

Determinants of the helpfulness of specialty coffee reviews on Amazon

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ABSTRACT

With the increasing volume of online reviews on platforms like Amazon, customers must put considerable effort into isolating useful information from irrelevant or ambiguous content. One solution implemented by e-commerce sites to address this challenge is product review systems, where customers can vote on whether they find a review helpful, thereby reducing uncertainty in purchase decisions. Therefore, it is crucial to understand what makes a review helpful and how to enhance customer access to these valuable reviews. This study aims to analyze the content characteristics of online reviews that influence their perceived helpfulness in the context of specialty coffee products sold on Amazon. A content analysis was conducted on 2369 reviews to identify elements that contribute to their informational value. Subsequently, a zero-inflated negative binomial regression model was applied to test the hypotheses, addressing issues of overdispersion and an excess of zeros in the response variable. The findings suggest that aspects such as multimedia format, review depth, and the inclusion of extrinsic product attributes (price and quality) are key factors that enhance review helpfulness. On one hand, the use of images and videos helps consumers visualize the product and understand its features, while detailed and extensive reviews provide more comprehensive information. Moreover, factors like price and quality allow consumers to assess whether the product meets their needs and preferences. These findings are crucial for developing more effective marketing strategies in the coffee industry by providing a more precise understanding of the attributes most valued by consumers.

Key words: eWOM; e-commerce; negative binomial regression; online reviews; specialty coffee.

1 INTRODUCTION

Currently, e-commerce platforms have integrated an essential element to mitigate consumer cognitive dissonance: customer reviews. These opinions on products and services have become a decisive factor in the purchasing process. Recent studies reveal striking data: 92% of consumers consult online reviews before purchasing, 89% acknowledge that these significantly influence their decision, and 82% value user recommendations more than those from the sellers themselves (Qin; Zheng; Wang, 2022). This phenomenon has transformed online reviews into an indispensable tool for consumers and a valuable source of strategic intelligence for companies, allowing them to understand and strengthen their competitive advantages in the market (Vidanagama; Silva; Karunananda, 2019).

The rapid growth of e-commerce has led to a significant increase in the number of online reviews, making it nearly impossible for customers to read them in detail (Yang, 2022). This phenomenon is attributed to various factors, such as the emergence of fake reviews written by fictitious users, incentives offered by retailers to motivate consumers to leave feedback, and the growing interest of customers in sharing their experiences (Zhang; Wang; Wu, 2021).

One of the solutions that e-commerce platforms have found to address this problem is review systems, which allow customers to vote on whether a review is helpful or not, thereby reducing the uncertainty associated with final purchase

decisions (Biswas; Sengupta; Ganguly, 2021). According to Kuan et al. (2015), a review can be considered helpful if it provides objective and reliable evaluations of the product or service. For this reason, opinions with higher voting rates will have greater weight in potential customers' purchasing decisions (Li; Fu; Zhang, 2022). Therefore, it is imperative to understand the determinants of review usefulness, especially those related to review content characteristics.

Recent research has explored the relationship between the characteristics of online reviews and their usefulness, focusing primarily on tourism platforms such as TripAdvisor (Son et al., 2022; Xiao; Luo; Ke, 2022). However, the analysis of review usefulness in other sectors, such as food retail, remains relatively unexplored. One market that deserves particular attention is that of specialty coffee, a growing sector that significantly contributes to the economic development of countries such as Brazil, Colombia, Ethiopia, and Costa Rica. Roy, Datta and Mukherjee (2018), suggest that online reviews could be especially influential in purchase intention within specialized markets such as specialty coffee. Moreover, Lis (2013) argues that these reviews could also foster loyalty and credibility in this market.

Examining the usefulness of online reviews in the specialty coffee market not only fills a gap in the existing literature but also offers valuable insights for the industry. In the context of specialty coffee, reviews, in addition to their format and content characteristics, may cover product attributes such as flavor, aroma, texture, price, packaging,

brand, and quality—factors that potentially influence consumer behavior and affect the perceived usefulness of the reviews (Malekpour; Yazdani; Rrezvani, 2022). Therefore, research that explores the effect of these attributes on the usefulness of reviews in the specialty coffee market not only represents a novel investigative approach but could also provide crucial information for producers, traders, and consumers in this growing sector.

