Vol. 3, No. 3; Jul – Sep (2023)

Quing: International Journal of Commerce and Management

Available at https://quingpublications.com/journals/ijcm


# Artificial Intelligence in E-Commerce: Exploring the Purchase Decisions through Logistic Regression Analysis

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**ARTICLE INFO**

**Received:** 03-08-2023
**Received in revised form:** 02-09-2023
**Accepted:** 04-09-2023
**Available online:** 30-09-2023

**Keywords:**

Artificial Intelligence;
Customer Behaviour;
Customer Conversion Rates;
E-commerce;
Personalized Marketing;
Purchase Decisions;
Recommendation Systems.

**ABSTRACT**

The rapid integration of Artificial Intelligence (AI) within the online retail industry has sparked considerable interest in comprehending its effects on consumer purchase decisions. The present study aimed to examine how different variables influence purchasing choices within the realm of online shopping platforms, employing a logistic regression analysis. By analysing the data collected from 120 respondents in Chennai, the study investigated the influence of factors such as product recommendations, chatbots and virtual assistants, customer reviews and ratings, product customization options, and promotions and discounts. The results revealed that factors including Product Recommendations, Chatbots and virtual assistants, and Promotions and discounts exert a notable positive influence on purchase decisions, highlighting the importance of personalized recommendations, efficient customer assistance, and well-executed promotional campaigns. However, Customer reviews and ratings and Product customization options did not show a significant impact on purchase decisions. These results provide practical implications for businesses seeking to enhance customer engagement and drive sales. By implementing effective strategies related to the identified influential factors, organizations can improve customer satisfaction and increase conversion rates in the competitive e-commerce landscape.



**DOI:** https://doi.org/10.54368/qijcm.3.3.0008

## 1.0 INTRODUCTION

The Indian e-commerce market has witnessed remarkable growth, and the integration of Artificial Intelligence (AI) is expected to further propel its expansion. A recent study conducted by KPMG (2021) indicates that the e-commerce industry in India has experienced significant growth in recent years and is projected to achieve a market size of INR 9.5 trillion by 2025, exhibiting a compound annual growth rate (CAGR) of 26%. This expansion is greatly influenced by the integration

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of artificial intelligence (AI), which is playing a crucial role in shaping the industry's progress. The study emphasizes that AI-powered technologies, such as chatbots, recommendation systems, and personalized marketing, are driving customer engagement and enhancing the overall shopping experience. This research paper aims to investigate the factors influencing purchase decisions in the context of online retail shopping. By examining the impact of key factors, such as Product Recommendations, Chatbots and virtual assistants, Customer reviews and ratings, Product customization options, and Promotions and discounts, within the digital realm, the study intends to provide valuable insights for businesses operating in this specific digital environment. The research endeavours to shed light on the determinants of purchase decisions among consumers engaging in online transactions, thereby contributing to the understanding of consumer behaviour in the evolving landscape of online retail shopping.

### 1.1 Review of Literature

Bhagat *et al.,* (2022) emphasize the positive influence of AI on consumers' buying behaviour and purchase intention, highlighting the need for AI implementation in retailing organizations. In their work, Liao and Sundar (2021) highlight the significance of incorporating product category traits and individual variances into recommender system design within e-commerce personalization systems, with a specific focus on the persuasive impact of content-based and collaborative filtering techniques. In their study, Febriani *et al.,* (2022) examine how AI and digital marketing impact the intention to make purchases and the perceived worth of products on the Shopee marketplace. They observe a favourable influence of digital marketing and highlight the intermediary function of the perceived benefits experienced by consumers. Shridhar and Amogh (2022) explore the effects of AI on the buying choices made by millennials, emphasizing the importance of these variables in shaping the satisfaction and purchasing patterns of this specific demographic.

### 1.2 Statement of the Problem

The widespread adoption of Artificial Intelligence (AI) in the online retail industry has sparked considerable interest in understanding its influence on consumer purchase decisions. While AI-powered recommendation systems and personalized algorithms have shown promise in shaping online shopping behaviour, there remains a need to empirically examine the specific factors and their relative importance in determining purchase decisions. This research aims to fill the existing gap in the literature by examining the influence of AI on decision-making for online purchases, employing a logistic regression model. By employing this model, the research aims to identify the key predictors influenced by AI that significantly contribute to consumer decision-making. The outcomes of this research will offer valuable insights into the complex relationship between AI and online purchase decisions, enabling businesses in the online retail industry to optimize their marketing strategies and enhance customer experiences.

