**THE CELEBRITY SALES GAME: WORTH THE INVESTMENT?**

**Abstract:**

This project examines YouTube advertising activity of Indian companies between 2021 and 2024, with a specific focus on identifying ads featuring celebrity endorsements. As digital marketing becomes increasingly central to brand promotion, YouTube serves as a key platform for companies to reach consumers. Celebrity endorsements, known for boosting visibility and brand credibility, play a significant role in these campaigns.

In this regard, the project utilizes the YouTube Data API, which retrieves data from the official YouTube channels of each selected company. The following information is extracted during the analysis: the company name, date of publication, and links to the advertisements. Special attention is given to filtering unofficial or user-generated content by only taking into consideration advertisements published by the companies themselves. The system also uses keywords and other methods to identify possible celebrity endorsements in the ads.

This study aims to draw from insight on how Indian companies have positioned YouTube for advertising in these three years, with the purpose of ascertaining the role that celebrity endorsement has played in their digital marketing strategies. This will allow one to understand if the celebrity-driven campaigns are a common feature and whether they stayed influential in brand recall between 2021 and 2024.

1.**Introduction**

In today’s competitive marketplace, brands strive to differentiate themselves and capture the attention of their target audiences. One common strategy that many brands utilize is celebrity endorsement, where well-known public figures promote a product or service to enhance brand recognition, credibility, and customer trust. However, the effectiveness of celebrity endorsements is often debated, with some experts arguing that endorsements do not always lead to tangible business results. This research explores the question: "Do brands need celebrity endorsements?" by analysing data from YouTube ads using the YouTube API.

In an increasingly digital world, companies are relying on social media platforms such as YouTube to advertise their products. YouTube’s global reach makes it an essential platform for brand awareness, customer engagement, and influencing purchase decisions. One of the most prominent strategies companies use to enhance the effectiveness of their advertising is celebrity endorsements. However, the return on investment (ROI) for celebrity-endorsed advertising has been widely debated.

YouTube, being one of the largest video platforms in the world, offers a vast repository of advertisements that include both celebrity-endorsed and non-celebrity content. By analyzing these ads, we aim to identify trends, patterns, and the overall impact of celebrity endorsements on ad performance metrics such as views, engagement (likes, comments), and audience reception. This research focuses on three sectors among India’s largest companies by market capitalization to determine whether celebrity endorsements truly offer an advantage or if brands can achieve similar success without them.

This study focuses on Indian companies and aims to determine whether celebrity endorsements through YouTube ads lead to improved sales performance. We employ a statistical approach to measure the impact of these endorsements by comparing sales data before and after the advertisements were launched.

