

# Increasing the Sale of Long Tail Items on E-Commerce Websites

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**Abstract**— The advent of e-commerce has transformed the retail industry, offering a platform for retailers to reach a vast audience, enabling consumers to shop from anywhere in the world at any time. However, most e-commerce websites are dominated by sales of popular or mainstream items, referred to as the head of the distribution. The long-tail items, which make up the tail of the distribution, are often overlooked, leading to reduced sales and low revenue for online retailers. This research paper aims to explore strategies that online retailers can use to increase the sale of long-tail items on their websites. It also includes a review of existing literature, a qualitative analysis of consumer behavior, and a quantitative analysis of sales data. The findings indicate that online retailers can increase the sale of long-tail items by optimizing their website design, improving search functionality, using data-driven pricing strategies, and implementing targeted marketing campaigns. These strategies have the potential to improve the visibility of long-tail items, increase consumer engagement, and boost revenue for online retailers. A study has also been conducted on the Retail Rocket e-commerce dataset from Kaggle which involved a meticulous examination of various aspects of user interactions within the online retail platform. The dataset provided a rich source of information, including events such as page views, add-to-cart actions, and completed purchases. The analysis aimed to uncover specific patterns and trends related to these events, shedding light on how users engage with both popular and long-tail items.

**Keywords**—Long-tail items, e-commerce websites, consumer behavior, SEO, recommendation system, promotions, discounts

## I. INTRODUCTION

In recent times, e-commerce websites have experienced a surge in popularity. This creates highly competitive marketplace where different firms get opportunities for creating a different appearance and help in increasing sales. One of the ideas that can be used by businesses is concentrating on their long-tail items sales. It also helps to understand the products having low demand and higher profit margins. However, there are several challenges that are involved in the long-tail items sales on e-commerce websites. It necessitates substantial research to identify effective strategies for achieving this goal.

Understanding consumer behavior is one of the crucial aspects that can be identified by increasing the long-tail items sale on online websites. Consumers may not feel comfortable while purchasing long-tail items because they are not aware about them (Goel et al., 2010). Therefore, it is essential for identifying ways that help in making the products more evident and create interest among potential customers such as targeted advertising campaigns.

Another essential factor is Search Engine Optimization role. SEO involves optimizing website content and structure to improve search engine rankings and visibility. This is particularly crucial for long-tail items which are not popular among audience as compared to other popular products. With the help of significant SEO strategies businesses get opportunities to increase visibility of their long-tail items among potential customers.

One effective strategy for increasing the sale of long-tail items on e-commerce websites is using Recommendation Systems. They use algorithms to suggest products to customers based on their browsing and purchasing history (Park and Tuzhilin, 2008). By using Recommendation Systems, businesses can suggest long-tail items to customers who may not have been aware of them otherwise. This can be particularly effective for niche products that are highly relevant to certain customer segments.

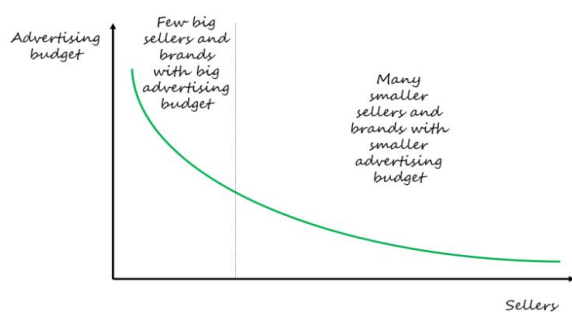


Figure 1: Long-Tail Items on E-commerce Websites  
(Source: John, 2016)

Another effective strategy can be the use of targeted promotions and discounts. With the help of discounts or promotion ideas businesses can motivate customers for buying the long-tail items. Targeted advertising or recommendation systems are different strategies which can be combined with SEO strategies to help businesses to stand out among the competitive market and increase their profit and sales.