In response to the identified gap in the literature, this research aims to analyze the content characteristics of online reviews that influence their perceived usefulness, specifically in the context of specialty coffees marketed through Amazon. The choice of this platform is justified by its global leadership and the diversity of data it offers, including reviews of food products such as specialty coffees (Heng et al., 2018; Kundu; Chakraborti, 2022). Additionally, its advanced classification and voting systems enable a deep exploration of the factors determining the perceived usefulness of reviews in a competitive and representative e-commerce environment (Choi; Leon, 2023).

The primary objective is to determine which elements of these reviews most significantly contribute to users considering them helpful. To achieve this objective, a comprehensive content analysis of 2369 specialty coffee reviews published on this e-commerce platform has been conducted. Additionally, an empirical model has been developed to quantify the influence of the various review characteristics on their usefulness, using the number of votes or recommendations each review receives as a metric.

1.1 Literature Review

1.1.1 Usefulness of Online Reviews

With the growth in the number of online reviews, helpfulness votes have consolidated as a crucial factor for filtering the most relevant and trustworthy reviews, helping consumers manage information overload. Helpfulness, according to Ismagilova et al. (2020), is key to facilitating product evaluation. Research such as that of Yang, Zhou and Chen (2021) and Xiao, Luo and Ke (2022), suggests that reviews with more helpfulness votes have a greater impact on purchase decisions and reflect higher product acceptance.

Theoretically, two approaches have been used to analyze usefulness: the first involves collecting online reviews from e-commerce platforms (Karimi; Wang, 2017), and the second consists of designing questionnaires and experiments to determine the usefulness of reviews (Leung, 2021). This study adopted the first approach to investigate three key determinants of usefulness: format, depth, and product attributes.

1.1.2. Review Format

There are primarily two formats for presenting information in reviews: the textual format, which provides specific details about the product, and the visual format, which communicates information intuitively through images or videos (Eslami; Ghasemaghaei; Hassanein, 2018). Fan and Zhang (2020) found that both formats positively influence the usefulness of the review, although the text has a stronger impact on purchase intention, as images only convey information about the product's appearance.

On the other hand, Xiao, Luo and Ke (2022) state that multimedia reviews ease the information processing load, making them more useful. According to Li and Xie (2019), visual information serves both decorative functions, by evoking emotional responses, and informative functions, by making the product's attributes visible. These features are especially useful given the lack of sensory experience in online shopping (Karimi; Wang, 2017). Based on this, the following hypothesis is proposed: H1. The presence of images and/or videos in the review has a positive effect on the review's usefulness.

1.1.3. Review Depth

Review depth, or information richness, is defined as the amount of information included in the online review (Goh; Heng; Lin, 2013) and is typically measured by the number of words or characters (Liang; Schuckert; Law, 2019; Siering; Muntermann; Rajagopalan, 2018). Some theorists have determined that depth is positively related to the usefulness of the review (Yang, 2022). Hu and Yang (2021) suggest that longer reviews are generally considered more useful because they provide more details and facilitate more informed decisions. Additionally, when two reviews address the same aspects of the product, the longer one tends to be more detailed and informative (Li; Xie, 2019). Therefore, the following hypothesis is proposed: H2. Review depth is positively associated with review usefulness.

1.1.4. Intrinsic and extrinsic product attributes

A product is a set of attributes that influence consumer preferences and, consequently, their purchasing decisions (Malekpour; Yazdani; Rrezvani, 2022). Various studies have classified product attributes into two categories: intrinsic and extrinsic (Bakhshian; Lee, 2022).

