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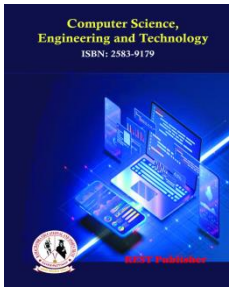

Unveiling the Dynamics of E-Commerce: A Comprehensive Study on Big Data Analytics, Environmental Impact, Socioeconomic Effects, and Platform Assessment

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Abstract. *The study addresses the paucity of thorough research in this field by examining the use of big data analytics (BDA) in e-commerce. It starts with a synopsis of how e-commerce first emerged with the introduction of the Internet and then developed into a worldwide marketplace. Even if e-commerce is becoming more and more popular, a unified framework is still required to comprehend its adoption drivers and effects on different domains. The study aims to fill this void by thoroughly examining 98 pertinent publications and emphasizing the applicability of e-commerce in various settings. Additionally, it addresses the possibility for e-commerce to lessen the environmental effects of the food system while discussing the environmental implications of food e-commerce. The study also looks at the socioeconomic effects of e-commerce privacy and how it affects customers. It also addresses how the COVID-19 epidemic has affected e-commerce and digital media consumption, highlighting the necessity of assessing how e-commerce may support constructive social change. The research assesses e-commerce platforms according to a number of factors, such as product variety, user reviews, website loading speed, and customer service response time, using the Weighted Product Method (WPM) as a decision-making tool. The WPM generates a weighted product score for every platform by allocating weights to each criterion according to its relative value. Stakeholders may make well-informed decisions by taking into account both quantitative and qualitative elements thanks to this methodical approach. Walmart is the most popular e-commerce platform among those that were analyzed, with Amazon, eBay, Etsy, and Shopify following closely after. In the ever-changing world of e-commerce, these results offer insightful information about the relative merits and performance of each platform, helping consumers and companies make informed decisions. All things considered, the article advances knowledge about business-to-consumer (BDA) in e-commerce and offers a methodical framework for assessing e-commerce platforms according to various standards, enabling well-informed choices and calculated planning in the virtual marketplace.*

1. INTRODUCTION

In recent years, big data analytics, or BDA, has become more and more important in e-commerce. Its theoretical and practical progress is hindered by the fact that it is yet a poorly researched topic. Research that offers a broad taxonomy for examining the characteristics and uses of big data in e-commerce is few. In the contemporary global economy, a new kind of trade known as "E-Commerce (EC)" quickly evolved with the introduction of the Internet and its commercialization starting in 1994. "The use of the Internet and other networking technologies for conducting business transactions" is the definition of e-commerce. With a growing number of researches on newly developing applications like augmented reality, e-commerce topped the list of TAM applications. The industries where TAM applications were used the most frequently were banking, education, and healthcare. Nevertheless, there is still a lack of a widely acknowledged framework outlining the direct drivers of e-commerce adoption. Even less attention was paid to the impacts of expanding e-commerce adoption in other industries because most