Figure 2: Long tail sale through SEO  
(Source: Verbolia, 2022)

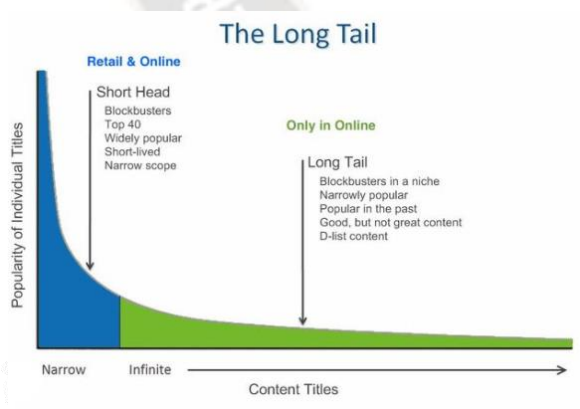


Figure 3: Recommendation System  
(Source: Kevin and Anna, 2023)

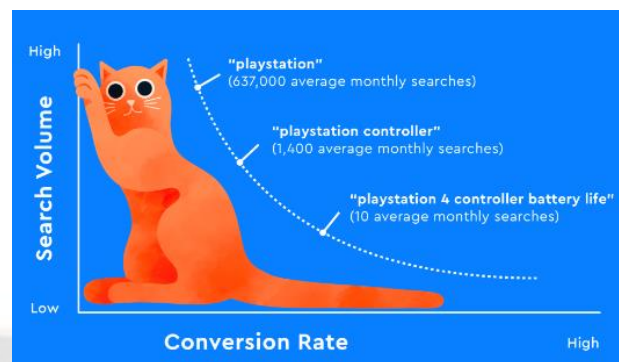


Figure 4: Driving More Traffic with Long tail Keywords  
(Source: Findstack Editorial Team, 2023)

#### A. Research Problem

The research problem is the challenge faced by ecommerce businesses in increasing the sales of long-tail items, which have low demand and are less visible compared to popular products. This can result in lower revenue and profitability for businesses, making it important to identify effective strategies for increasing the sale of long-tail items on ecommerce websites.

#### B. Research Objective

The research objective is to identify effective strategies for increasing the sale of long-tail items on ecommerce websites. This may involve exploring consumer behavior and preferences, analyzing the role of SEO and recommendation systems, and evaluating the effectiveness of targeted advertising, promotions, and discounts. By achieving this objective, the research can provide valuable insights and recommendations to ecommerce businesses on how to increase the sale of long-tail items, improving their revenue and profitability.

#### C. Research Design

For the current study systematic review and comprehensive study are used as a research design. In this method the existing literature from peer-reviewed journals, industry reports and publications of government are involved (Park and Tuzhilin, 2008). Google Scholar, journals, articles, and Scopus are different electronic databases which are involved in the research design. It also reviews the selected data thoroughly. Key themes and findings are identified and analyzed which is involved in the review process (Goel et al., 2010).

#### D. Data Collection

The secondary data collection method for the research involves the collection of existing data from various sources such as academic journals, industry reports, and government publications (Liu and Zheng, 2020). With the help of qualitative data analysis approach the collected data is analyzed where the key themes and patterns are identified and analyzed. The analysis is conducted using software such as NVivo or Atlas.ti, which allows for efficient and systematic data analysis.

#### E. Data Analysis

The analysis started with selected literature initial reading to develop the understanding about the research topic. The next step is to identify and code the key themes and patterns. The coding process will involve identifying keywords and concepts



that are relevant to the research topic and categorizing them into different themes. The coding process will be iterative, with themes being refined and revised as the analysis progresses. The analysis final step is to synthesize the themes into a coherent narrative that gives important insights and recommendations to online retailers on how to increase the long-tail items sale.

#### *F. Ethical Considerations*

This section outlines the ethical guidelines that contribute to upholding the integrity and accuracy of the research. Emphasis is placed on ensuring transparency and replicability in the literature search and selection process, with clearly defined search terms and criteria (Oestreicher-Singer and Sundararajan, 2012). It is also ensured that the selected literature is from reliable and relevant sources like peer reviewed journals and articles. The researcher also provide relevant citations for all the selected literature and sources are credited efficiently. A comprehensive and in-depth knowledge on significant strategies that help in increasing the sale of long tail items on online websites is provided in the secondary research approach.