According to Hussein, Silva and Fraser (2015), intrinsic attributes are natural, sensory, and biochemical characteristics inherent to the product that cannot be altered without changing its essence and are highly valued by consumers. In the case of coffee, these attributes include its appearance, taste, and aroma, which influence purchasing decisions (Samoggia; Riedel, 2018). Seo et al. (2008) found that the taste and aroma of coffee generally induce positive feelings and drive consumption. These attributes are crucial for product acceptance and justify

consumers' willingness to pay higher prices for them (Ariadna et al., 2021). Based on the preceding discussion, this study proposes the following hypotheses:

- H3a: The “aroma” attribute in the review positively affects its usefulness.
- H3b: The “taste” attribute in the review positively affects its usefulness.
- H3c: The “texture” attribute in the review positively affects its usefulness.

Although intrinsic attributes are more reliable for evaluating product quality, they are more difficult to assess in e-commerce, leading consumers to rely on extrinsic attributes such as brand, country of origin, price, label, or packaging, which come from the product's environment and are not part of its physical composition (Amrullah et al., 2021; Barahona et al., 2020; Li; Murray; Scott, 2000).

Several studies have analyzed consumer preferences for the extrinsic attributes of coffee. Teuber and Herrmann (2012) found that the country of origin is an important quality signal in the specialty coffee market. According to Traore, Wilson and Fields (2018), brand and geographic origin distinguish products and create value. Kobayashi and Benassi (2015) demonstrated that packaging and label information influence coffee consumption. Additionally, price is considered a relevant attribute when the consumer lacks adequate information about the intrinsic characteristics of the product (Acebrón; Dopico, 2000). Finally, the sustainability of coffee, supported by Fair Trade certification since the 1990s, is an increasingly valued attribute, as consumers are willing to pay more for products with sustainability labels (Grunert, 2011; Feucht; Zander, 2017). Based on the above, the following hypotheses are formulated:

- H4a: The “price” attribute in the review positively affects its usefulness.
- H4b: The “packaging” attribute in the review positively affects its usefulness.
- H4c: The “brand” attribute in the review positively affects its usefulness.
- H4d: The “quality” attribute in the review positively affects its usefulness.
- H4e: The “responsible coffee” attribute (encompassing origin, sustainability, and benefits) in the review positively affects its usefulness.

Figure 1 presents the conceptual model of the research, indicating each hypothesis and its corresponding effect (+ or -).

2 MATERIAL AND METHODS

2.1. Data Collection

Online reviews were collected from the Amazon website, globally recognized for its wide variety of products,

including foods such as specialty coffees (Lai et al., 2022). The ethical use of reviews for academic purposes is justified as they are publicly accessible data, an approach supported by previous studies (Hong; Pittman, 2020; Zhou; Tu, 2022). Additionally, the privacy of reviewers was protected by not collecting identifying information such as usernames.

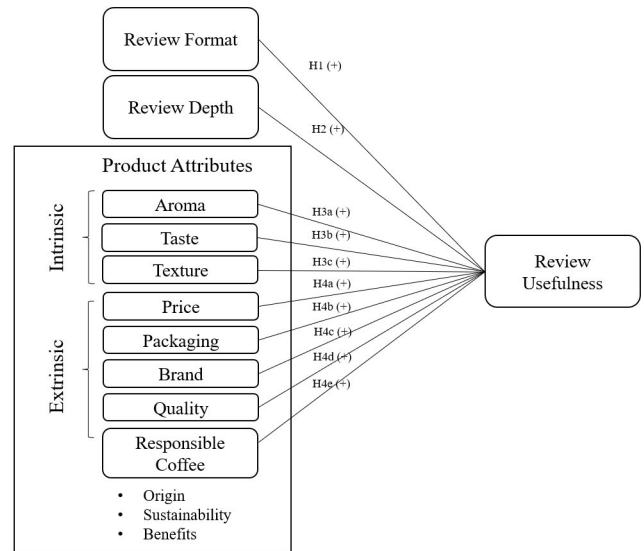


Figure 1: Conceptual model.

Note: The figure shows the relationship between review attributes and product attributes with review helpfulness, highlighting the positive or negative effects of each hypothesis.

A non-probabilistic convenience sampling method was used to collect data from online reviews of the 10 best-selling specialty coffees on Amazon. Data collection was carried out using search terms like “special coffee” or “specialty coffee.” To avoid algorithmic biases, the website was accessed in incognito mode. Similarly, the sample size was determined based on recent studies employing quantitative analysis of digital content (Table 1).