**2. Literature Review**

One of the earliest comprehensive reviews on celebrity endorsements was conducted by [Erdogan (1999)](https://www.researchgate.net/profile/B-Zafer-Erdogan/publication/233894890_Celebrity_Endorsement_A_Literature_Review/links/6085bf7e907dcf667bc4538f/Celebrity-Endorsement-A-Literature-Review.pdf). This paper examined the critical role of celebrities in marketing and emphasized the complexity of managing celebrity personas. Erdogan noted that while celebrities can create a positive impact on brand awareness and perception, companies have limited control over the actions and public image of the celebrities they partner with. The study concluded that while celebrity endorsements can be beneficial, they are not without risks, particularly when the celebrity's behavior negatively affects the brand.**Impact of Celebrity Endorsements on Brand Image: Debiprasad Mukherjee** explored the direct relationship between celebrity endorsements and brand image. They argued that celebrity endorsements could be instrumental in building a strong brand image, especially in competitive markets. However, the effectiveness of these endorsements depends on the alignment between the brand and the celebrity’s image. The study found that if there is congruence between the celebrity and the brand, the endorsement is more likely to succeed in reinforcing the brand image.  
 **Who Endorses Whom? Meanings Transfer in Celebrity Endorsement**: [Halonen-Knight and Hurmerinta (2012)](https://www.academia.edu/download/31384363/Who_endorses_whom_-_Meanings_transfer_in_celebrity_endorsement.pdf) delved into the meaning transfer model in celebrity endorsements, framing these endorsements as a form of brand alliance. Their research revealed that celebrity endorsements allow for the transfer of meaning from the celebrity to the brand. This study highlighted the importance of the symbolic meanings attached to celebrities and how these meanings can be absorbed by the brand through the endorsement process. The research also indicated that if the meaning transfer is successful, the brand can benefit significantly in terms of enhanced image and emotional connections with consumers.  
 **The Economic Value of Celebrity Endorsements**: [Elberse and Verleun (2012)](https://www.journalofadvertisingresearch.com/content/52/2/149.short) focused on the economic aspect of celebrity endorsements by examining their impact on sales. The study discovered that, on average, a celebrity endorsement could increase sales and stock market returns for the brand. However, they also noted that there could be a downside to these endorsements. Their research highlighted that celebrity endorsements might also help competing brands in the same category, diluting the effectiveness of the endorsement. The study concluded that while celebrity endorsements can be valuable, they must be carefully executed to prevent benefiting rivals.  
 **Celebrity Endorsements: Exploring the Role of Identity**: Knoll and Matthes (2015) explored how identity plays a role in the effectiveness of celebrity endorsements. This study suggested that endorsements work best when there is a strong match between the celebrity’s identity and the brand’s message. When celebrities are perceived as genuine and authentic, their endorsements are more likely to resonate with consumers. This authenticity factor can reduce skepticism and enhance the credibility of the brand message. **Consumer, Brand, Celebrity: Which Congruency Produces Effective Celebrity Endorsements?**:[Heath et al. (2017)](https://www.academia.edu/download/59533008/1-s2.0-S0148296317302539-main20190605-24696-1mlmi10.pdf) introduced the concept of congruency among the brand, celebrity, and consumer. Their study tested the simultaneous effects of three types of congruency: brand-celebrity, brand-consumer, and celebrity-consumer. They found that the most effective endorsements occur when all three dimensions align. For instance, a brand's values, the celebrity's persona, and the target audience’s preferences should all be congruent for maximum impact. The study suggested that mismatches in any of these areas could reduce the effectiveness of an endorsement.  
 **Endorsement Effectiveness: The Role of Public Image and Scandal** : A study by [Zhu and Chang (2018)] focused on the risk of scandal in celebrity endorsements. Their research found that celebrities with a history of scandal can negatively affect the brand’s image, even if the scandal occurs after the endorsement is signed. This highlights the risks associated with celebrity endorsements, as a celebrity's personal life can directly impact a brand's perception in the public eye. **Influencers vs. Celebrities: Who Holds More Power?** Recent studies, such as by [Jin and Phua (2020)] have compared traditional celebrity endorsements with social media influencer partnerships. The research suggested that while influencers may have less widespread recognition than traditional celebrities, their endorsements often feel more authentic to consumers due to the perceived personal relationship influencers maintain with their followers. As a result, many brands have begun shifting their focus from traditional celebrity endorsements to influencer marketing, particularly in industries like fashion and beauty.

**2.1. Literature Gap**

1. While extensive research has been conducted on the impact of celebrity endorsements on brand awareness, perception, and sales, a notable gap exists in the exploration of “long-term effects of celebrity endorsements” across different sectors, particularly in the Indian market. Most studies focus on short-term sales boosts or the general effectiveness of such endorsements but fail to analyse the “percentage change in revenue” over multiple years.
2. Additionally, there is limited research comparing “celebrity-endorsed brands” to “non-endorsed brands” in terms of revenue growth using statistical methods like “t-tests” and “Welch's t-test”. This project seeks to address these gaps by evaluating the “impact of celebrity endorsements” on company revenue, specifically in the “Manufacturing, Consumer Goods, and Automotive sectors”, and comparing these results to companies that have not used celebrity endorsements.
3. This project also explores whether celebrity endorsements still hold the same value in the age of digital influencers and whether companies can achieve comparable success without celebrity endorsements, a less examined aspect in the existing literature.