studies concentrated on how it would affect traditional forms of retailing. Articles with only a passing mention of the e-commerce environment or those lacking any real significance were not included in the list of articles under consideration. The final list of 98 articles that fall under the purview of this study was produced by carefully evaluating each article's relevance to the e-commerce environment and eliminating 65 of them. The online purchasing and selling of goods, or e-commerce, may help lessen the negative effects of the food system on the environment. Although there has been much discussion about the environmental effects of general e-commerce, large-scale effective implementations of food e-commerce are relatively new. It implies that the global nature of an e-commerce industry is crucial. However, several new tendencies are dividing the Internet-enabled economy into numerous specialized industries despite the expanding market reach. Consumers will find killer applications in the form of real-time, personalized product and service matching as network and distributed computing technologies develop. Terms like Internet marketing, online purchasing, and electronic commerce (E-commerce) are now widely used by both regular people and corporate leaders worldwide.. In reality, a lot of customers today believe that shopping and even trading online are trendy. The Defense Advanced Research Project Agency launched the Internet in 1969 as a packet-switched network for the US Department of Defense under the moniker ARPANET. The number of PCs connected to the Internet rose dramatically by the middle of 1988. The primary goal of the workshop was to bring together researchers and developers from industry, government, and academia to discuss their experiences with establishing, operating, and maintaining electronic commerce systems in order to identify the key challenges of component-based e-commerce and strategies for addressing them. Researchers showcased frameworks, tools, and prototypes in the workshop that represent the state of Internet commerce practice today. However, larger e-commerce businesses have their own IT departments that can build up more sophisticated, reliable systems and offer quicker assistance. Since e-commerce sites are always online, having strong technical support is essential. Any downtime caused by technical issues may have a severe negative impact on a company's income and image. The aforementioned four phases of e-commerce are immediately applicable to comparable procedures for online insurance product purchases. Customers look for items from various insurance providers that they are willing to buy. With the emergence of new business models, e-commerce is growing and will continue to do so in the near future. The expansion in the number of businesses engaging in e-commerce has had a significant impact on logistics. E-commerce research has operationalized transparency in different ways and looked at it from many perspectives. Building on the general understanding of the definitions, disclosure is defined as either actual disclosure activity or intention (or other variations). Besides, given the scale and value of the sector, the socio-economic effects of e-commerce privacy are apparent. From the standpoint of the customer, e-commerce creates a necessary trade-off when contrasted to other privacy settings. People must undertake the risks of releasing their information in order to complete a transaction, and they must supply at least the bare minimum of information. Human existence has changed as a result of the COVID 19 pandemic. Lockdowns, self-isolation, and social distance were the tactics that were implemented. These measures have a significant influence on the amount of digital media that individuals consume in order to keep themselves engaged, entertained, socially connected, and in contact with their friends and family. Thus, assessing these several prevailing themes theses, tactics, and ideologies is the first step towards figuring out how development should take place and how e-commerce may assist in achieving that in a developing country. An assessment of this kind would provide insight into what constitutes a good change, which benefits from it, and how e-commerce might advance or facilitate the realization of this good change. Second, although laypeople may lack social skills, as regular online shoppers they may possess a wealth of practical knowledge that is lacking in specialized and established specialists (Beck 1992). Fortunately, customizing customization according to client preferences is the special advantage of e-commerce implementation. Future studies will employ novel platforms, such intelligent wearables. Furthermore, customization for e-commerce has developed rapidly and is now a growing area of Web services. The significance of the research gap and the FTSP mechanism design difficulty are the driving forces for this study. The issue is highly relevant to supply chain and logistics, thus we are especially interested in looking at it in the context of omnichannel E-commerce.

2. MATERIALS AND METHOD

A decision-making method called the Weighted Product Method (WPM) is used to assess options according to a number of factors or characteristics. When the criteria differ in relevance or significance, it is very helpful. Each criterion is given a weight to indicate its relative relevance by WPM, which then computes a weighted product score for each option. Lastly, it designates the option with the greatest total score as the recommended one. When using the Weighted Product Method; the following procedures are usually involved:

- Identify Criteria: Begin by identifying the criteria or attributes that are relevant to the decision-making problem. These criteria should be measurable and reflect the objectives or requirements of the decision.
- Assign Weights: Assign weights to each criterion based on its relative importance or priority. The weights should sum up to 1 or 100%, indicating the total importance of all criteria. The assignment of weights can be subjective, based on expert judgment, or derived from stakeholders' preferences through techniques like the Analytic Hierarchy Process (AHP) or pairwise comparison.
- Normalize Data: If the criteria are measured on different scales, normalize the data to ensure comparability. This step involves transforming the raw data into a common scale, typically between 0 and 1, where higher values indicate better performance.
- Calculate Weighted Scores: Multiply each alternative's performance on each criterion by the corresponding weight assigned to that criterion. This yields the weighted score for each alternative on each criterion.
- Calculate Weighted Product**: For each alternative, calculate the weighted product by multiplying together its weighted scores across all criteria.

Rank Alternatives: Rank the alternatives based on their weighted product scores. The alternative with the highest overall score is considered the best choice.

