 - 2022

Spotify's marketing area in the US is critical to its performance, as the US market accounts for a significant portion of its revenue and user base, in which Spotify's 2022 revenue was 11,727 million Euros and the average revenue's annual growth rate from 2017 to 2022 was 24% (Fig. 1). This analysis aims to use regression analysis to predict the number of monthly active users (MAUs) in the US market based on two variables: US disposable income per capita and R&D and Marketing expenses. By understanding the factors that drive MAUs in the US market, Spotify can enhance its marketing strategies and optimize its investments in R&D and marketing to achieve sustainable growth.

II. Assessments of Key Variables

1. Descriptive Analysis

Table 1 Key variables description

Variables	Type	Level of measurement
Monthly Active Users	Dependent	Discrete
US Disposable Income per Capita	Independent	Continuous
R&D and Marketing Expenses	Independent	Continuous

This analysis will assess three key variables as described in Table 1, in which:

- Monthly Active Users (MAUs) is a key metric for measuring the success of a digital platform, also interpreted as unique users who consume music on Spotify's streaming platform in a 28-day window.
- US Disposable income per Capita is the after-tax income is a commonly used as an indicator of economic well-being (Bureau of Economic Analysis, n.d) as it reflects the amount of money available to individuals to spend on discretionary items such as entertainment or online services. As a result, it is reasonable to anticipate that changes in disposable income will be related to changes in MAUs for digital platforms.
- R&D and marketing expenses: Spotify has invested extensively in R&D to improve user engagement and customer satisfaction on its platform, which they feel helps drive organic growth in MAUs.

Table 2 Descriptive statistics of key variables

Descriptive Statistics

|	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Skewness Std. Error	Kurtosis Statistic	Kurtosis Std. Error
MAUs in North America	24	42	103	72.46	19.003	361.125	-.038	.472	-1.170	.918
R&D and Marketing Expenses	24	73.94	355.59	166.5339	76.18603	5,804.311	1.194	.472	.935	.918
US Disposable income per Capita	24	42,294.67	52,186.00	45,517.6944	2393.3478	5,728,113.690	1.117	.472	1.504	.918
Valid N (listwise)	24									

- Monthly Active Users in North America
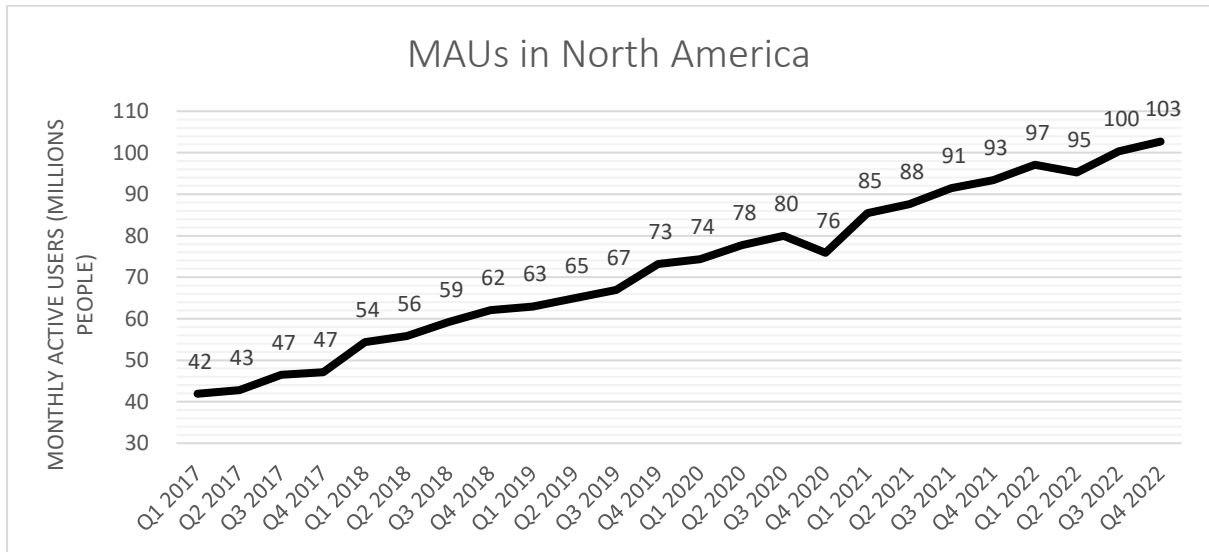
Figure 2 Monthly Active Users in North America by quarters (2017 – 2022)

Figure 2 depicts a stable growth in MAUs of Spotify, where monthly listeners of the platform grew from 42 million people to 103 million people within 6 years. This was due to the success of marketing campaigns.