#### *G. Results*

The results section presents the findings of the secondary research conducted on increasing the sale of long-tail items on e-commerce websites. The analysis of the selected literature revealed several effective strategies that e-commerce businesses can employ to increase the sale of long-tail items. Behavior and preferences of consumer, through SEO and recommendation systems optimization of e-commerce website, and target marketing, promotion, and discounts are involved in these strategies.

## **II. UNDERSTANDING CONSUMER BEHAVIOR AND PREFERENCES**

The analysis of the literature revealed that understanding consumer behavior and preferences is critical to increasing the sale of long-tail items on e-commerce websites. Niche products are considered in long-tail items that are not available in brick-and-mortar stores. It has been difficult for consumers to find out them (Ahlers et al., 2018). Understanding behavior and preferences of consumer help online retailers for tailoring the offers to fulfil the target audience's needs. One of the major data identified is that long-tail items are purchased by consumers only when these items are suggested by legitimate sources like friends or family members. However, e-commerce businesses adopt social media channels for boosting confidence of customers that influence their purchasing behavior on social network. Through consumer behavior and preferences analyzation businesses gain knowledge on consumers drives for buying products and tailoring their advertising efforts (Chen et al., 2020). For increasing long-tail items sale e-commerce firms can adopt different strategies which are discussed below.

#### *A. Conduct Market Research*

Market research must be conducted by e-commerce businesses for gaining insight into preferences and behavior of consumer. By examining data of consumer, businesses can grab knowledge on consumer behavior patterns and trends. It includes buying habits and choices for products. This data can be applied for developing targeted advertising campaigns that allowed for designing the attractive interests and preferences of the target audience.

#### *B. Personalization*

The It is an effective marketing tool that can be used by e-commerce businesses for increasing the long-tail items sale. By customizing marketing efforts as per the individual consumer's preferences and interests, a more customized shopping experience can be created by businesses that develop the actual purchase (de Sousa Silva and Durão, 2020). With the help of customized product recommendations, targeted marketing campaigns, and customized email advertising this can be accomplished.

#### *C. Utilize Social Media*

Facebook, Instagram, and Twitter are different social media channels that can be used for promoting long-tail item among wider audience. Engaging content can be created and promote it on social media channels, online businesses can increase the long-tail items visibility and attracting new audience.

#### *D. Provide Detailed Product Descriptions*

Providing detailed product descriptions can help e-commerce businesses increase the sale of long-tail items (Salunke and Nichite, 2022). Different information about the product like features, advantages and uses are provided by businesses to consumers that help them to make an informed buying decision.

#### *E. Leverage Influencer Marketing*

Influencer marketing can help eRetailers boost their sales from long tail items by making it easier to sell them. Businesses can increase their visibility of longtail items and attract new customers by partnering with influencers who have significant following on social media platforms.

## **III. OPTIMIZING THE E-COMMERCE WEBSITE USING SEO AND RECOMMENDATION SYSTEMS**

SEOs can help businesses improve their rankings on search engines and recommendation systems may be helpful to encourage the promotion of long tail items among customers which are more likely to buy them (Liu and Zheng, 2020). To optimize their websites using search engine optimization and recommendation systems, here are some strategies to be used by e commerce companies:

#### *A. Conduct Keyword Research*

To optimize your search engine results, it is important that you research keywords. To find the keywords and phrases that potential customers may be seeking online, e commerce companies should conduct keyword research. Businesses can improve the ranking of their website in search engines and increase visibility by optimizing products' descriptions, metadata or content using relevant keywords.

#### *B. Optimize Website Design*

To optimize SEO, the design of websites is crucial. E-Retailers should make sure that their web pages are optimized for user friendliness, mobile responsiveness, and rapid loading (Kumar and Bala, 2017). In addition, to make it easier for search engines to crawl and index your website, businesses should consider making their Web page clearly structured, including sitemaps and breadcrumbs.

### C. Utilize On-Page Optimization

Another critical aspect of optimizing the website is on Page Optimization. To ensure that their product pages include optimized metadata, including the title tags and meta descriptions, ecommerce firms should comply with these requirements. Furthermore, it is necessary for businesses to improve their description of products through the inclusion of relevant keyword phrases and good quality product images and videos.