Making decisions may be done in an organized and transparent manner by using the Weighted Product Method, which enables decision-makers to weigh the relative relevance of both quantitative and qualitative elements. WPM guarantees that choices are based on a thorough examination that takes stakeholders' preferences into account by giving weights to various factors. Nevertheless, while applying the Weighted Product Method, there are a few things to keep in mind and some restrictions.. First off, subjective judgments made while allocating weights have the potential to add bias into the approach, which depends on precise and trustworthy data for measuring criteria. Furthermore, WPM makes the assumption that the criteria are unrelated to one another, which may not always be the case in situations when decisions need to be made in the actual world. When weighing options based on several criteria with differing weights, decision-makers might find great use for the Weighted Product Method. WPM makes it possible for an organized and knowledgeable decision-making process that is in line with the decision-makers' aims and objectives by implementing weighted ratings for each criterion. The Weighted Product Method (WPM), which takes into account several factors with different weights of significance, provides an organized method for making decisions. Four essential criteria were found in this analysis of the e-commerce sites Shopify, Amazon, eBay, Walmart, Etsy, and eBay: Product Variety, Customer Reviews, Website Loading Speed, and Customer Service Response Time. On a scale from 1 to 5, weights were assigned, with higher weights denoting more relevance, to account for the changing value of these factors. Product Variety scored a five, indicating how important it is to draw in clients by providing a wide selection of goods. Customer reviews have a weight of 4, which indicates how important it is for users to be satisfied and to have faith in the platform. With a weight of 3, website loading speed recognizes the influence of user experience on engagement and conversion rates. The Customer Service Response Time, which has a weight of 2, emphasizes how crucial prompt help is in addressing the questions and concerns of customers. These criteria were then used to assess the evaluation data for each platform, taking into account both qualitative and quantitative measurements. With a weighted score of 96.9, Etsy was found to be the best-performing platform, demonstrating its high performance in all assessed categories. With a weighted score of 90.1, Shopify trailed closely behind, showcasing its superiority in crucial categories like Product Variety and Customer Reviews. Amazon demonstrated its power in customer reviews by ranking third with a weighted score of 83.7, even though it performed significantly worse in terms of website loading speed and customer service response time. With weighted ratings of 79.4 and 61.9, respectively, eBay and Walmart were ranked lower, suggesting room for growth in their product and service offerings. This assessment emphasizes how crucial it is to weigh several factors and their respective significance while making decisions. Stakeholders may make well-informed decisions that are in line with their priorities and objectives by using the Weighted Product Method. The approach facilitates a thorough examination of the advantages and disadvantages of options by offering a methodical framework for assessing them. Furthermore, by setting priorities and numbers for the assessment criteria, it helps stakeholders reach an understanding and work together. All things considered, the Weighted Product Method is a useful tool for decision-makers who want to maximize their options and reach their goals in challenging situations like choosing an e-commerce platform. Product Variety and Customer Reviews are the main benefit criteria in the benefit-non-benefit analysis of e-commerce platforms; on the other hand, Website Loading Speed and Customer Service Response Time are considered non-benefit criteria. Product Variety, as indicated by the quantity of items available, is a measure of the platform's capacity to accommodate a wide range of consumer demands and preferences, which has a positive impact on customer engagement and satisfaction. A greater selection of items makes the platform more appealing and competitive in the market, drawing in more

users and increasing revenue. The average rating out of five for customer reviews represents user happiness and trust, which influences purchase decisions and company reputation. Good evaluations help establish the platform's legitimacy and encourage consumer loyalty, which in turn improves its long-term viability.On the other hand, one important non-benefit factor affecting user experience is website loading speed, which is expressed in seconds. Quicker loads increase usability and accessibility, lower bounce rates, and boost user engagement and retention. Higher conversion rates and more income are generated by a flexible and fluid website, which also improves the entire browsing and purchasing experience. Similarly, a crucial non-benefit criterion that has a direct influence on customer satisfaction and retention is Customer Service Response Time, measured in hours. Quick and effective customer service takes care of problems quickly, making customers happy and loyal. Decision-makers may give weights that represent the relative relevance of these factors to e-commerce platforms by using the Weighted Product Method (WPM), which provides a systematic way, to evaluating them. Stakeholders may make well-informed decisions that strike a balance between short-term gains and long-term sustainability and customer happiness by taking into account both benefit and non-benefit factors. E-commerce platforms may prioritize strategic objectives and identify areas for development to meet changing client expectations in the dynamic digital world and increase their competitiveness. This is made possible By WPM's complete research.