Table 2 suggests that the average MAUs in North America within 5 years are 72.46 million people, with negative skewness of -0.038 indicating the distribution slightly skews to the left (Figure 3). Figure 3 also illustrates that the MAUs variable does not have outliers.
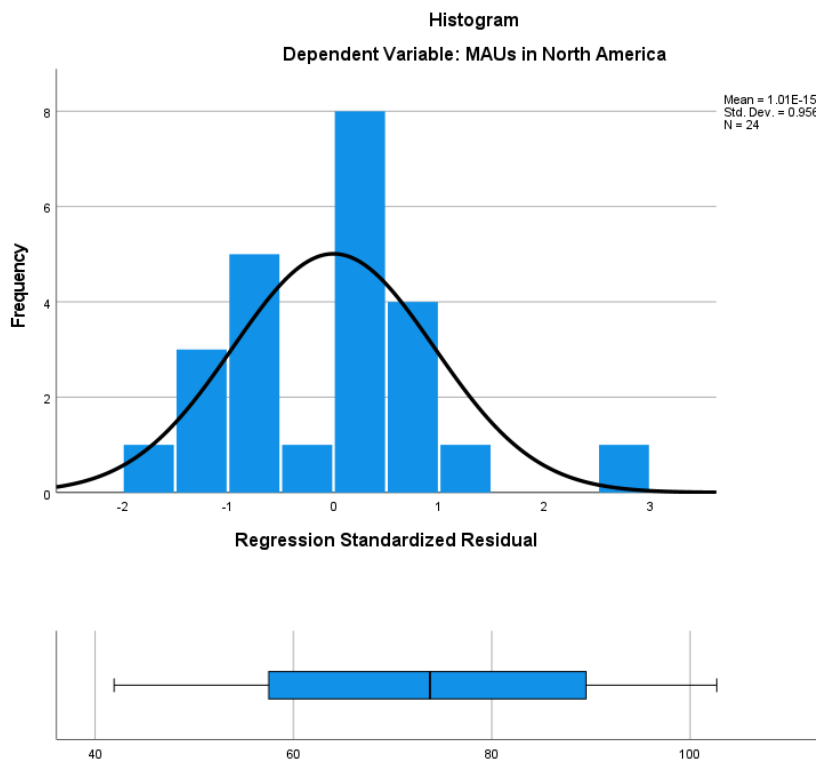

Figure 3 Boxplot of MAUs in North America
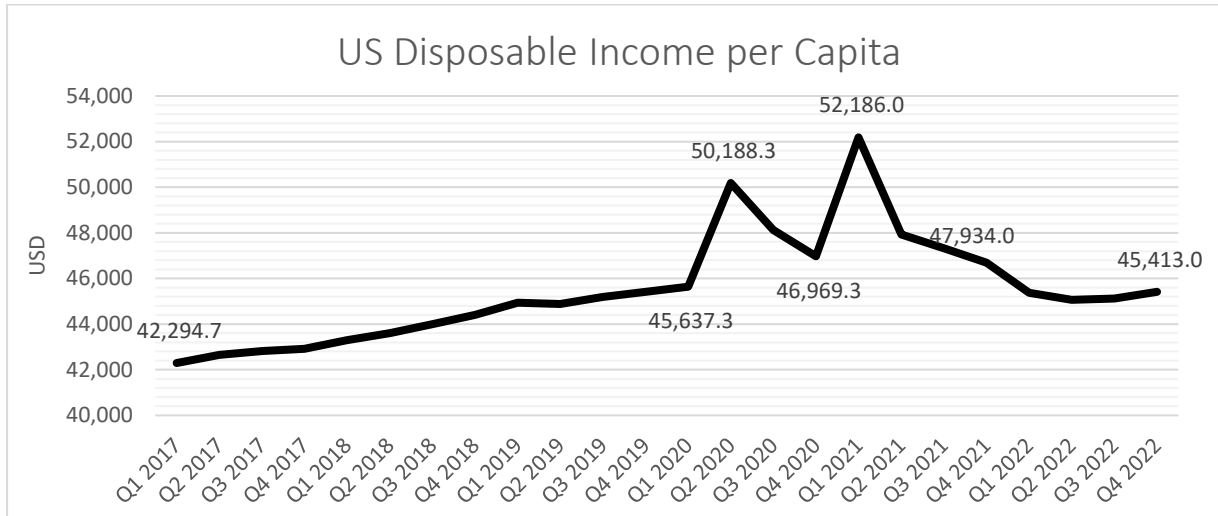
- US Quarterly Disposable Income per Capita