**3. Methodology**

**3.1 Data Sources**

This study relies on publicly available YouTube advertising data, extracted using the YouTube Data API v3. The data includes advertisements published on the official YouTube channels of 30 Indian companies over a four-year period (2021–2024). These companies are categorized into three key sectors: Automobile & Transportation, Manufacturing & Engineering, and Consumer Goods & Retail.

**3.2 YouTube Data API v3 Overview**

The **YouTube Data API v3** allows developers to interact programmatically with YouTube, accessing data about videos, channels, and playlists. For this study, the API was utilized to extract advertisement data from official company channels. The API provides metadata for each video, such as video URLs, publication dates, and the number of views.

**API Setup and Quota Limitations**

* **API Key Generation**: The API key was generated using Google Developer Console, enabling access to YouTube's data.
* **Quota Limits**: YouTube enforces daily quota limits, restricting the number of API requests. Every API request consumes a portion of the quota, especially video searches and data retrieval. To manage this, queries were optimized to focus on the most relevant data points such as video IDs, views, and publication dates.
  + A typical video search query uses a significant portion of the quota, so careful attention was paid to minimize redundant requests.

**Issues with Data Consistency**

Initially, querying the API returned irrelevant videos, including content not directly from the official company channels. For example, when searching for Apollo Tyres, non-company content occasionally appeared. To rectify this issue, the official YouTube channel IDs for each company were gathered from verified sources.

**Example:**

For **Apollo Tyres**, the official YouTube channel ID is **ApolloTyresLtd**. The correct channel was ensured by using the URL https://www.youtube.com/@ApolloTyresLtd.

The official YouTube IDs for all 30 companies were collected into a CSV file and used in the API queries to ensure accurate data extraction. This CSV file mapped company names to their respective official YouTube channel IDs, guaranteeing that only videos from verified channels were included in the analysis.

**3.3 Sector and Company Selection**

The analysis covers three major sectors of the Indian market:

1. **Automobile & Transportation**  
   Companies included:
   * Tata Motors
   * Maruti Suzuki India
   * Bajaj Auto
   * Hero MotoCorp
   * TVS Motor Company
   * CEAT
   * SpiceJet
   * InterGlobe Aviation (IndiGo Airlines)
   * MakeMyTrip
   * Apollo Tyres
2. **Manufacturing & Engineering**  
   Companies included:
   * Crompton Greaves
   * Tata Steel
   * JSW Steel
   * Havells India
   * Blue Star
   * Indian Oil Corporation
   * Hindustan Petroleum Corporation Limited (HPCL)
   * Jindal Steel & Power
   * Gulf Oil Lubricants
   * MRF
3. **Consumer Goods & Retail**  
   Companies included:
   * Britannia Industries
   * Zomato
   * Nykaa
   * Bata India
   * Hindustan Unilever Limited (HUL)
   * Dabur India
   * Asian Paints
   * Raymond
   * Berger Paints
   * Emami India

**3.4 Data Collection Process**

The YouTube API was used to collect video data from the official YouTube channels of the selected companies. Key information such as video title, video URL, publication date, number of views, and video description were collected. The data collection process involved the following steps:

1. **Channel Identification**:  
   The official YouTube channel IDs for each company were retrieved to avoid irrelevant or non-official videos being included in the dataset.
2. **API Query**:  
   The API was queried to retrieve the 100 most recent videos uploaded by each company between 2021 and 2024. Data points such as video views, publication date, and metadata were captured.
3. **Manual Validation**:  
   Due to inconsistencies in some API results, a manual validation process was performed to ensure that the extracted videos belonged to the official channels. Each video ID was verified by cross-referencing with the official YouTube channel before storing the data.

**3.5 Video Selection and Ranking**

For each company, a random selection of 100 videos was initially gathered from the API. The videos were then ranked by the number of views to identify the top 10 most popular ads for each company. This filtering ensured that only the most impactful ads were included in the final analysis.