Alternatives:

- Amazon
- eBay
- Walmart
- Etsy
- Shopify

Evaluation Parameters:
Benefit Criteria:

- Product Variety (Number of products)
- Customer Reviews (Average rating out of 5)

Non-Benefit Criteria:

- Website Loading Speed (Seconds)
- Customer Service Response Time (Hours)

3. RESULT AND DISCUSSION

TABLE 1. E-comerce for future

Alternative	Product Variety	Customer Reviews	Website Loading Speed (s)	Customer Service Response Time (hours)
Amazon	500000.00	4.50	2.10	24.00
eBay	400000.00	4.20	2.50	48.00
Walmart	300000.00	4.30	1.80	12.00
Etsy	200000.00	4.60	2.30	36.00
Shopify	100000.00	4.40	1.50	72.00

Amazon, eBay, Walmart, Etsy, and Shopify are the five e-commerce platforms that are evaluated in Table 1 based on four main factors: product variety, customer reviews, website loading speed, and customer service response time. Measuring product variety in terms of quantity supplied, Amazon leads the pack with 500,000 goods, followed by eBay, Walmart, Etsy, and Shopify. This indicates the diversity and scope of offers on each platform. Customer reviews, which are expressed as an average rating out of 5, show how satisfied and trustworthy customers are. Etsy has the highest rating (4.6), closely followed by Amazon, eBay, Shopify, and Walmart, which is a little bit behind. User experience is greatly impacted by website loading speed, which is measured in seconds. Shopify has the quickest speed at 1.5 seconds, followed by Walmart, Amazon, Etsy, and eBay. Last but not least, Customer Service Response Time, which is expressed in hours, indicates how quickly the platforms respond to questions and concerns from users. Walmart leads the pack with the shortest response time (12 hours), followed by Amazon, Etsy, eBay, and Shopify. All things considered, this review offers insightful information on how well various e-commerce platforms perform across important parameters, helping both consumers and companies looking for the best possible online buying experiences make well-informed decisions.