Figure 4 Quarterly US Disposable Income per Capita (2017 - 2022)

The descriptive statistics in Table 2 indicates that the average of quarterly US disposable income per capita is USD45,517.7. Positive skewness of 1.117 and positive kurtosis of 1.504 indicate that frequency distribution of the US disposable income per capita is slightly right-skewed and peaked with thick tails (Figure 5). The boxplot (Figure 5) illustrate an outlier, which is the observation of Quarter 1 2021. According to the Bureau of Economic Analysis (2021), the US disposable personal income per capita experienced a significant increase in the second quarter of 2020 and the first quarter of 2021 (Figure 4) due to the implementation of several government stimulus programs in response to the COVID-19 pandemic.
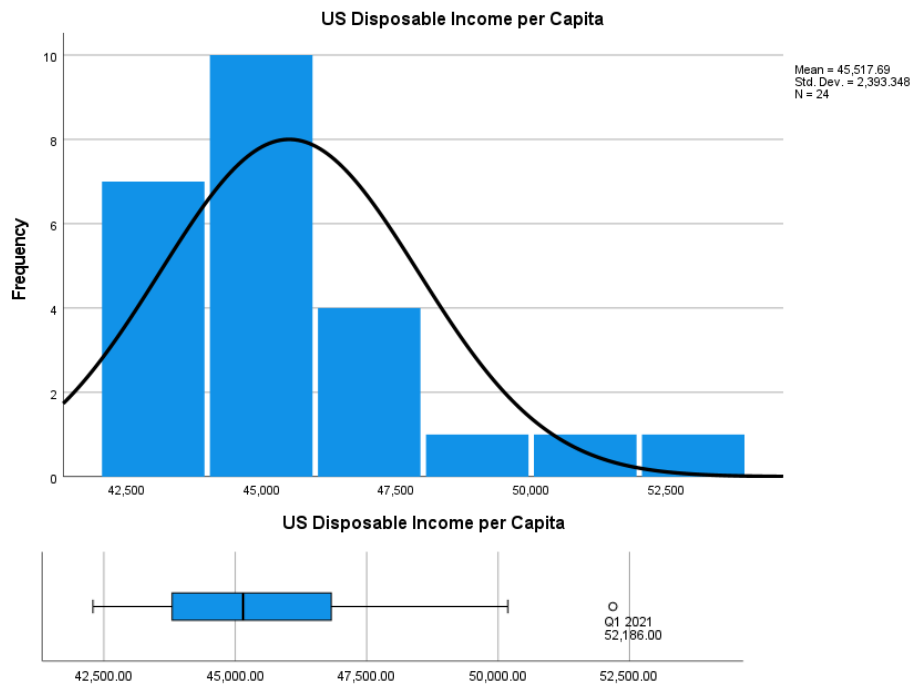