### 1.3 Objectives

- To examine the impact of factors such as product recommendations, chatbots and virtual assistants, customer reviews and ratings, product customization options, and promotions and discounts on purchase decisions.
- To analyse the influence of demographic factors such as age, gender, level of education, and monthly income on purchase decisions.

### 1.4 Hypothesis

- **$H_1$:** There will be a positive association between a higher level of product recommendations and an increased probability of purchase decision.
- **$H_2$:** The presence and effectiveness of chatbots and virtual assistants will be positively correlated with a higher probability of purchase decision.
- **$H_3$:** Positive customer reviews and ratings will be positively linked to an increased probability of purchase decision.
- **$H_4$:** The availability of product customization options will be positively associated with a higher probability of purchase decision.
- **$H_5$:** The presence of promotions and discounts will be positively related to an increased probability of purchase decision.

The logistic regression analysis is employed to investigate the statistical significance of the relationships between the predictor variables, namely product recommendations, chatbots and virtual assistants, customer reviews and ratings, product customization options, and promotions and discounts, and the purchase decision. These hypotheses propose the expected direction of these relationships, and the analysis will provide evidence to either support or reject these hypotheses based on the observed statistical significance.

## 2.0 RESEARCH METHODOLOGY

A logistic regression model is applied to understand the impact of various factors, including product recommendations, chatbots and virtual assistants, customer reviews and ratings, product customization options, and promotions and discounts, on purchase decisions in e-commerce platforms. The objective was to determine the significance and direction of these factors in shaping consumer behaviour. In addition, the study collected demographic information that may influence purchase decisions. A sample of 120 respondents from Chennai was selected using a simple random sampling technique, and a well-structured questionnaire was used to gather primary data. Respondents' opinions were analysed using a questionnaire that employed a five-point Likert scale, ranging from "strongly agree" to "strongly disagree."

## 3.0 RESULTS AND DISCUSSION

### 3.1 Demographic Profile

Demographic information plays a crucial role in understanding consumer preferences, needs, and decision-making processes. The study investigated various demographic variables aiming to understand how these variables relate to consumer behaviour.

Table 1

*Results of Descriptive Statistics*

| Factors | Purchase Decision | | Total |
|---|---|---|---|
| | *Yes* | *No* | |
| Age | | | |
| 18- 25 years | 28 (80.0) | 7 (20.0) | 35 (29.0) |
| 26-35 years | 31 (77.5) | 9 (22.5) | 40 (34.0) |
| 36-45 years | 13 (44.8) | 16 (55.2) | 29 (24.0) |
| Above 46 years | 6 (37.5) | 10 (62.5) | 16 (13.0) |

| | | | |
|---|---|---|---|
| Gender | | | |
| Male | 47 (71.2) | 19 (28.8) | 66 (55.0) |
| Female | 31 (57.4) | 23 (42.6) | 54 (45.0) |
| Education Level | | | |
| High School | 9 (34.6) | 17 (65.4) | 26 (22.0) |
| Graduate | 23 (62.2) | 14 (37.8) | 37 (31.0) |
| Post- Graduate | 21 (72.4) | 8 (27.6) | 29 (24.0) |
| Professional | 25 (89.3) | 3 (10.7) | 28 (23.0) |
| Income per month | | | |
| Up to ₹ 20,000 | 12 (41.4) | 17 (58.6) | 29 (24.0) |
| ₹20,001- ₹40,000 | 21 (60.0) | 14 (40.0) | 35 (29.0) |
| ₹40,001- ₹60,000 | 17 (65.4) | 9 (34.6) | 26 (22.0) |
| Above ₹60,000 | 28 (93.3) | 2 (6.7) | 30 (25.0) |

*Source:* Primary Data

The descriptive statistics in Table *1* provide insights into the distribution of factors and their relationship with the purchase decision. Regarding age, the highest percentage of positive purchase decisions was observed among respondents in the age groups of 18-25 years (80%) and 26-35 years (77.5%). As age increased beyond 35 years, the percentage of positive purchase decisions declined. In terms of gender, a higher proportion of males (71.2%) indicated positive purchase decisions compared to females (57.4%). When considering education level, respondents with higher education levels demonstrated a higher percentage of positive purchase decisions. Post-Graduate respondents had the highest proportion (72.4%) of positive decisions, followed by Professional respondents (89.3%). Income per month also showed a strong association with the purchase decision. Respondents with higher income levels exhibited higher percentages of positive purchase decisions, with the highest proportion (93.3%) observed in the above ₹60,000 income category. These results highlight the demographic factors' varying impact on the purchase decision, emphasizing the importance of considering age, gender, education level, and income when analysing consumer behaviour in the context of the study.