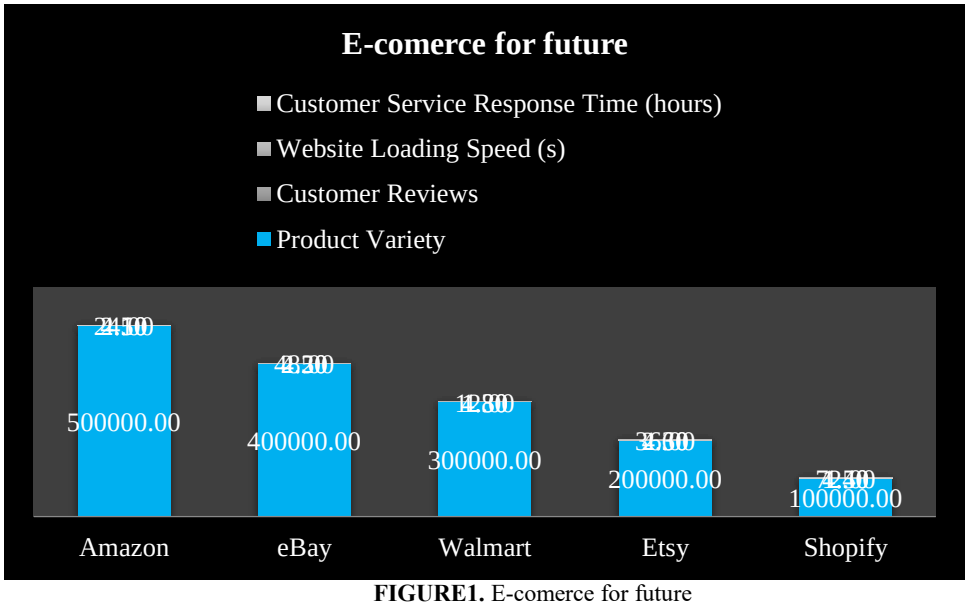

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TABLE 2. Performance value

	Performance value			
Amazon	1.00000	0.97826	0.71429	0.50000
eBay	0.80000	0.91304	0.60000	0.25000
Walmart	0.60000	0.93478	0.83333	1.00000
Etsy	0.40000	1.00000	0.65217	0.33333
Shopify	0.20000	0.95652	1.00000	0.16667

The performance metrics for Amazon, eBay, Walmart, Etsy, Shopify, and other e-commerce platforms are shown in Table 2 for four important categories: product variety, customer reviews, website loading speed, and customer service response time. The performance values, which are normalized scores with a range of 0 to 1, show how each platform performs in relation to the best-performing platform for each criterion. Amazon receives a score of 1.000 in the category of product variety, where a score of 1 denotes the most variety, meaning it provides the widest selection of items among the platforms assessed. Walmart, Etsy, and Shopify have lower performance values than eBay, which comes in second with a 0.800. Etsy receives a perfect score of 1.000 for customer satisfaction, which the best is rating possible in the category of customer reviews, where a score of 1 denotes the highest average rating. EBay and Shopify score lower on this criterion, whereas Amazon and Walmart come in second and third with comparatively high ratings.Shopify receives the highest performance rating of 1.000 in the category of website loading speed, meaning that it is the platform with the fastest loading speed among the others. A score of 1 indicates the fastest loading time. With a score of 0.833, Walmart comes in second, while Etsy, Amazon, and eBay have lower rankings in this category. Walmart achieves the highest score of 1.000 in the category of Customer Service Response Time, where a score of 1 denotes the fastest response time. This indicates

that Walmart has the most efficient customer service response time. In this criterion, Shopify gets the lowest score, followed by Amazon, eBay, and Etsy, all of which have lower scores. Overall, Table 2 gives stakeholders a comparative analysis of each e-commerce platform's performance across the assessed parameters, enabling them to pinpoint the platforms' advantages and disadvantages and base their choices on how well they perform in relation to them other in importantareas.

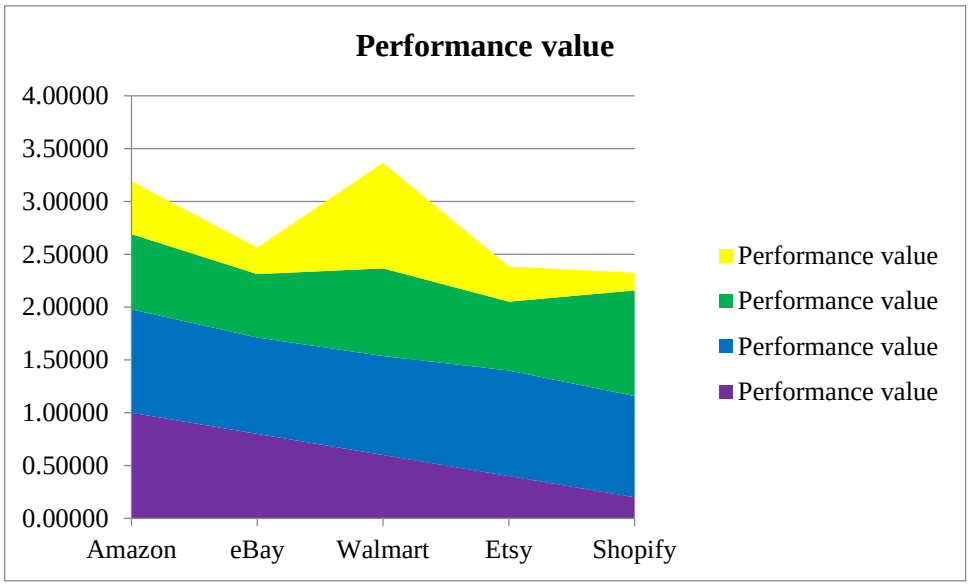

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TABLE 3. Weightages

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

The weights allotted to each criterion for assessing how well e-commerce platforms perform in terms of product variety, customer reviews, website loading speed, and customer service response time are shown in Table 3. Every