**3.6 Data Analysis**

Once the top 10 videos from each company were identified, the data was analyzed to assess the impact of celebrity-endorsed ads versus non-celebrity ads. The following analyses were performed:

* **Engagement Metrics**:
  + Comparison of likes, coRmments, and views between celebrity and non-celebrity ads.
  + Analysis of the emotional response and viewer interaction, as seen through comments.
* **Sector-Specific Insights**:
  + Differences in the effectiveness of celebrity endorsements across the three sectors were explored, determining if certain industries benefited more from celebrity marketing.
* **Trend Analysis**:
  + Performance trends of ads over time were analyzed to see if the impact of celebrity involvement diminished or remained steady over the period of 2021 to 2024.

**3.7 YouTube API and Limitations**

Although the YouTube Data API is a robust tool, several limitations were encountered during the research:

* **Quota Restrictions**:  
  API requests are subject to quota limits, which can restrict large-scale data collection. The study managed these limits by optimizing requests and focusing on core data points.
* **Data Accuracy**:  
  In some cases, the API returned outdated or irrelevant videos, which required additional manual verification to ensure data accuracy.
* **Incomplete Data**:  
  Certain metadata, such as detailed audience demographics or exact advertising spend, was not available through the API, limiting the study's ability to directly link ad spend to performance. Nonetheless, other data points such as views, likes, and comments provided a robust framework for analysis.

**3.8 Data**

In the **Data Section**, we've included the company names from each sector along with their respective official YouTube channel IDs. This allows us to accurately query and gather advertisement data from their official channels.

**Manufacturing & Engineering**



**Manufacturing and Engineering:**



**Consumer Goods and Retail:**



**4. Aim**  
The aim of this project is to analyse the impact of celebrity endorsements on the revenue growth of Indian companies across three sectors—Manufacturing and Engineering, Consumer Goods and Retail, and Automotive—over the years 2021 to 2024 by using YouTube API to gather data on company advertisements and video promotions. The study compares the revenue growth of companies with and without celebrity endorsements and explores the effectiveness of these endorsements on sales through YouTube advertising activity.

**5. Objectives**

1. To collect advertisement data from YouTube channels of selected Indian companies using the YouTube API.

2. To categorize companies into three sectors: Manufacturing and Engineering, Consumer Goods and Retail, and Automotive.

3. To analyse the revenue growth percentage of companies from 2021 to 2024, with a focus on those using celebrity endorsements versus those that do not.

4. To compare the effectiveness of celebrity endorsements on sales through statistical analysis, examining the differences between endorsed and non-endorsed companies.

5. To assess the role of YouTube advertisements in promoting sales and their relationship with celebrity involvement.

**6. Results:**

This section will include the detailed results and interpretations of the t-tests and Welch's t-tests

6.1 **T-Test Results**

**Null Hypothesis (H₀)**

* **Statement**: There is no significant difference in the average revenue before and after the celebrity endorsement. The mean revenue difference is equal to 5.
* **Mathematical Expression**: H₀: μ₁ = 5

This implies that, on average, the change in revenue observed is consistent with a mean difference of 5, meaning that any changes in revenue are not large enough to suggest that the endorsement has made a significant impact.

**Alternative Hypothesis (H₁)**

* **Statement**: There is a significant difference in the average revenue before and after the celebrity endorsement. The mean revenue difference is not equal to 5.
* **Mathematical Expression**: H₁: μ₁ ≠ 5

This suggests that if there is enough statistical evidence, the revenue change caused by the endorsement would significantly differ from 5, indicating a meaningful effect of the endorsement.

**Without celebrity:**



**Output:**



**With celebrity:**



**Output:**



**Summary of the Results**

* **Test Performed**: A t-test was conducted to compare the difference in percentage of the revenue before and after the celebrity endorsement.
* **P-Values**: In all cases, the p-values were found to be greater than 0.05.
* **Decision Rule**: If the p-value is greater than 0.05, we fail to reject the null hypothesis. This means we accept the null hypothesis and conclude that the observed differences in revenue are not statistically significant.