Figure 5 Frequency Distribution and Boxplot of US Disposable Income per Capita

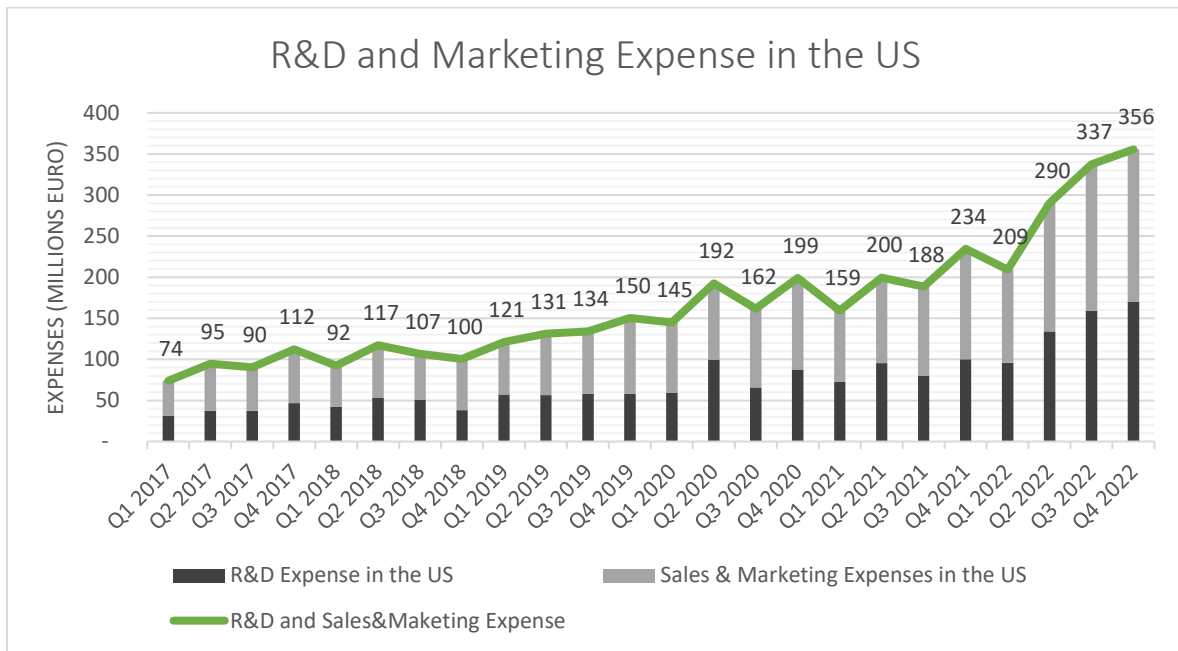- Research & Development and Marketing Expenses

Figure 6 Spotify's Quarterly R&D and Marketing expenses (2017 - 2022)

Figure 6 shows that from 2017 to 2022, the quarterly amount Spotify invested in R&D and Marketing was 74 million Euros in 2017 and increased five times to 356 million Euros in the end of 2022. The descriptive statistics (Table 2) indicates that Spotify's average quarterly expense on R&D and Marketing within 6 years is 166.5 million Euros. Moreover, the positive skewness of 1.194 and Kurtosis of 0.935 indicates a unremarkably right-skewed and peaked frequency distribution (Firgure 7). Two outliers of observation in Quarter 3 and 4 2022 were identified.
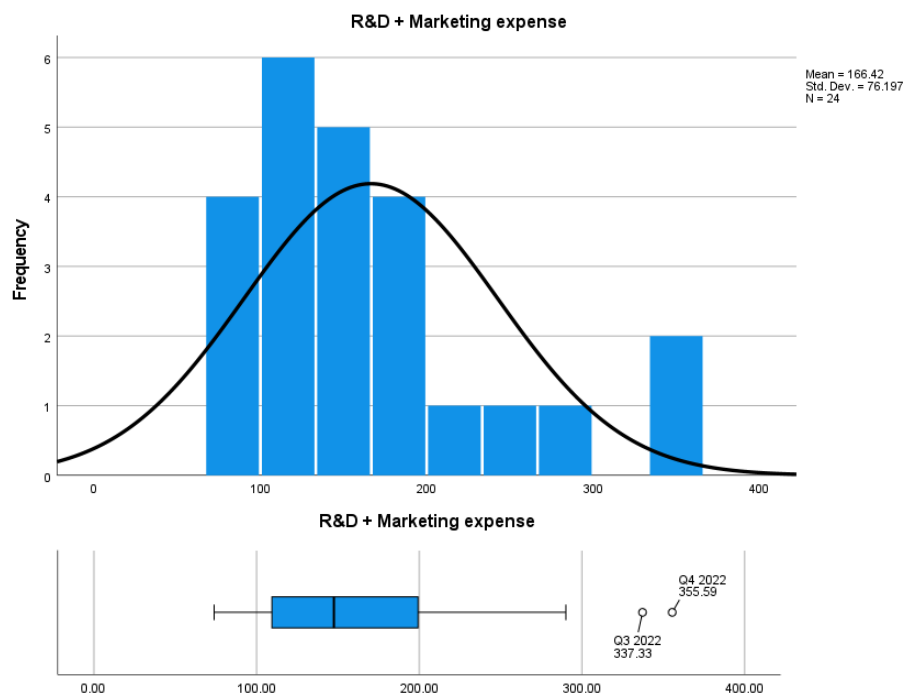