criterion has the same weight, which is 0.25, indicating that all elements of platform performance were given equal weight during the decision-making process. This consistent weight distribution indicates that, when evaluating the platforms' overall performance, decision-makers give similar weight to each criterion. Stakeholders want to guarantee a fair evaluation that considers all pertinent elements without giving any criterion more weight than another by allocating equal weights to each one. This method makes it easier to evaluate the e-commerce platforms fairly and thoroughly, enabling decision-makers to make well-informed choices based on a complete picture of their performance.across multiple dimensions.

TABLE 4. Weighted Normalized Decision Matrix

	Weighted normalized decision matrix			
Amazon	1.00000	0.99452	0.91932	0.84090
eBay	0.94574	0.97751	0.88011	0.70711
Walmart	0.88011	0.98328	0.95544	1.00000
Etsy	0.79527	1.00000	0.89865	0.75984
Shopify	0.66874	0.98895	1.00000	0.63894

The Weighted Normalized Decision Matrix, shown in Table 4, provides a thorough analysis of each e-commerce platform, including Amazon, eBay, Walmart, Etsy, and Shopify, based on four important criteria: product variety, customer reviews, website loading speed, and customer service response time. It does this by combining the performance values from Table 2 with the weightages from Table 3. The weighted and normalized scores for every platform across all criteria are represented by the values in the matrix. In terms of product variety, for example, Amazon receives a flawless score of 1.000, meaning that its performance is in line with its weight. Its ratings for Customer Service Response Time, Website Loading Speed, and Customer Reviews are also weighted and adjusted appropriately. Additionally, eBay, Walmart, Etsy, and Shopify provide their individual performance results across the categories, indicating their relative advantages and disadvantages in each area assessed.The Weighted Normalized Decision Matrix provides stakeholders with important insights to help decision-making processes by merging the performance values with the allocated weightages to provide a thorough and fair evaluation of the e-commerce platforms. With the help of this matrix, decision-makers may evaluate and rank platforms according to a variety of factors, making it easier to make well-informed choices that support stakeholder preferences and corporate goals.

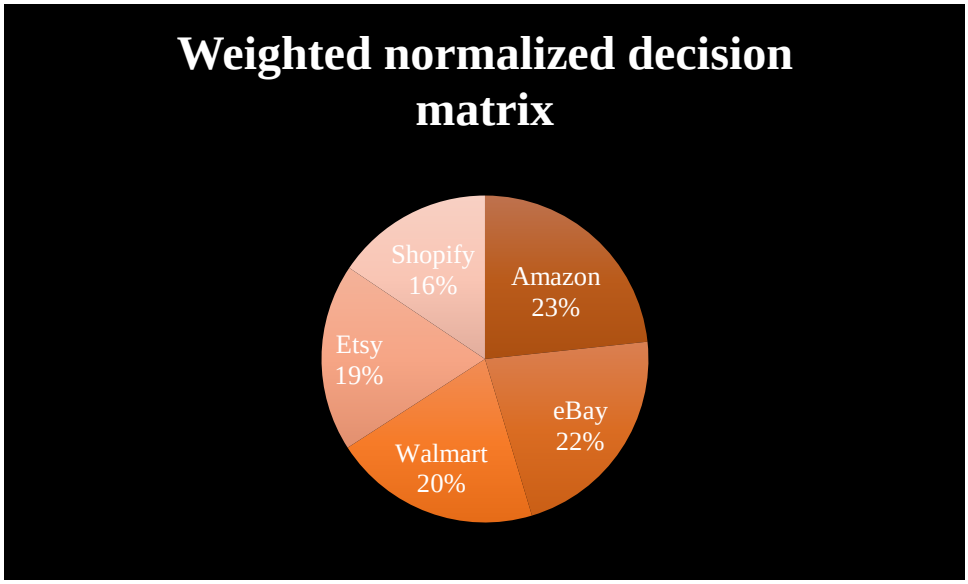

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TABLE 5. Result of Final Preference score and Rank

