

# Analysis of Consumer Reviews for Online Purchases on Social Media Using 4A Framework

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## Abstract

Consumers are growing relying on online product reviews to make purchase choices. Although reviews are provided directly on e-commerce websites, for higher quality reviews, people are accessing vast resources like Twitter. Social media might be a wonderful resource for checking for product reviews since consumers write about their newest purchases on social media. However, it is hard to hunt for evaluations on social media and combine them. For in-store purchases, seeking up reviews gets tricky since there are relatively few reviews for in-store items. Consumers need to browse many websites while standing in front of the goods to receive reviews and synthesize all the information themselves to make a choice. The suggested 4A framework pulls up reviews across four distinct social media networks, consolidates them, and shows the findings. The flexibility in the suggested framework our findings demonstrate that social media reviews are beneficial in making purchase choices. Although the suggested framework has yet to be adopted by businesses, the findings are fairly favorable and will undoubtedly boost the adoption of social media by enterprises for engagement with consumers.

**Keywords:** 4A framework • Naive bayes algorithm • Amazon India • Flipkart • Snapdeal • Myntra • eBay

## Introduction

The Indian e-commerce industry is expanding quickly, at a rate of 21.3% (PwC, 2015), and is generated \$28 billion in sales by 2019–2020, representing an annual growth rate of 45% over the next four years [1]. In addition, e-commerce accounts for 1.23% of India's overall 7.6% GDP [2]. India's e-commerce development rate increased by 31.2% in 2021. Additionally, the Indian economy's fastest-growing sector is e-commerce [3]. Many businesses struggle to match customer interactions with business strategy due to the continued maturation of mobile purchasing and the consumer mindshare being divided across several platforms [4]. They use social media as a result to improve customer relationships and digitally promote brand awareness. Due to social media's significant internet presence, it is assumed that it may boost sales. Additionally, when these businesses interact with customers via social media platforms, they are able to get feedback right away, which offers them a rapid understanding of what their customers want. The present research focuses on a review of the feedback gathered by the top five electronic firms in India, including Amazon India, Flipkart, Snapdeal, Myntra, and eBay India (Top 10 Ecommerce Companies in India, 2017). From January 1, 2022, through August 31, 2022, these firms' posts on Twitter were the basis for the feedback study. The experiment uses 1500 tweets and the Nave Bayes

algorithm to classify the responses into one of the four quadrants of the 4A (Anxious, Apart, Ardent, and Active) investigation model, termed as 4A framework. These businesses may adopt and apply the study's general social media strategies, which were adopted, based on the findings [5].

For e-commerce businesses, it is challenging to understand and control the elements that drive consumers' views and actions. Traditionally, in order to gather consumer insights and feedback, these companies depended on a combination of quantitative data from surveys (to measure consumer happiness and feedback) and qualitative insights from focus groups and interviews. However, both sorts of technologies depended largely on consumers' remembrances and recall abilities, which diminished swiftly. It was owing to this reason that internet-based research tools were established to collect user experiences nearly quickly. However, these platforms offered barely 15% of consumers' contacts with businesses [6]. The introduction of social media has both spurred and facilitated a radical shift in the way companies and consumers engage. Social networks such as Twitter and Facebook give a platform as an integrated communication model, where consumers have the option of how and when they engage with businesses [7]. Nielsen indicated that over 70% of individuals who use social media

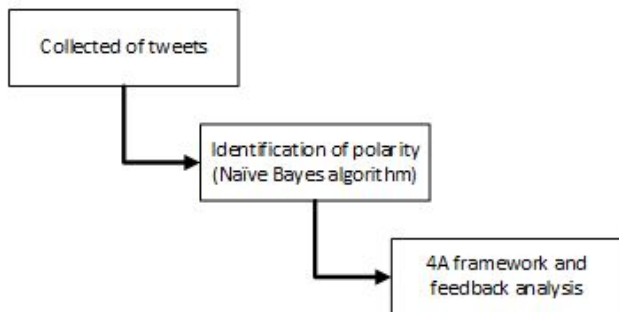
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to purchase things online [8]. Another survey says that 44% of businesses have recruited consumers through Twitter [9]. Thus, the most essential applications of Twitter by e-commerce enterprises are consumer contact Blacknell and consumer's expansion [10].