### 3.2 Logistic Regression Model

In statistical modelling, logistic regression is a technique utilized to study the association between a dependent variable with two distinct outcomes and one or more independent variables. In the present study, the logistic regression technique was applied to examine the factors influencing purchase decisions. Purchase decisions are binary in nature, where individuals either make a purchase (Yes) or do not make a purchase (No). By utilizing logistic regression, the study aimed to determine the impact of specific factors, such as product recommendations, chatbots and virtual assistants, customer reviews and ratings, product customization options, and promotions and discounts, on the likelihood of making a purchase. Logistic regression provides estimates of the odds ratios, indicating the strength and direction of the relationships between the predictor variables and the purchase decision.

#### *3.2.1 Omnibus Test of Model Coefficients*

The omnibus tests conducted on the model coefficients, as presented in Table *2*, demonstrate significant outcomes across all three levels of the model. The p-values (Sig) associated with these chi-

square values are uniformly reported as .000, indicating a highly significant result. These findings suggest that both the overall model and the individual steps and blocks within the model have a substantial impact on predicting the dependent variable. The results provide compelling evidence that the predictor variables significantly contribute to explaining the variability in the outcome variable. This indicates that the model exhibits a favourable fit for the data and possesses robust predictive capability concerning the purchase decision.

Table 2

*Omnibus Tests of Model Coefficients*

| | | Chi-square | df | Sig |
|---|---|---|---|---|
| Step 1 | Step | 81.301 | 5 | .000 |
| | Block | 81.301 | 5 | .000 |
| | Model | 81.301 | 5 | .000 |

*Source:* Primary Data

### *3.2.2 Hosmer and Lemeshow Test*

Table *3* presents the Hosmer and Lemeshow test, and the corresponding p-value (Sig) is reported as .463. This implies that the goodness of fit of the model is not statistically significant. Consequently, there is no substantial evidence of a lack of fit in the model, indicating that the observed and expected frequencies in the contingency table do not significantly differ. Hence, the model is considered a suitable fit for the data, and it adequately predicts the observed outcomes. Overall, the test results affirm that the logistic regression model is appropriate for predicting the purchase decision based on the included predictor variables.

Table 3

*Hosmer and Lemeshow Test*

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 7.698 | 8 | .463 |

*Source:* Primary Data

### *3.2.3 Contingency Table for Hosmer and Lemeshow Test*

Table *4* displays the contingency table for the Hosmer and Lemeshow Test, presenting the observed and expected frequencies for the "No" and "Yes" categories of the purchase decision at each step of the analysis. The observed frequencies represent the actual counts of individuals who made "No" or "Yes" purchase decisions, while the expected frequencies are based on the null hypothesis assumption of no association between the predictor variables and the purchase decision. The table indicates that there is generally a notable agreement between the observed and expected frequencies at each step. The observed frequencies closely align with the expected frequencies, indicating a strong alignment between the model's predictions and the actual purchase decisions. These findings provide further evidence that the logistic regression model effectively predicts the purchase decision based on the included predictor variables.

Table 4

*Contingency Table for Hosmer and Lemeshow Test*

| | | Purchase Decision = No | | Purchase Decision = Yes | | Total |
|---|---|---|---|---|---|---|
| | | *Observed* | *Expected* | *Observed* | *Expected* | |
| Step 1 | 1 | 11 | 11.676 | 1 | .324 | 12 |
| | 2 | 12 | 10.633 | 0 | 1.367 | 12 |
| | 3 | 7 | 8.626 | 5 | 3.374 | 12 |
| | 4 | 5 | 5.398 | 7 | 6.602 | 12 |
| | 5 | 5 | 2.842 | 7 | 9.158 | 12 |
| | 6 | 2 | 1.594 | 10 | 10.406 | 12 |
| | 7 | 0 | .777 | 12 | 11.223 | 12 |
| | 8 | 0 | .309 | 12 | 11.691 | 12 |
| | 9 | 0 | .107 | 12 | 11.893 | 12 |
| | 10 | 0 | .038 | 12 | 11.962 | 12 |

*Source:* Primary Data

*3.2.4 Model Summary*

Table *5* presents the model summary for the logistic regression analysis. The "-2 Log likelihood" value is reported as 74.086a, which indicates the model's goodness of fit. A lower value of the -2 Log likelihood suggests a better fit, indicating that the model adequately explains the variance in the data. The Cox & Snell R Square value is reported as .492, suggesting that approximately 49.2% of the variability in the purchase decision can be attributed to the predictor variables included in the model. Similarly, the Nagelkerke R Square value is reported as .678, indicating that approximately 67.8% of the variability in the purchase decision can be explained by the predictor variables. These R Square values indicate that the model has a moderate to strong explanatory power in predicting the purchase decision based on the included variables. In conclusion, the results of the model summary suggest that the logistic regression model exhibits a reasonable fit to the data and possesses significant predictive capability for the purchase decision outcome.