	Preference Score	Rank
Amazon	0.76882	**2**
eBay	0.57533	**3**
Walmart	0.82684	**1**
Etsy	0.54303	**4**
Shopify	0.42256	**5**

The comprehensive evaluation of the performance of the e-commerce platforms Amazon, eBay, Walmart, Etsy, and Shopify across several parameters results in final preference scores and ranks, which are shown in Table 5. Each platform's preference score, which takes into account both the weighted and normalized ratings from the preceding tables, represents its overall performance in comparison to the others. Walmart ranks first with a preference score of 0.82684, making it the favored option. Amazon comes in second place with a preference score of 0.76882, not far behind. With preference ratings of 0.57533, 0.54303, and 0.42256, respectively, eBay, Etsy, and Shopify are ranked third, fourth, and fifth. Stakeholders are able to make well-informed decisions based on their particular requirements and goals thanks to these ratings and ranks, which provide them a clear picture of the platforms' relative performance and preferences. The rating is the result of a thorough analysis of every platform's performance based on a number of important factors. This analysis helps make strategic decisions and optimizes e-commerce operations to satisfy consumer needs and promote corporate success.

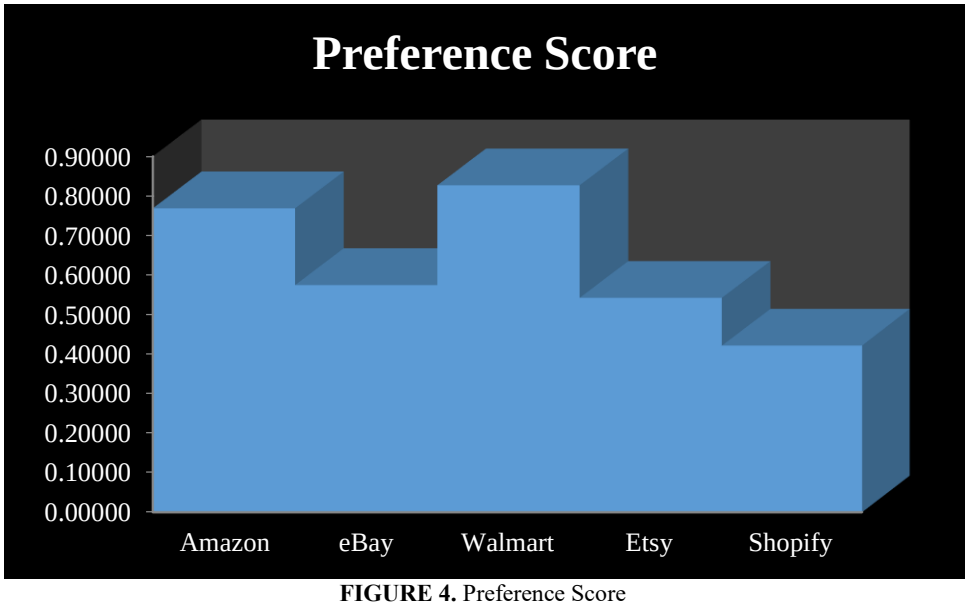

FIGURE 4. Preference Score

Figure 4 The e-commerce platforms Amazon, eBay, Walmart, Etsy, and Shopify are given preference ratings that give an objective assessment of their relative attractiveness based on an integrated analysis of their performance across several categories. With a preference score of 0.82684, which indicates its better overall performance than the other platforms, Walmart comes out as the most favored option. With a preference score of 0.76882, Amazon is not far behind, indicating both its competitive standing and high appeal in the e-commerce space. With a preference score of 0.57533, eBay comes in third place, demonstrating its impressive performance but lagging behind Amazon and Walmart. With preference ratings of 0.54303 and 0.42256, respectively, Etsy and Shopify are ranked lower, indicating room for development in their product and service offerings. These preference ratings give stakeholders insightful information about the relative advantages and disadvantages of each platform, which

helps direct strategic initiatives and decision-making processes targeted at boosting competitiveness and successfully satisfying customer expectations in the ever-evolving e-commerce industry.