The study is divided into three steps mentioned in Figure 1.



**Figure 1.** Research steps.

Company	Twitter account(s)	Total tweets	Total followers
Amazon	@amazonIN	21.7 K	637 K
	@AmazonHelp	1.31 M	103 K
Flipkart	@Flipkart	32.8 K	1.48 M
	@Flipkartsupport	332 K	63.4 K
Snapdeal	@Snapdeal	26.2 K	696 K
	@Snapdeal_Help	217 K	24 K
Myntra	@Myntra	80.9 K	350 K
	@MyntraSupport	29.4 K	16.7 K
eBay	@ebayindia	84 K	210 K

**Table 1.** Twitter status (as on 31/08/2022).

Twitter account(s)	Tweets (n=1500)
	Feedback collected
@amazonIN	1500
@AmazonHelp	1500
@Flipkart	1500
@Flipkartsupport	1500
@Snapdeal	1500
@Snapdeal_Help	1500
@Myntra	1500
@MyntraSupport	818
@ebayindia	1199

**Table 2.** Feedback collected.

As shown in Figure 1, step 1 gathered the tweets to a maximum of 1500 and is described in section 2. Section 3 elaborates on step 2 and shows the usage of the Naive Bayes algorithm for feedback analysis. Step 3 states the suggested 4A framework and inserts the positive polarity of feedback received into one of the quadrants, as indicated in section 4. The outcomes and recommendations are mentioned in section 4.

## Literature Review

### Collection of tweets

During the analysis, it was noted that these businesses have 2 Twitter accounts (except for eBay). One is the official source, where these businesses post the updates, sales, and offers; the other is for assistance or supporting consumers with queries. Table 1 provides the entire status of the Twitter accounts of these businesses.

Step 1 runs the R code to gather the tweets and comments from 01-06-2022 to 31-08-2022 for a maximum of the latest 1500 tweets. The results of step 1 are provided in Table 2 below:

### Identification of polarities using Naive Bayes algorithm

The Naive Bayes technique is used to describe the contextual polarity of remarks by customers of e-commerce companies. The comments are gathered as a "bag of words" and supplied to the Naive Bayes, which considers each remark independently of the other. Based on each phrase from each tweet, the algorithm identifies the class of each word as positive, neutral, or negative. The aggregate of classes for each tweet is then categorized into one of three polarities.

The mathematical representation of Naive Bayes algorithm is represented in equation 1 as:

$$P(A/B) = P(B/A)P(A)/P(B) \dots\dots(1)$$

Where,

P(A/B) is the probability of A (class), given B (tweet).

P(B/A) is the probability of B (tweet), given A (class).

P(A) is the probability of A (class), and is independent of each other.

P(B) is the probability of B (tweet), and is independent of each other.

Based on equation (1), positive and negative tweet are represented as

$$P(\text{positive}/\text{tweet}) = P(\text{tweet}/\text{positive}) P(\text{positive})/P(\text{tweet}) \dots\dots(2)$$

$$P(\text{negative}/\text{tweet}) = P(\text{tweet}/\text{negative}) P(\text{negative})/P(\text{tweet}) \dots\dots(3)$$

It is observed that probability of tweets, is constant, and can thus be ignored. Thus, equations (2) and (3) can be represented as:

$$P(\text{positive}/\text{tweet}) = P(\text{tweet}/\text{positive}) P(\text{positive}) \dots\dots(4)$$

$$P(\text{negative}/\text{tweet}) = P(\text{tweet}/\text{negative}) P(\text{negative}) \dots\dots(5)$$

The more precise notation of each class is thus given in equations (6), (7) and (8) respectively.

$$P(\text{positive}) = \sum_{j=1}^m \sum_{i=1}^n P(T_i/\text{positive}) \dots\dots(6)$$

$$P(\text{negative}) = \sum_{j=1}^m \sum_{i=1}^n P(T_i/\text{negative}) \dots\dots(7)$$

$$P(\text{neutral}) = 1 - (P(\text{positive}) + P(\text{negative})) \dots\dots(8)$$