Table 1: Methodological References.

No	Authors	Reviews	Website
1	Siering, Muntermann and Rajagopalan (2018)	12330	Amazon
2	Zhang et al. (2022)	2822	Suning.com
3	Ya and Alton (2021)	2197	Douban.com
4	Jia, Shin and Jiao (2022)	1200	-
5	Srivastava and Kalro (2019)	509	TripAdvisor

Source: Own elaboration.

To this end, the median number of reviews from previous studies was calculated, resulting in 2197 reviews for analysis, a

robust measure against extreme or outlier values. Additionally, an 8% surplus of reviews was collected as a precaution against any unusual or anomalous reviews, thereby ensuring a more comprehensive sample. Web scraping was employed to gather data from the website using the free tool Google Chrome Web Scraper (Thota; Ramez, 2021). As a result, information from $n = 2369$ online reviews corresponding to the 10 best-selling whole bean roasted specialty coffees on Amazon. Data collection took place in April 2023, covering reviews from the years 2022 and 2023. It is important to note that, to be included in the sample, reviews had to contain sufficient information for coding (more than just one word) and be directly related to the selected product (specialty coffees).

2.2. Data Coding

As digital environments have become sources of information for academic research, various methods for analyzing digital content have been developed. One such method is quantitative content analysis, which systematically and repeatedly examines texts. This process involves segmenting content into units, assigning them to categories, and providing numerical values for each (Krippendorff, 2018). Table 2 presents the coding manual for the content analysis.

2.3. Statistical Analysis

RStudio version 4.1.1 and Stata 14 were used to obtain the descriptive statistics of the sample and to determine the appropriate data analysis approach. Additionally, correlational techniques were applied to test the research hypotheses.

3 RESULTS

Before conducting the statistical analysis of the data, the reliability of the coding was assessed using reproducibility as the primary criterion (Krippendorff, 2018). Two evaluators independently coded 10% of the online reviews to verify the consistency of the results. It was confirmed that all variables had reliability coefficients of $\alpha \geq 0.800$, ensuring the robustness of the information.

Additionally, descriptive statistics of the quantitative variables showed that the usefulness votes variable has a mean of 4.08, indicating that reviews receive an average of 4 helpful votes. However, the median of 0 suggests that most reviews do not receive votes. Furthermore, the analyzed reviews have an average length of 177 characters, ranging from 6 characters (shortest review) to 6770 characters (longest review) (Table 3).

In the analysis of qualitative variables, it was observed that characteristics such as video, origin, sustainability, and potential benefits have frequencies below 8% in the reviews. Therefore, it was appropriate to recode the data to group or redefine these categories. The variables of image and video were combined to create a new category of multimedia content, which jointly represents 8.23%. Additionally, the variables of origin, sustainability, and potential benefits were merged under the category of responsible coffee, increasing its representation to 10.09% (Table 4).

On the other hand, the absence of perfect collinearity among the independent variables was confirmed using an Ordinary Least Squares (OLS) regression model and evaluating the Variance Inflation Factor (VIF). The results showed that all variables were within the expected ranges (0.02 to 4) (Hair et al., 2009).

Subsequently, the normality assumption for the dependent variable was tested using the Shapiro-Wilk test. The test revealed a p-value significantly less than 0.000, providing strong evidence to reject the null hypothesis that the dependent variable follows a normal distribution. This finding suggests the need to consider alternative approaches that fit the observed distribution, as 75.43% of the data corresponds to reviews without helpful votes. Therefore, it was considered appropriate to apply specific models to address the high presence of zeros, such as zero-inflated models, which involve creating two regression models: one to predict the presence of the event and another to predict the frequency of its occurrence (Bekalo; Kebede, 2021).

Table 2: Coding Manual.

Variables	Categories	Details
Depth	Characters	Number of characters
Attributes (Intrinsic and Extrinsic)	Intrinsic: taste, aroma and texture. Extrinsic: price, packaging, brand, quality, origin, sustainability and potential benefits.	1 = presence of attribute 0 = absence of attribute
Review Format	Image Video	
Usefulness	Helpful Vote	Number of helpful votes received 1= presence of votes 0= absence of votes

Source: Own elaboration.