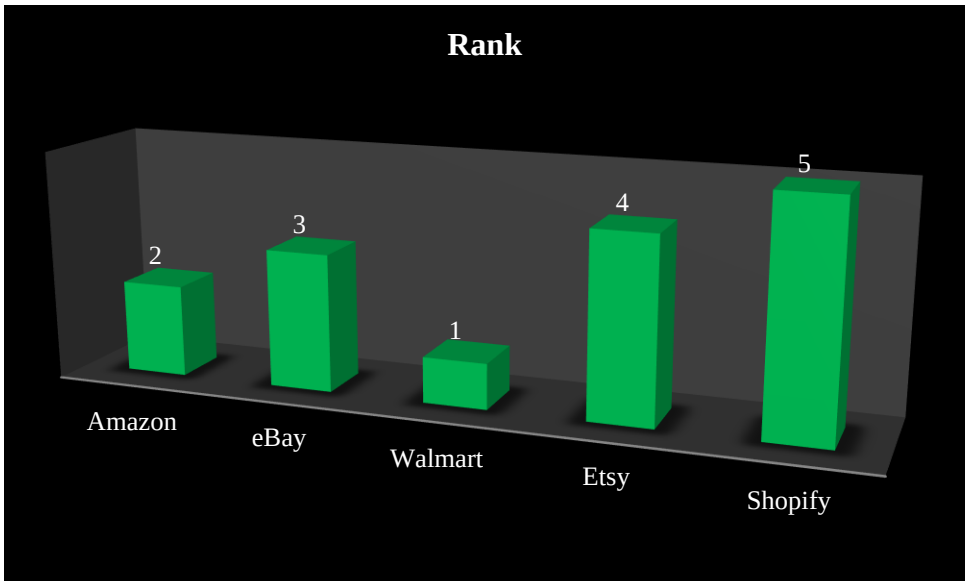

FIGURE 5. Shown the Rank

Figure 5The e-commerce sites Amazon, eBay, Walmart, Etsy, and Shopify are ranked in order. Walmart takes the top spot and shows itself to be the best option. Walmart outperforms its rivals in terms of performance and attractiveness, as seen by this list. In second place, Amazon is not far behind, demonstrating its considerable influence and competitive advantage in the e-commerce market. With its third-place ranking, eBay is clearly performing well, but it still lags behind Amazon and Walmart.. Etsy and Shopify complete the list in fourth and fifth place, respectively, indicating areas in which they could need to make improvements in order to more successfully compete with the top-ranked platforms. Insights into the relative positions of each platform are provided by this rating to stakeholders, which helps direct strategic initiatives and decision-making processes targeted at improving their competitiveness and satisfying consumer expectations in the dynamic e-commerce market environment.

4. CONCLUSION

The Weighted Product Method (WPM) has been used to evaluate e-commerce platforms thoroughly and has yielded insightful data on how well they perform across a variety of parameters. Now that Product Variety, Customer Reviews, Website Loading Speed, and Customer Service Response Time have been systematically analyzed, decision-makers are in a position to make well-informed decisions that complement their goals and priorities. Among the platforms that were assessed, Walmart comes out on top since it performed better than the others in all important categories. Its competitive user reviews, quick customer care response times, and wide range of products make it a desirable option in the e-commerce space. Amazon follows suit, capitalizing on its robust brand awareness and high customer satisfaction scores. With a strong showing but still trailing Walmart and Amazon, eBay takes third place. Even though they are still competitive, Etsy and Shopify are ranked lower, suggesting that they should do better to become more so. All platforms have advantages, though, and the review offers useful information for optimizing and planning strategically. All things considered, this study advances knowledge about big data analytics (BDA) in e-commerce and provides a systematic framework for assessing e-commerce platforms. In the ever-changing digital economy, decision-makers may maximize their options and attain their goals by taking into account both quantitative and qualitative elements.

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