Where,

i=1..n teewt hcae rof sdrow fo rebmun latot

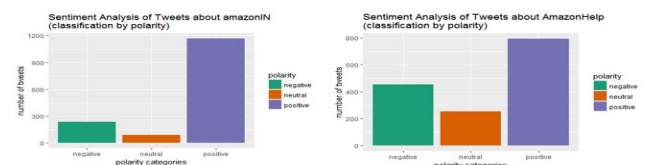
J=1..m steewt fo rebmun latot

Based on equations (6), (7), and (8), Table 3 reveals the polarity of tweets for these businesses.

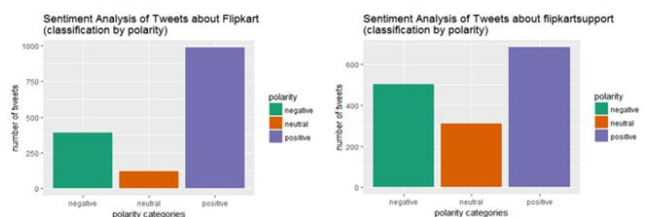
Twitter account(s)	Polarity		
	+	+/-	-
@amazonIN	66.87%	14.80%	18.33%
@AmazonHelp	54.87%	17.73%	27.40%
@Flipkart	66.60%	8.20%	25.20%
@Flipkartsupport	46.67%	20.00%	33.33%
@Snapdeal	56.20%	16.73%	27.07%
@Snapdeal_Help	54.93%	18.87%	26.20%
@Myntra	76.67%	11.67%	11.67%
@MyntraSupport	72.13%	14.67%	13.20%
@ebayindia	78.32%	12.93%	9.17%

**Table 3.** Polarity status.

The Twitter graphs are constructed for the companies in stages using publicly available data from the Twitter API. From the list of each business's tweets, only the comments on which the consumers react are collected; this cuts out unknown consumers who did not comment and thus are unlikely to provide useful information. Also, due to the rapid speed of development on Twitter, the polarity tends to expand rapidly; so the overall polarity is a reflection of the companies' current social standing and not the precise status that existed at the time of the tweet. The feedback from these consumers was gathered over the time period from 01-06-2022 to 31-08-2022, and a maximum of 1500 tweets were collected. Figures 2-6 shows the feedback polarity breakdown for these companies.



**Figure 2.** Amazon Twitter status.



**Figure 3.** Flipkart Twitter status.

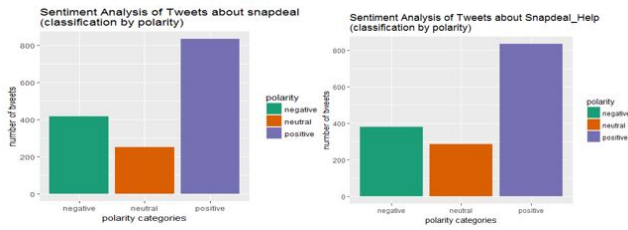


Figure 4. Snapdeal Twitter status.

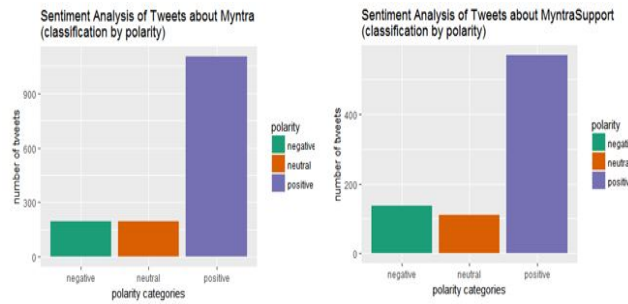


Figure 5. Mynta Twitter status.