Figure 7 Frequency Distribution and Boxplot of R&D and Marketing expense

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2. Assessments of Correlations among Variables

Table 3 Correlations among key variables

Correlations

		MAUs in North America	US Disposable income per Capita	R&D and Marketing Expenses
MAUs in North America	Pearson Correlation	--		
	N	24		
US Disposable income per Capita	Pearson Correlation	.611**	--	
	Sig. (2-tailed)	.002		
	N	24	24	
R&D and Marketing Expenses	Pearson Correlation	.888**	.355	--
	Sig. (2-tailed)	<.001	.088	
	N	24	24	24

**. Correlation is significant at the 0.01 level (2-tailed).

With confidence interval of 95%, Table 3 shows that there are a significantly strong positive relationship between variable MAUs in North America and US Disposable income per capita as the correlation coefficient is .0611 and p-value is 0.002. Additionally, variable MAUs also has a significantly strong positive relationship with R&D and Marketing expenses as the correlation coefficients is 0.888 and p -value is <.001. Finally, the two independent variables have the correlation coefficient of .355 with p-value of .088, indicating an insignificant positive relationship.

III.   Results

The adjusted R square of 0.878 indicates that approximately 87.8% of the variance in MAUs can be explained by the two independent variables (Table 4).

Table 4 Regression model summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.943[a]	.889	.878	6.639

a. Predictors: (Constant), US Disposable income per Capita, R&D and Marketing Expenses

b. Dependent Variable: MAUs in North America

The ANOVA results in Table 5 (F = 83.722, p < .001) suggest that the regression model is significant, indicating that the model provides a good fit for the data.

Table 5 ANOVA results of regression analysis

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7380.273	2	3690.136	83.722	<.001[b]
	Residual	925.602	21	44.076		
	Total	8305.874	23			

a. Dependent Variable: MAUs in North America

b. Predictors: (Constant), US Disposable income per Capita, R&D and Marketing Expenses

As shown in Table 6, the regression results indicate that both quarterly R&D and marketing expenses (b = 0.192, p < .001) and quarterly US disposable income per capita (b = 0.003, p < .001) are positively associated with monthly active users (MAUs) in North America. The constant coefficient of -81.449 (p = .007) suggests that the predicted value of MAUs in North America is -81.449 when both independent variables are zero. The VIF of the independent variables (1.144) is relatively low, indicating that there is not a high level of multicollinearity among the independent variables.

From the regression results in Table 6, the regression equation is:

MAUs = 0.019*[R&D and Marketing Expense] + 0.003*[US disposable income per capita] – 81.449

Table 6 Coefficients of regression analysis

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	Upper Bound	Collinearity Statistics Tolerance	VIF
1	(Constant)	-81.449	27.218		-2.992	.007	-138.052	-24.846		
	R&D and Marketing Expenses	.192	.019	.768	9.859	<.001	.151	.232	.874	1.144
	US Disposable income per Capita	.003	.001	.338	4.331	<.001	.001	.004	.874	1.144