### D. Implement Recommendation Systems

Recommendation systems are an efficient tool for businesses to encourage the sale of Long-tail Products to their customers. These systems consider customer behavior and shopping history to give personalized recommendations regarding products that customers may be more inclined to buy (Alshammari et al., 2019). Businesses may increase visibility of long tail items and promote them to consumers more likely to buy them by putting in place recommendation systems.

### E. Use Social Proof

A powerful tool that e-commerce companies can use is social proof. Customer reviews, ratings and testimonials are also part of the social proof. Businesses can gain the trust of their customers by placing social proof on a product's page, thus increasing buyer confidence.

To improve the visibility of a website in search engines, it is necessary to optimize its content and structure (Hussien et al., 2021). Recommendation systems include algorithms which are used to recommend products that can be of interest to the customer's search history or past purchases.

The literature suggests that e-commerce firms should optimize their websites with long tail keywords which are of relevance to their products. This approach can increase the visibility of your website in search engines and drive more traffic to it. Furthermore, e-shopping businesses should implement recommendation systems based on their search history and prior purchases so that they can recommend relevant Long Tail items to the customer.

## IV. USING TARGETED ADVERTISING, PROMOTIONS AND DISCOUNTS

Targeted advertising, promotions and discounts can be used by e-commerce operators to increase the sale of long tail items (Grozin and Levina 2017). These strategies are designed for businesses to connect with their target audience, create awareness of the Long Tail items and encouraging customers to buy them. To boost sales of long tail products, e-commerce Businesses can take advantage of specific advertising, promotions and discounts:

### A. Segment the Audience

A segmentation of the target audience is the first step in using targeted advertising, promotion and discounts. Businesses should identify the demographic and psychographic information related to their target audience, including age, gender, income, interests or preferences. Businesses can enhance the likelihood that their advertising and marketing will be beneficial to customers by setting up a kind of ad or promotion for an audience.

### B. Create a Sense of Urgency

It is by creating a sense of urgency that we can be very effective at encouraging customers to buy. For stimulating a sense of urgency, e-commerce companies can make use of discounts and promotions that range from providing limited time offers, temporary sales or discount shipping for an extended period (Dennis 2016). As soon as customers feel compelled, companies may be able to convince them to act and buy.

### C. Use Retargeting

Target marketing is a form of advertising designed for the purpose of targeting consumers who have been to your website or are showing an interest in your products. For the target group of customers that show interest in similar products or category types, e-commerce businesses may use Retargeting to encourage long-term items on behalf of these consumers. Businesses will be able to remind them of their interests and encourage them to buy, by targeting customers.

### D. Offer Bundle Deals

Bundle deals are an incentive for customers to buy multiple items at the same time. E-commerce businesses can offer bundle deals that include long-tail items in addition to other popular goods (Singh and Matsui 2017). Businesses can boost sales for long tail items and promote the purchase by customers of supplementary products through bundling offers.

### E. Personalize Promotions

Personalizations are an effective way to make the customer feel valued and increase his or her likelihood of buying. Through the offer of discounts or special offers based on a customer's past purchase, shopping history and preferences, e-commerce companies can customize their promotion. Businesses can promote the purchase of their products and increase customer loyalty by personalizing promotions.

### F. Summary of Findings

Several effective strategies can be used by e-retailers to maximize sales of Longtail items through their websites, according to the Secondary Research carried out to raise awareness among consumers about such goods on online stores. Understanding consumer behavior and preferences, optimizing e-commerce sites through the use of search engine optimization techniques as well as recommendation systems using target advertising, promotion or discounts are part of these strategies. Table 1 below summarizes the findings.

Strategy	Description
Understanding behavior and preferences of consumer	Consumers are more likely to purchase long-tail items when they are recommended by trusted sources, such as friends or family members.
e-commerce website is optimized using SEO and recommendation systems	E-commerce businesses should optimize their website using long-tail keywords and implement recommendation systems that



	suggest relevant long-tail items to customers.
Targeted advertising, promotions, and discounts are used	E-commerce businesses should use targeted advertising on social media platforms and offer promotions and discounts to incentivize customers to purchase long-tail items.

