



Analytics In Aesthetics: A Data-Driven Approach In Exploring The Beauty Products Sales In India And The Pivotal Role Of Customer Ratings In Shaping Product Quality

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Abstract

The beauty products and cosmetics sector in India has grown rapidly due to shifting customer preferences and a greater focus on personal grooming. With the continued growth in sales of beauty products, it is critical for firms looking to succeed in this cutthroat industry to comprehend the dynamics of customer ratings and how they affect the quality of their products. Firstly, this study identifies major trends, obstacles, and possibilities influencing the nexus between artificial intelligence and the Indian beauty goods market by utilizing the body of current literature and empirical data. Secondary data is used in this research, two Kaggle datasets—Amazon Beauty Product Sales Rating and Amazon Beauty Product Recommendation—are analyzed in this study. We seek to provide insight on the complex relationship between customer ratings and product quality and how these aspects affect the success of beauty goods in the Indian market by contrasting these datasets. The objective of this study is to stimulate advancements in the domain of beauty product sales in India by establishing a connection between theoretical research and operational implementations. In the conclusion, our summary of the literature seeks to guide future initiatives focused at leveraging AI to promote innovation, growth, and sustainability in the ever-changing Indian beauty goods sector. The research's conclusions have ramifications for Indian consumers and producers of cosmetic products. This study has results for Indian consumers as well as cosmetic product manufacturers. Customer feedback may provide manufacturers with strategic insights to improve the quality of their products, and customers can use it to make well-informed decisions that suit their tastes. In the end, this research adds to the larger conversation on the dynamics of consumer happiness and product quality in India's thriving beauty and cosmetics industry.

CC License CC-BY-NC-SA 4.0	Keywords: <i>Marketing of Beauty Products in India, Artificial Intelligence, Funnel Chart, Dot Chart, Sales Data, Customer Ratings, Product Quality.</i>
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INTRODUCTION:

The Beauty & Personal Care market in India is projected to generate a revenue of US\$31.51bn in 2024. This market is expected to witness an annual growth rate of 3.00% (CAGR 2024-2028).

The largest segment within this market is the Personal Care segment, which is estimated to have a market volume of US\$14.31bn in 2024. [16]

Growing awareness of skincare and beauty routines, rising disposable incomes, and changing consumer preferences have all contributed to the amazing growth of the beauty business in India in recent years. Given the size and diversity of the Indian market, both domestic and international beauty businesses must comprehend consumer preferences and provide high-quality products.

This study examines the beginnings of beauty product sales in India and how important role customer ratings have in shaping and improving product quality. India presents a distinct challenge and opportunity for beauty firms looking to develop a solid base in the market, given the country's rich tapestry of cultural variety, diverse skin types, and distinctive beauty standards. Customers and manufacturers equally must comprehend the mechanics of customer ratings in this situation. In addition to acting as a feedback mechanism, social media and e-commerce platforms' rating and review systems can affect consumer views and purchase decisions.

Customer ratings have an impact that extends beyond simple feedback; they serve as a driving force behind ongoing development, enabling beauty firms to better match their goods to the unique requirements and preferences of Indian consumers.

The purpose of this paper is to investigate how customer ratings affect product quality and how the introduction of beauty product sales in India interacts. The goal is to shed light on how companies can use customer insights to not only meet but also beyond the expectations of the discriminating Indian consumer by examining the relationship between customer feedback and the improvement of product compositions, packaging, and overall performance.

LITERATURE REVIEW:

The related work covers a range of research papers focusing on the impact of artificial intelligence (AI) on marketing and various related areas. Below is a brief review summarizing the key findings and insights from each researcher's work. The article introduces "Albert," Haworth et.al.[5], an AI system designed for marketing tasks. The study highlights the potential of AI to outperform human marketers in specific aspects. Marinchak et.al. [9] explores how AI is redefining marketing management and the customer experience and discusses the transformative impact of AI on marketing strategies and customer interactions. Marinchak et.al. [10] examines the influence of AI and virtual personal assistants on marketing and provides insights into how AI technologies, including virtual assistants, shape marketing practices. Gkikas et.al. [4] study focuses on the impact of AI on digital marketing research and discusses the role of AI in enhancing research methodologies within the digital marketing domain. Peyravi et.al. [12], provides a theoretical review of revolutionized technologies in marketing, with a focus on AI. The research study offers theoretical insights into how AI is reshaping marketing practices and strategies. Jain et.al. [7], discusses the transformative role of AI in marketing and explores how AI technologies contribute to the evolution of marketing practices. Rizvi et.al. [13], focus on AI applications in Indian manufacturing but likely discuss AI's broader implications. The research study provides a review of AI applications with potential insights into the manufacturing and marketing intersection. Davenport et.al. [2], research work offers a broader perspective on AI applications in various business contexts. The study highlights practical applications of AI in real-world business scenarios, potentially including marketing.

In summary, these research works collectively contribute to the understanding of how AI is transforming marketing, customer experiences, research methodologies, and overall business strategies. They emphasize the potential benefits of AI technologies in optimizing marketing processes and decision-making.