a. Dependent Variable: MAUs in North America

Overall, these results suggest that quarterly R&D and marketing expenses and quarterly US disposable income per capita are important predictors of MAUs in North America for Spotify, and that the model provides a good fit for the data. Figure 8 and 9 below depict the linear relationships between dependent variable MAUs in North America and independent variables R&D and Marketing expenses and US disposable income per capita.
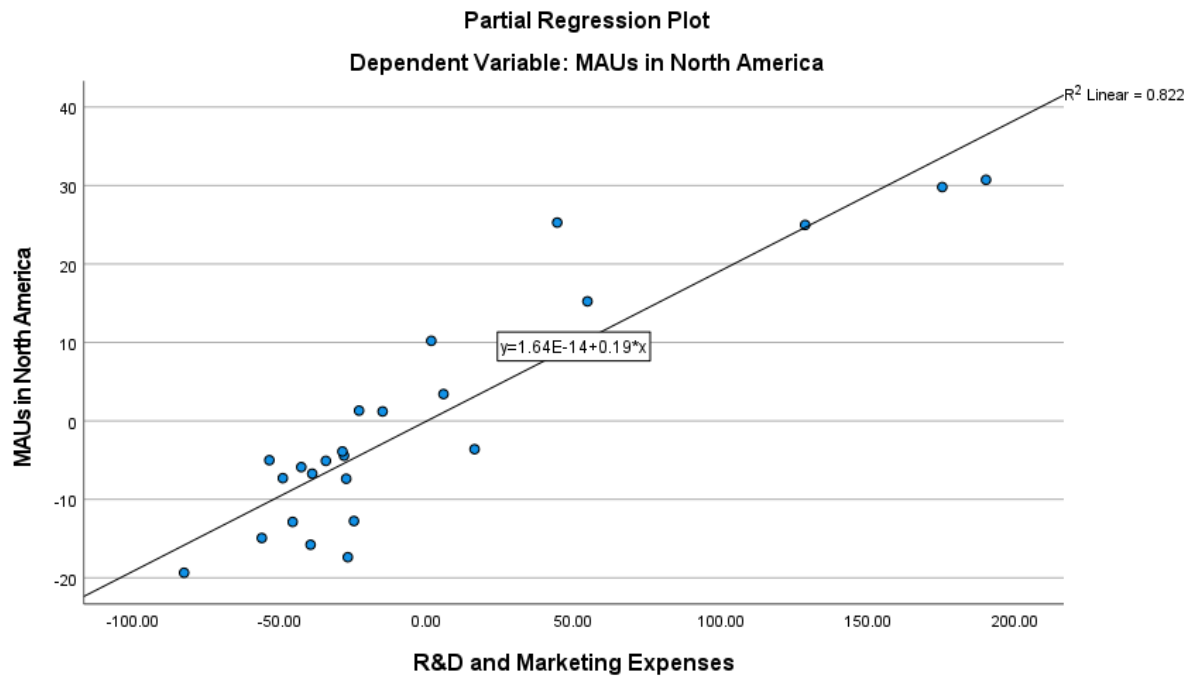

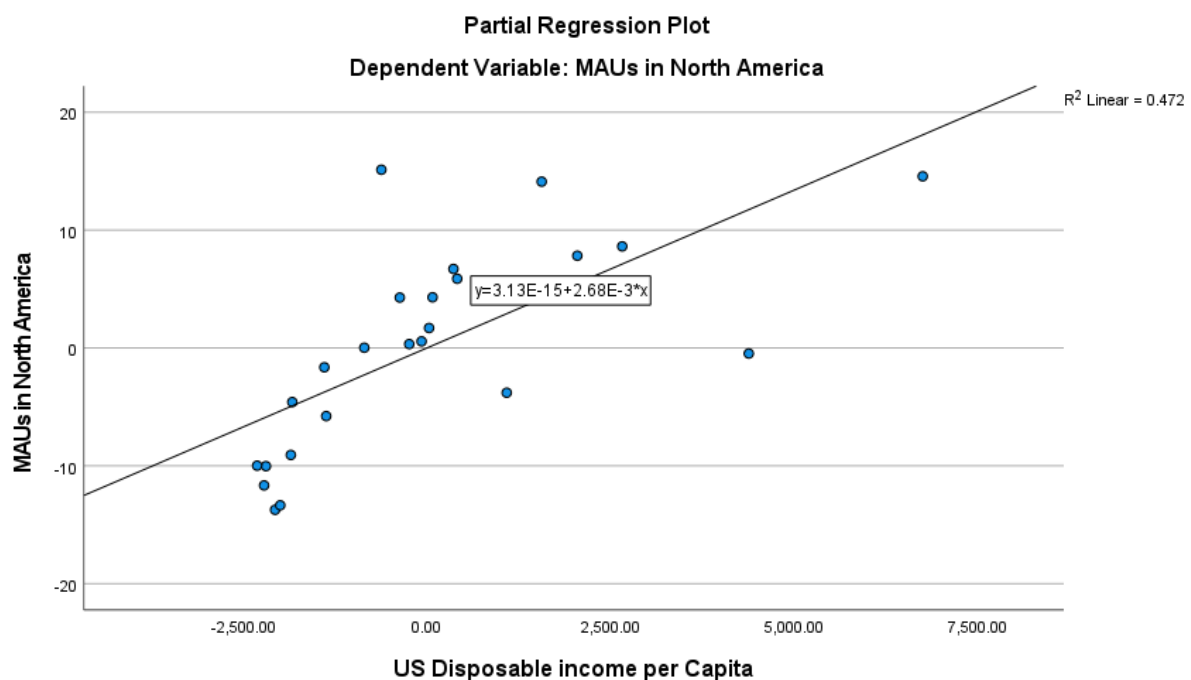*Figure 8 Partial regression plot of MAUs in North America and R&D and Marketing expense*