Table1. Summary of Findings

The strategies highlighted in the table, focusing on understanding consumer behavior, optimizing e-commerce websites, and utilizing targeted advertising, align seamlessly with the exploration detailed in next section. The analysis of significant events in the dataset mirrors the strategy of comprehending consumer interactions, which is an essential step for personalized recommendations. The system configuration, employing frameworks like TensorFlow and Surprise, corresponds to the strategy of optimizing e-commerce websites through recommendation systems. Integration of long-tail keywords and recommendation techniques into the system enhances relevance, aligning with the strategies outlined in the table. Moreover, evaluation metrics such as Hit-Rate and Novelty in "Data Analysis and Evaluation Framework" section directly correspond to the targeted advertising and promotions strategy, emphasizing their impact on long-tail item purchases. In summary, the alignment between the identified strategies and the detailed framework underscores a holistic approach to enhance e-commerce recommendations and drive sales of long-tail items.

## V. DATA ANALYSIS AND EVALUATION FRAMEWORK

A research investigation was undertaken utilizing the Retail Rocket E-commerce dataset sourced from Kaggle to analyze and illustrate significant events, items most frequently added to the cart, and the subsequent items that were ultimately purchased. The system configuration employed for this study included TensorFlow, Surprise, Pandas, NumPy, and Matplotlib frameworks. The computational resources comprised a GPU, specifically a Tesla K80 with 2496 CUDA cores and 12GB GDDR5 VRAM. The training process spanned 650 epochs, utilizing approximately 12.64 GB of RAM, and took a total time of 10,000 seconds. The dataset was divided into training and validation sets with a split ratio of 0.75:0.25, and the total data points amounted to 2,756,101.

The evaluation metrics employed in this study encompass Root Mean Squared Error (RMSE), which indicates accuracy with lower values being more desirable, and Mean Absolute Error (MAE), where lower values imply improved accuracy. Additionally, Hit-Rate (HR) and Cumulative Hit Rate (CHR) measure the frequency and cumulative frequency, respectively, of accurately recommended left-out ratings, with higher values indicating superior performance. The Average Reciprocal Hit Rank (ARHR) considers the ranking of hits, while Coverage assesses the ratio of users for whom recommendations above a certain threshold exist, with higher values being preferable. Diversity, calculated as 1 minus the average similarity score (S) between all possible pairs of recommendations for a given user,

is another crucial metric. Higher diversity scores signify a more varied set of recommendations.

Furthermore, the study incorporates the Novelty metric, which evaluates the average popularity rank of recommended items. A higher Novelty score indicates a more innovative set of recommendations.

Dataset:

<https://www.kaggle.com/datasets/retailrocket/ecommerce-dataset>

The model flow comprises six interconnected stages: "Events" data is processed to identify transactions and "Add to Cart" events, creating a refined dataset. This refined data, along with information from "Items Properties," undergoes a "Data Merge" operation. The integrated dataset is then fed into an "Autoencoder for Recommendation," generating personalized recommendations. Finally, the recommendations are evaluated using diverse metrics in the "Metrics Evaluation" block, assessing accuracy, diversity, and novelty. This comprehensive approach ensures a holistic and effective personalized recommendation system. The figure below shows the flow of the model:

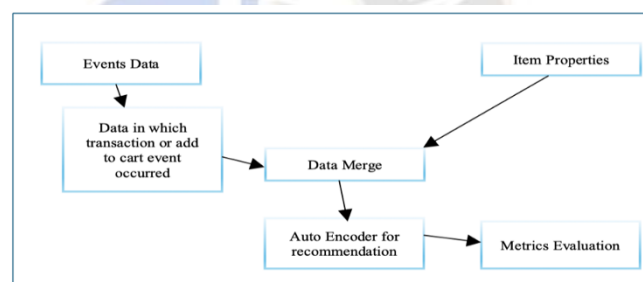


Figure6: Comprehensive Model Flow for Personalized Recommendation System

Three graphical representations are included in the study. The initial graph, titled "Events Plot," illustrates the distribution of events. The second graph provides insights into the items most frequently added to the cart, showcasing the quantity sold against each item code on the x-axis. The third graph delineates the items most frequently purchased, presenting the quantity sold for each corresponding item code along the x-axis. These visualizations offer a quantitative perspective on user interactions with the items in the dataset, aiding in the analysis of user preferences and engagement patterns.