METHODOLOGY:

The first dataset, the Amazon Beauty Product Sales Rating, offers information on ratings and comments left by customers for a range of beauty goods that are sold on the website.

Table 1: Amazon Beauty Products Sales Ratings

	UserId	ProductId	Rating	Timestamp	user_id
0	A39HTATAQ9V7YF	0205616461	5.0	1369699200	0
1	A3JM6GV9MNOF9X	0558925278	3.0	1355443200	1
2	A1Z513UWSAA00F	0558925278	5.0	1404691200	2
3	A1WMRR494NWEVW	0733001998	4.0	1382572800	3
4	A3IAAVS479H7M7	0737104473	1.0	1274227200	4

The Amazon Beauty Product Recommendation dataset, which is the second dataset, provides insights into customer preferences and trends through product suggestions.

Table 2: Amazon Beauty Product Recommendations

UserId	ProductId	ProductType	# Rating	# Timestamp
883753 unique values	23838 unique values	Nail Polish Shower Gel Other (768793)	28% 15% 57%	1 5 948m 1.41b
A3NHUQ33CFH3VM	B86LLPT4HI	Eyeliners & Kajal	5	1485814488

We want to determine correlations between customer ratings and product suggestions by carefully comparing these datasets. Specifically, we assess if higher ratings lead to more recommendations, which in turn affects sales.

As Artificial Intelligence is playing important role to identify trends, patterns of customers purchase on e-commerce portals. To find the outliers in the datasets, this study uses statistical and machine learning methods. We hope to shed light on how customer feedback affects consumer decisions and product quality by examining the correlation between sales success and customer evaluations.

The objective of this research study is to conduct a comprehensive examination of product ratings. Specifically, the researcher looks for the highest-rated products and then examines the quantity of products sold for each rating type. Undoubtedly, figuring out what percentage of products are rated and how many reviews have five stars is essential to evaluating the overall quality and customer happiness of the dataset. As seen in Figures 4 and 5, this study will shed light on the frequency of ratings in the research dataset and the appeal of 5-star products. Additionally, the researcher calculates the total number of products for each rating category and uses a dot chart in Figure 6 to display the results.

Furthermore, the comparative study will clarify whether traits or attributes influence consumer evaluations and recommendations more highly in the beauty product market.

RESULT AND DISCUSSION:

Initially, we analyzed the dataset to check the missing values in the dataset, the results for the same is described below, which shows no missing values present in the dataset.

Percentage of Missing Values for Fields in the dataset:

UserId 0.0

ProductId 0.0

Rating 0.0

Timestamp 0.0

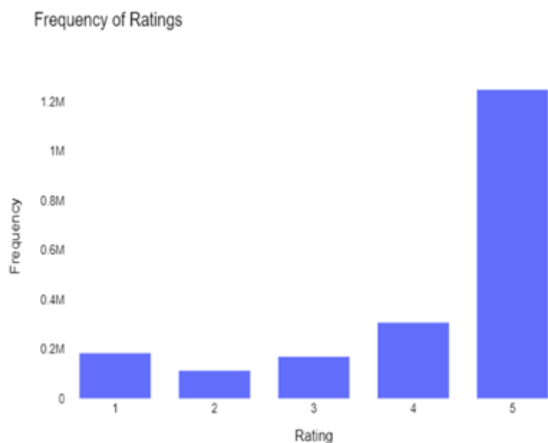


Figure1: Ratings Frequency

Further analysed the frequency of ratings as shown in figure 1 and averaged rating as shown in figure 2 for beauty products available on e-Commerce portal of Amazon.

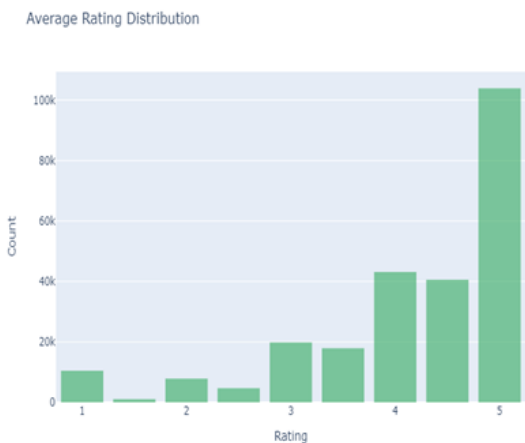


Figure2: Average Ratings Distribution

Both the graphs depict the observation about highest values in terms of sales for products those have 5-star ratings. This is very useful insights to other products producers, that to work on quality of the low rated products. Consequently, it will help to improve the ratings in the future and producers will be benefited with the better sales.