Figure 9 Partial regression plot of MAUs in North American and US Disposable Income per Capita

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Table 7 Residuals Statistics

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	39.94	104.33	72.46	18.188	24
Residual	-10.812	12.757	.000	5.505	24
Std. Predicted Value	-1.788	1.752	.000	1.000	24
Std. Residual	-1.877	2.214	.000	.956	24

a. Dependent Variable: MAUs in North America

Residuals are the differences between the predicted values and the actual values in the data. In this case, the mean of the predicted values is 72.46 (Table 7), which means that on average, the model is predicting that there will be 72.46 million monthly active users in North America. The standard deviation of the predicted values is 18.188, which indicates that there is some variability in the predicted values around the mean. On the other hand, the mean of the residuals is 0, which indicates that on average, the predicted values are not significantly different from the actual values. However, the standard deviation of the residuals is 5.505, which indicates that there is some variability in the residuals around the mean.

Overall, these statistics suggest that the model is a reasonable fit for the data, but there is some residual variability that is not explained by the model.

IV.   Discussions and implications

1.   Discussion of regression analysis results

The regression model is attempting to predict the number of monthly active users in North America (MAUs) based on two independent variables, R&D and Marketing Expense, and US disposable income per capita. The regression equation can be interpreted as follows:

For every unit increase in R&D and Marketing Expense, we can expect an increase in MAUs of 0.019 units, holding all other variables constant.

For every unit increase in US disposable income per capita, we can expect an increase in MAUs of 0.003 units, holding all other variables constant.s

The intercept of the model is -81.449, which represents the predicted MAUs when both independent variables are equal to zero.
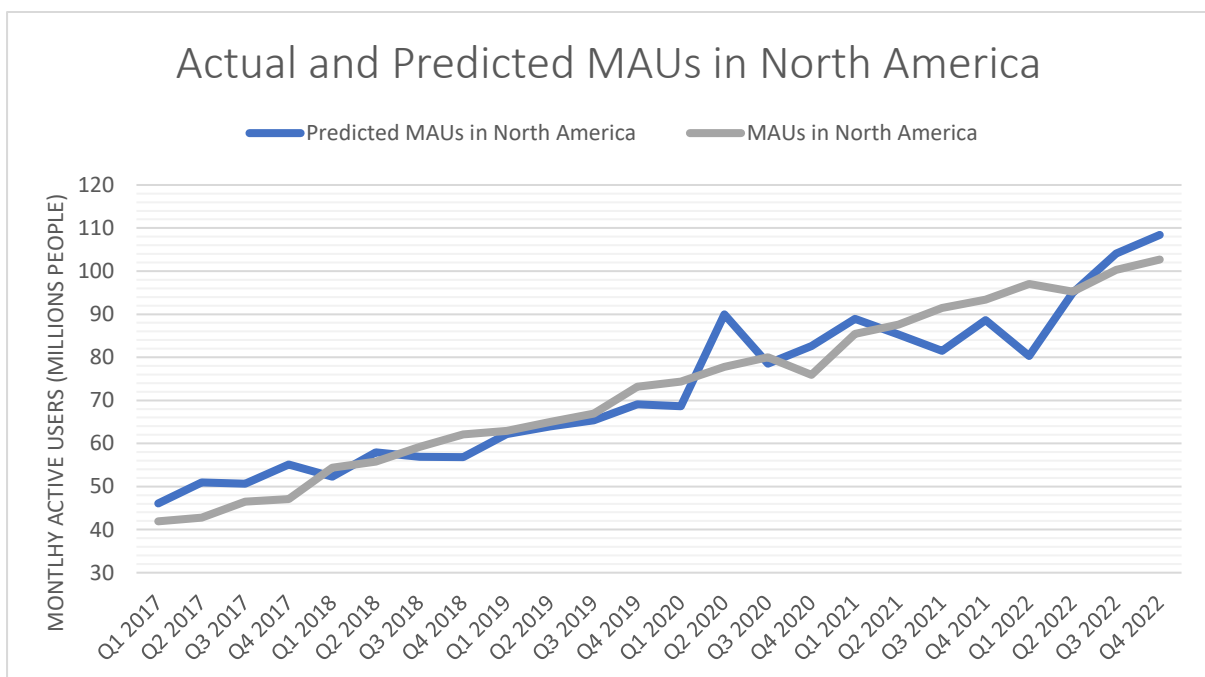