**Overall Conclusion**

Based on the t-test results, where all p-values are greater than 0.05, we accept the null hypothesis H₀: μ₁ = 5. This indicates that there is **no significant difference** in the average revenue before and after the celebrity endorsement. In other words, the endorsement did not lead to a substantial impact on the revenue, and the revenue changes observed are consistent with a mean difference of 5, which could be due to random variation.

Thus, we conclude that the celebrity endorsements in this study do not have a statistically significant effect on the revenue of the companies analysed.

**6.2 Welch's T-Test Results**

**Null Hypothesis (H₀)**

The null hypothesis states that there is no difference in revenue between companies that used celebrity promotion and those that did not. This can be expressed as:

* **For Year 1**: H₀: μ₁ = μ₂ (where μ₁ is the mean revenue of companies with celebrity promotion and μ₂ is the mean revenue of companies without celebrity promotion in Year 1)
* **For Year 2**: H₀: μ₁ = μ₂ (for Year 2)
* **For Year 3**: H₀: μ₁ = μ₂ (for Year 3)

**Alternative Hypothesis (H₁)**

The alternative hypothesis states that there is a difference in revenue between the two groups. This can be expressed as:

* **For Year 1**: H₁: μ₁ ≠ μ₂
* **For Year 2**: H₁: μ₁ ≠ μ₂
* **For Year 3**: H₁: μ₁ ≠ μ₂

**Summary**

* **Null Hypothesis (H₀)**: No difference in revenue due to celebrity promotion.
* **Alternative Hypothesis (H₁)**: There is a difference in revenue due to celebrity promotion.



**Output:**



**Interpretation of Results**

1. **Year 1**:
   * **t-statistic**: 0.1485
   * **p-value**: 0.8835
   * **Interpretation**: The p-value is much greater than 0.05, indicating no statistically significant difference in revenue between the two groups for Year 1. You would fail to reject the null hypothesis (which states that there is no difference between the two groups).
2. **Year 2**:
   * **t-statistic**: 0.7636
   * **p-value**: 0.4522
   * **Interpretation**: Again, the p-value is greater than 0.05, suggesting that there is no significant difference in revenue between the companies that used celebrity promotions and those that did not in Year 2. You would also fail to reject the null hypothesis here.
3. **Year 3**:
   * **t-statistic**: 0.5314
   * **p-value**: 0.5997
   * **Interpretation**: Similar to the previous years, the p-value is greater than 0.05, indicating no statistically significant difference in revenue for Year 3 as well. You would fail to reject the null hypothesis.

**Overall Conclusion**

Across all three years, the Welch's T-Test show that there is **no statistically significant difference** in revenue between companies that engaged in celebrity promotions and those that did not. This means that the use of celebrity endorsements in promotion does not appear to correlate with a significant increase in revenue for the companies over the years analysed.

**7. Results and conclusion:**

Based on the statistical analysis using both the **t-test** and **Welch's t-test**, we examined the impact of celebrity endorsements on revenue changes for Indian companies across the Automobile & Transportation, Manufacturing & Engineering, and Consumer Goods & Retail sectors.

The null hypothesis (H₀) stated that there is no significant difference in the revenue change between companies that use celebrity endorsements and those that do not.

**Key Findings:**

* **t-test** results for the three sectors showed no statistically significant difference in revenue change between celebrity-endorsed and non-celebrity-endorsed ads.
* **Welch's t-test**, which accounts for unequal variances between the two groups, also confirmed that there is no significant difference in the revenue performance of companies using celebrity endorsements versus those that do not.

**Conclusion:**

As a result of both the t-test and Welch's t-test, we **accept the null hypothesis**, indicating that there is no significant difference in revenue change between companies with celebrity endorsements and those without. Therefore, celebrity endorsements do not appear to have a substantial impact on revenue growth, suggesting that other factors may play a more crucial role in driving revenue performance for Indian companies