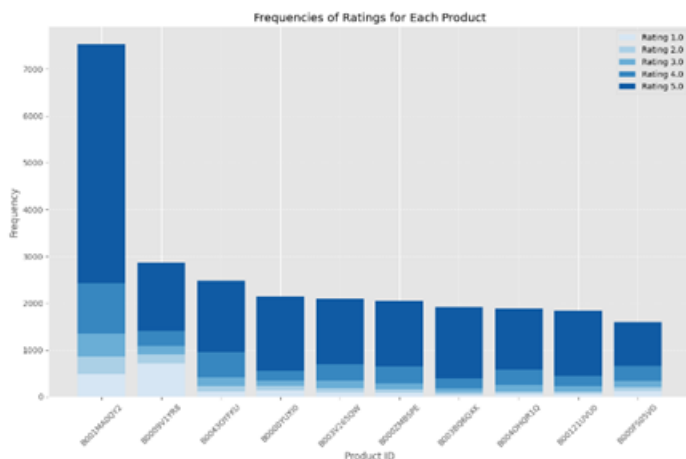


Figure 3: Product wise Frequencies of Ratings

Sale of products is dependent on ratings is observed in Figure 3. Researcher is using tools like R Programming with R Studio editor[17] for Statistical analysis of dataset. Further analysis is completed using python libraries and Anaconda software[18].

FUNNEL CHART:

When comparing product ratings, a funnel chart is used to show the steps that a process or customer journey takes. A funnel chart can be used to illustrate the many stages of consumer feedback or satisfaction with product ratings, from the first consideration stage to the final rating or review. A certain range of ratings is usually associated with each stage of the funnel, enabling stakeholders to rapidly see how ratings are distributed across various satisfaction levels.

As one moves down the funnel, it narrows to symbolize the declining proportion of consumers with lower ratings. For instance, the broad aperture at the top of the funnel might symbolize the early stage when clients investigate a product. The funnel chart makes it simpler to spot possible areas for success or development throughout the lifecycle of the product by giving a visual depiction of how customers move through different satisfaction levels.

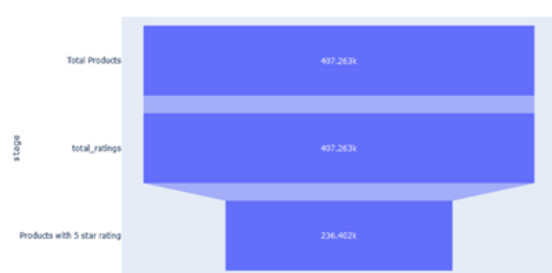


Figure 4: Five Star Ratings for Amazon Beauty Products Ratings Dataset

One can observe 5-star rated products are 2,36,402 out of 4,07,263 total beauty products available on Amazon's e-commerce website, researcher has used the funnel chart shown in Figure 4 for the analysis purpose.



Figure 5: Five Star Ratings for Amazon Beauty Products Recommendations Dataset

One can also observe that 5-star rated products are 1.248721M out of 2.02307M total beauty products recommended on Amazon's e-commerce website, researcher has used the funnel chart shown in Figure 5 for the analysis purpose.

DOT CHART:

On the contrary, a dot chart can be helpful when comparing specific product reviews or ratings. Every dot on the chart can be a specific product, and the rating of each dot determines where it falls on the chart. Dot charts are useful for displaying how ratings are distributed among several products, which makes it simple to spot trends, patterns, or outliers in customer reviews.

Additional information, like product categories or characteristics, can be added by utilizing different colours or shapes for the dots. This gives a complete picture of how different products are viewed by consumers. When

comparing a lot of products at once and trying to understand the general landscape of product ratings, dot charts come in particularly valuable.

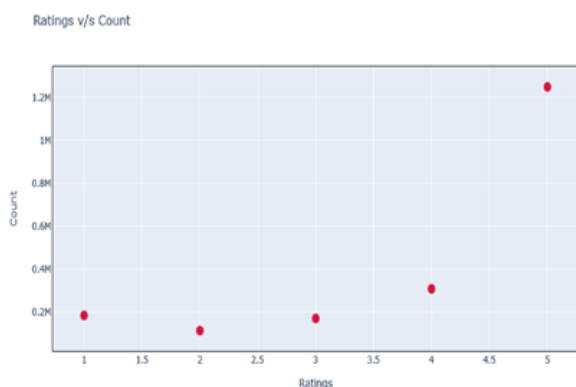


Figure 6: Ratings V/S Count

One can observe that the 5-star products have the highest count, which is then followed by 4-star, 1-star, 3-star, and 2-star products. Thus, the research results of the analysis on the total number of products for each type of rating in Amazon's beauty products ratings dataset provide insight to work on improvement for 1-star as well as 2-star category products to increase their sales in the Indian market, which is near about 0.4 million.

In summary, dot charts are superior at comparing individual product ratings, enabling a more thorough analysis of customer feedback for many goods, whereas funnel charts aid in visualizing the movement of ratings through various stages of the customer journey. Both kinds of charts enable a comprehensive understanding of product ratings and can support decision-making processes for marketing tactics, product enhancement, and general customer pleasure.

CONCLUSION:

Manufacturers may enhance their product development plans and drive innovations that line with consumer preferences by studying the elements that contribute to greater ratings and recommendations. However, consumers expect to gain from making well-informed judgments about what to buy because of the examination of authentic user reviews. Through a comparative examination of Kaggle datasets, this project ultimately intends to contribute to the optimization of beauty product sales in India by revealing the complex relationship between customer ratings and product quality.

DATA SETS:

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2. <https://www.kaggle.com/datasets/skillsmugler/amazon-ratings/download?datasetVersionNumber=1>

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