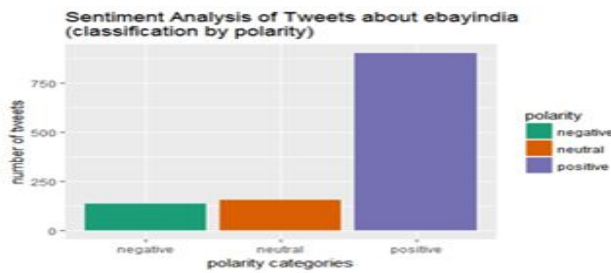


Figure 6. eBay India.

## Discussion

Input from consumers is a crucial facet of business, and input via social media sites is becoming more and more critical for businesses. Word of mouth has traditionally been one of the most potent marketing tactics for businesses, which has now been taken over by e-word of mouth, or consumers conversing to one another via increased feedback through social media. As is said, social media is becoming significantly more relevant for organizations, and as suggested, volume, impact, and sentiment are three basic but vital approaches to measure social media. The suggested approach is employed in the research to examine consumer feedback. The approach employs positive polarity to determine the state of present involvement of these businesses with consumers, as seen in Table 4:

Positive polarity (in%)		4A states
0	30	Anxious
31	60	Apart
61	80	Ardent
81	100	Active

Table 4. Evaluation Table for 4A framework.

The analysis for a model is mentioned in Figure 7. The model is divided into four quadrants based on the percentage of positive polarities. Placing the outcomes into these quadrants easily identifies the current state of social media adoption and strategies to be adopted if required.

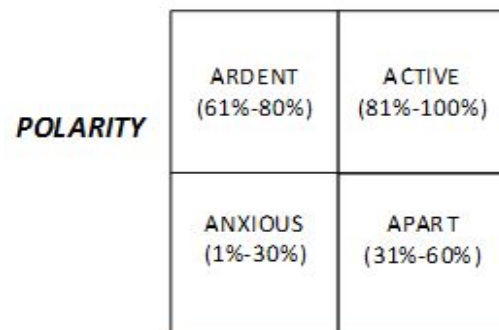


Figure 7. Feedback analysis.

### Implication of 4A framework for the observed outcomes

The section highlights the implication of results in the proposed 4A framework. Figure 8 depicts the results of the experiment undertaken.

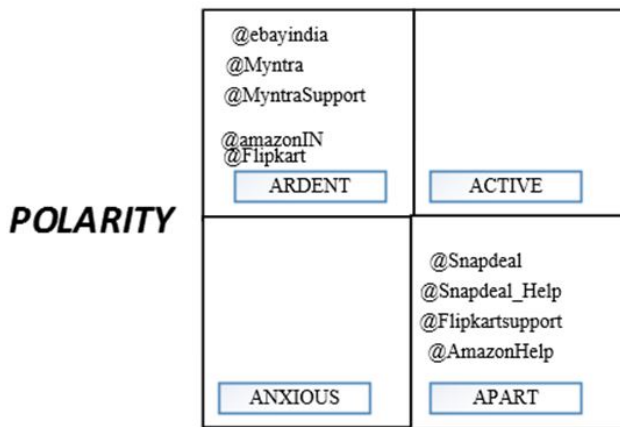


Figure 8. Outcomes of Twitter adoption by Indian e-commerce.

### Conclusion

Surprisingly, the response for tweets is just in two states-apart and nervous. Also, none of these businesses fall into an "anxious" condition, which suggests that these companies have adopted Twitter and utilize it for updates and comments relatively often. However, curiously, none of these firms have achieved an "active" condition, even after years of Twitter adoption, which is astounding.

Also, the average response for ardent state is 72.12% and for apart state is 53.17%. The research further emphasizes that consumers are not content with the response they are receiving online from these businesses. Thus, the help/support component of Twitter accounts by these businesses is not benefiting consumers. A social media strategy should be in place to help these businesses to deal with consumer queries and respond appropriately.

### Recommendations

There were several observations obtained throughout the research. Based on the findings, various recommendations include the following:

- Online rating and review systems allow users to make decisions on the basis of peer reviews.

- Documentation of consumer experiences on social networks. These networks foster peer-to-peer consumer engagement and let consumers communicate.
- Inclusion of social media plugins may be introduced to a website to expand the advantages beyond the social networking arena.
- Content management may be used to enhance consumer connection via social media.

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