Figure 10 Actual and predicted MAUs in North America

Figure 10 indicates that the regression model is a good fit to forecast MAUs in Nort America based on two predictors which are US disposable income per capita and R&D and Marketing expense as the times series line for predicted values fluctuates closely to that of actual values.

2.   Implications for Spotify's marketing strategies and investment decisions in the US market

Based on the regression analysis results, we can see that both R&D and Marketing expenses and US disposable income per capita have a significant positive impact on the number of Monthly Active Users (MAUs) in North America. This suggests that increasing investments in marketing and R&D initiatives can lead to a growth in MAUs, as well as targeting markets with higher disposable income per capita.

Therefore, Spotify may consider increasing their marketing and advertising efforts in North America, especially in areas where the disposable income per capita is high, in order to attract

more users to the platform. In addition, investing in R&D initiatives such as enhancing the user interface or developing new features can also help to retain and attract users.

However, it is also important for Spotify to monitor the cost-effectiveness of their marketing and R&D investments, as we can see that there is a diminishing marginal return on these expenses. Spotify should continue to assess the effectiveness of their marketing strategies and R&D initiatives and adjust their investment decisions accordingly to optimize their return on investment.

3. Limitations of the analysis

There are several limitations to consider when interpreting the results of this analysis.

Firstly, the analysis relies on the assumption that the data used is accurate and representative of the population being studied. There may be errors or biases in the data that were not detected during data cleaning and preparation, which could have affected the results. Secondly, the analysis is limited by the available data, which only covers a specific time period and geographic location. This means that the results may not be generalisable to other time periods or regions. Additionally, the presence of outliers in the data can affect the accuracy and reliability of the regression model. While efforts were made to address outliers through data cleaning and transformation, there is still a possibility that outliers have influenced the results. Lastly, it is important to note that correlation does not necessarily imply causation. While the analysis has identified relationships between the variables, it is not possible to determine with certainty whether one variable is causing changes in another variable or if there are other underlying factors at play.

Overall, while the analysis provides valuable insights into the relationships between the variables, it is important to consider the limitations and potential sources of error when interpreting the results.

V.   Conclusion and Recommendations

1. Summary of key findings and their implications

The multilinear regression analysis showed a significant positive relationship between monthly active users in North America and R&D and marketing expenses as well as US disposable income per capita. The adjusted R-squared value of 0.878 indicates that 87.8% of the variability in the dependent variable can be explained by the independent variables.

2. Quantitative recommendations for Spotify

Based on these findings, it is recommended that Spotify continue to invest in R&D and marketing to increase its user base in North America. A quantified suggestion based on the regression model would be for Spotify to increase its investment in R&D and marketing expenses to drive an increase in monthly active users in North America. Based on the coefficients in the regression model, a $1 million increase in R&D and marketing expenses is predicted to result in an increase of approximately 0.192 million monthly active users in North America. This can be a valuable insight for Spotify to prioritise and allocate its resources towards R&D and marketing efforts to drive user growth in the US market.

Additionally, Spotify should also consider targeting users with higher disposable income, as this may lead to increased revenue and growth potential. One strategy to achieve this could be through collaborations with popular podcast creators or by creating its own exclusive podcast content that appeals to high-income individuals, as this has been Spotify's investment focus in recent years.

However, it is important to note that the analysis has some limitations, including the limited availability of data for some quarters and the presence of outliers in the US disposable income variable. These limitations should be taken into account when making decisions based on the analysis.