Table 3: Descriptive Analysis of Quantitative Variables.

Variable	Mean	Median	SD	Minimum	Maximum
Helpful Vote	4.08	0	118.77	0	4131
Characters	177.10	106	290.71	6	6770

Source: Own elaboration in RStudio (2024).

Table 4: Descriptive Analysis of Qualitative Variables.

Variable	Category	Frequency	R Frequency
Usefulness	Helpful Vote	582	24.57%
Review Format	Multimedia Content	195	8.23%
Intrinsic Attributes	Aroma	213	8.99%
	Taste	1322	55.80%
	Texture	635	26.80%
Extrinsic Attributes	Price	387	16.34%
	Packaging	405	17.10%
	Brand	470	19.84%
	Quality	705	29.76%
	Responsible Coffee	239	10.09 %

Source: Own elaboration.

Additionally, given that the response variable is count-based, it was determined that count regression models are the most suitable for analyzing these measures. Consequently, this study employed four statistical models derived from count regression: Poisson regression, zero-inflated Poisson regression, negative binomial regression, and zero-inflated negative binomial regression.

3.1. Model Estimation

To validate and select the best model, two common goodness-of-fit criteria were used: Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) (Hellalbi; Bouabdallah, 2024). In this context, models with better fit would have lower AIC and BIC statistics. Similarly, the likelihood ratio (LR) test values were compared among the different models to evaluate their fit relative to the observed data. Additionally, the p-value associated with the LR χ^2 test ($\text{Prob} > \chi^2$) was used to determine the statistical significance of the differences between the models.

On the one hand, it is important to note that all models show a significantly better fit than a null model ($\text{Prob} > \chi^2 = 0.000$). However, the Akaike and Bayesian Information Criteria indicate that the best-fitting models are the Negative Binomial and Zero-Inflated Negative Binomial (Table 5). Nonetheless, an additional justification for the choice of the Zero-Inflated Negative Binomial regression model is warranted. According to Zhang, Yang and Ding (2023), the AIC is efficient in non-parametric scenarios, while the BIC is more suitable for parametric scenarios.

Based on the above, the model selection is prioritized using the lowest AIC, which in this case is the Zero-Inflated Negative Binomial model. Additionally, this model fits better with the data distribution type, given the high frequency of zeros.

According to the data, the Zero-Inflated Negative Binomial model is significant based on the LR statistic at a 99% confidence level. Furthermore, the variable multimedia content is statistically significant at the 90% level with a positive effect ($\beta = 1.5020$). The variable characters is also significant, in this case at the 99% level with a positive estimator ($\beta = 0.014$). In this model, two significant variables are also present in the extrinsic attributes dimension. In this case, the variable price is significant at the 90% level with a positive effect ($\beta = 0.7860$), as is the variable quality, with a 90% confidence level and a positive estimator ($\beta = 0.8159$). Table 6 summarizes the results of the model estimates.

4 DISCUSSIONS

This study represents progress in understanding the determinants of review usefulness on e-commerce platforms. Traditionally, research has focused on analyzing review characteristics (Liang, Schuckert; Law, 2019; Siering; Muntermann; Rajagopalan, 2018); however, the influence of intrinsic and extrinsic product attributes on usefulness has been less explored.

The research empirically validated hypothesis H1, demonstrating that the review format in its multimedia form positively influences usefulness. This finding aligns with the proposals of Li and Xie (2019) and Xiao, Luo and Ke (2022), who indicate that the inclusion of multimedia elements increases the attractiveness of the review. Thus, adopting multimedia content in reviews allows consumers to form a

Table 5: Model Comparison.

Evaluation Metrics	Poisson Regression	Zero-Inflated Poisson Regression	Regression (BN)	Zero-Inflated Regression (BN)
LR χ^2 (10)	110979	87050	87631	1580.6
Prob > χ^2	0.000	0.000	0.000	0.000
AIC	4971.842	4384.809	3784.277	3735.371
BIC	5035.314	4511.754	3853.52	3868.086

Source: Own elaboration in RStudio (2024).

more complete mental image of the product, which is relevant given the lack of sensory experience with products sold on online platforms (Karimi; Wang, 2017).