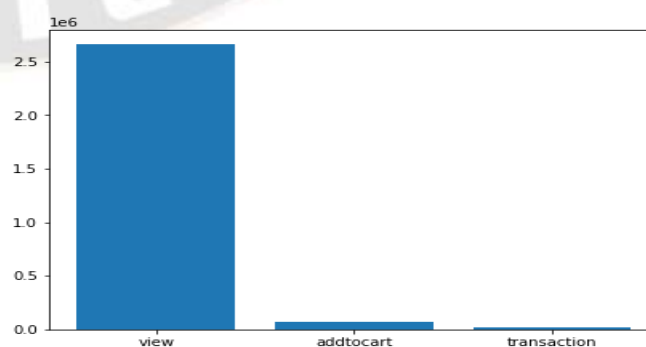


Figure7: Events Plot

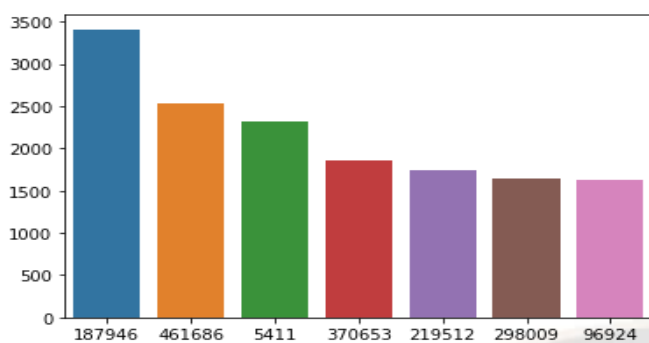


Figure8: Items Added Most to Cart

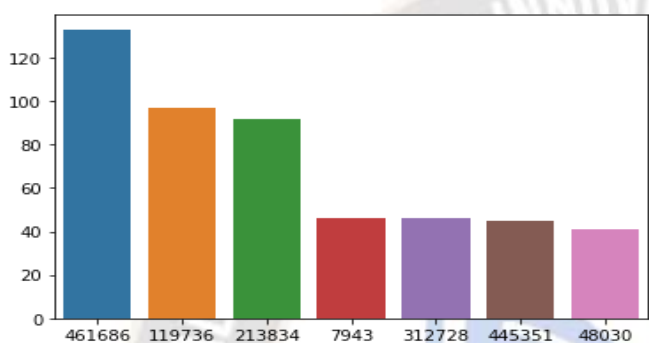


Figure9: Items Most Purchased

## VI. CONCLUSION

Finally, the research findings show that e-retailers could increase sales of long-tail items if they focus on improving product discovery, increasing descriptions and images, optimizing their website's search function, using data mining techniques such as Analytics or promotional strategies. Such strategies can help e-commerce firms attract more customers, raise their sales and profits.

In addition, e-commerce companies should understand how important long-tailed items are to their overall revenue and profitability. Long tail products, which are sold in large quantities, may have a lower demand but can contribute substantially to the overall revenue. Accordingly, e-commerce firms need to concentrate their efforts on improving the sales of longer lasting goods to achieve maximum revenue potential.

In addition, businesses that sell online can exploit machine learning and artificial intelligence with the aim of personalizing customer experiences and improving product recommendations. To provide personalized recommendations for products and to increase the level of customer engagement, e-commerce companies can analyze customers' data to find out what is on their minds, interests or purchasing behavior.

Next, it will be possible to further explore the efficiency of these strategies across different sectors and market segments. In addition, research can also look at the impact of emerging technologies such as virtual or Augmented Reality on improving long-tailed goods sales.

Overall, e-retailers can be helped to increase the sale of long tail products, improve profit margins and profitability by means of recommendations from this research. In undertaking such strategies, e.g., by providing a differentiated experience for consumers and increasing customer loyalty and repeat sales, the

company will be able to gain advantages in competition as well as increased market share.

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