Table 6: Model Estimates.

Models		Zero-Inflated Negative Binomial Regression
Constant		1.0025***
Format	Multimedia Content	1.5020*
Depth	Characters	0.014***
Intrinsic Attributes	Aroma	0.2006
	Taste	0.2931
	Texture	0.3633
Extrinsic Attributes	Price	0.7860*
	Packaging	-2.738
	Brand	0.5685
	Quality	0.8159*
Responsible Coffee		-0.3616
LR chi ² (10)		1580.6
Prob > chi ²		0.000
AIC		3735.371
BIC		3868.086

Source: Own elaboration in RStudio (2024).

Hypothesis H2, suggesting that depth positively influences review usefulness, was corroborated in this study, consistent with previous research findings (Yang, 2022). This is explained by the fact that a longer review tends to contain a greater amount of information about the product's attributes. While these authors used word count as the operational measure of the variable, the present research chose to measure length in characters, representing a theoretical advancement in the field. However, the findings did not determine an optimal number of characters per review, making it essential to address this issue in future research, as an excess of information could overwhelm the reader and complicate their decision-making process (Sun; Han; Feng 2019).

The positive correlations proposed in H3a, H3b, and H3c were not corroborated. Although intrinsic attributes of specialty coffees, such as aroma, taste, and texture, are highlighted in the literature as relevant elements in the consumption experience and product acceptability (Ariadna et al., 2021), no evidence was found of their influence on perceived usefulness. This result suggests that while the organoleptic characteristics of coffee impact purchase decisions (Samoggia; Riedel, 2018), they may not be considered differentiators in the context of specialty coffees sold on online platforms. This may be due to the general perception that specialty coffee already possesses distinctive characteristics in these aspects.

The results also show that extrinsic attributes, such as price and quality, influence the helpful vote of the review, thus corroborating hypotheses H4a and H4d. According to Acebrón and Dopico (2000), price becomes more relevant in online purchases when consumers have little information about the intrinsic characteristics of the product. Similarly, specialty coffees are perceived as high-quality products, prompting consumers to express their opinions through reviews if they feel their expectations and standards are not met (Teuber; Herrmann, 2012).

On the other hand, hypotheses H4b, H4c, and H4e were not supported by the study. In this sense, mentioning attributes in the review related to packaging, brand, and characteristics associated with coffee responsibility, such as origin and sustainability, do not influence review usefulness. Although some previous studies, such as those by Kobayashi and Benassi (2015) and Traore, Wilson and Fields (2018), have suggested that these attributes may contribute to the product's appeal and the formation of consumer judgments, the results of the present study do not support this relationship in the analyzed context.

5 CONCLUSIONS

Online reviews are crucial in consumer decision-making, as perceived usefulness directly influences behavior, with factors like format, depth, and extrinsic attributes such as price and quality playing a key role. This study contributes theoretically by understanding how consumers process and value reviews, and practically, it emphasizes the importance of multimedia content and review structure for improving digital marketing strategies and e-commerce platform design.

This study has limitations, focusing on ten review features and one product type. Expanding to more aspects and categories would improve its scope. While Amazon is key in e-commerce, analyzing other platforms could provide a broader market view. The study covers 2022–2023 reviews; a larger dataset over time would enhance insights. Future research should explore deep learning for sentiment analysis and NLP techniques to detect fake reviews, improving result accuracy and reliability (Mitra & Jenamani, 2021; Lee & Park, 2022).

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7 AUTHORS' CONTRIBUTION

Conceptual Idea: Patiño-Giraldo, L.V.; Arango-Pastrana, C.A; Methodology design: Osorio-Andrade, C.F; Data collection: Patiño-Giraldo, L.V; Data analysis and interpretation: Patiño-Giraldo, L.V.; Osorio-Andrade, C.F., and Writing and editing: Patiño-Giraldo, L.V.; Arango-Pastrana, C.A.

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