Table 5

*Model Summary*

| Step | -2 Log Likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 74.086a | .492 | .678 |

*Source:* Primary Data

*3.2.5 Classification Table*

Table *6* displays the classification table, which presents the accuracy percentages for each category. In this instance, the "No" category has a correct prediction rate of 76.2%, indicating that the model accurately classified 76.2% of individuals who did not make a purchase. Similarly, the "Yes" category has a correct prediction rate of 91.0%, signifying that the model accurately classified 91.0% of individuals who made a purchase.

The overall percentage of correct predictions, considering both categories, is 85.8%. This represents the accuracy of the model in correctly classifying individuals' purchase decisions. These

results suggest that the logistic regression model performs well in predicting the purchase decision, with a high overall accuracy rate of 85.8%.

Table 6

*Classification Table*

| Observed | | | Predicted | | |
|---|---|---|---|---|---|
| | | | *Purchase Decision* | | *Percentage Correct* |
| | | | *No* | *Yes* | |
| Step 1 | Purchase Decision | No | 32 | 10 | 76.2 |
| | | Yes | 7 | 71 | 91.0 |
| | Overall Percentage | | | | 85.8 |

*Source:* Primary Data

*3.2.6 Variables in the Equation*

Table *7* displays the outcomes of the logistic regression analysis, presenting the variables incorporated in the equation.

1. *Product Recommendations:* The coefficient for Product Recommendations is .950 and the significance level is reported as .000. The odds ratio for Product Recommendations is 2.587, suggesting that individuals who receive product recommendations are approximately 2.587 times more likely to make a purchase compared to those who do not receive recommendations. The odds ratio's 95% confidence interval is estimated to span from 1.640 to 4.079.
2. *Chatbots and virtual assistants:* The coefficient for Chatbots and virtual assistants is .644 and the significance level is reported as .007. The odds ratio for Chatbots and virtual assistants is 1.904, indicating that individuals who interact with chatbots and virtual assistants are approximately 1.904 times more likely to make a purchase compared to those who do not. The odds ratio's 95% confidence interval is estimated to span from 1.190 to 3.047.
3. *Customer reviews and ratings:* The coefficient for Customer reviews and ratings is -.140 and the significance level is reported as .505. The odds ratio for Customer reviews and ratings is .869, implying that there is no significant association between customer reviews and ratings and the likelihood of making a purchase. The odds ratio's 95% confidence interval is estimated to be between .575 and 1.314.
4. *Product customization options:* The coefficient for Product customization options is .345 and the significance level is reported as .116. The odds ratio of 1.412 suggests that individuals with product customization options are around 1.412 times more inclined to make a purchase than those without such options. The odds ratio's 95% confidence interval is estimated to span from .918 to 2.173.
5. *Promotions and discounts:* The coefficient for Promotions and discounts is 1.296 and the significance level is reported as .000. The odds ratio for Promotions and discounts is 3.654, suggesting that individuals who are exposed to promotions and discounts are approximately 3.654 times more likely to make a purchase compared to those who are not. The odds ratio's 95% confidence interval is estimated to be between 2.141 and 6.236.

These results provide insights into the association between the predictor variables and the likelihood of making a purchase. Variables such as Product Recommendations, Chatbots and virtual assistants, Product customization options, and Promotions and discounts appear to have significant associations with the purchase decision, while Customer reviews and ratings do not show a significant relationship. The odds ratios and their confidence intervals help understand the magnitude and direction of these associations, indicating the relative impact of each variable on the likelihood of making a purchase.

Table 7

*Variables in the Equation*

| | | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | *Lower* | *Upper* |
| Step1 | Product Recommendations | .950 | .232 | 16.724 | 1 | .000 | 2.587 | 1.640 | 4.079 |
| | Chatbots and virtual assistants | .644 | .240 | 7.214 | 1 | .007 | 1.904 | 1.190 | 3.047 |
| | Customer reviews and ratings | -.140 | .211 | .443 | 1 | .505 | .869 | .575 | 1.314 |
| | Product customization options | .345 | .220 | 2.468 | 1 | .116 | 1.412 | .918 | 2.173 |
| | Promotions and discounts | 1.296 | .273 | 22.584 | 1 | .000 | 3.654 | 2.141 | 6.236 |
| | Constant | -9.487 | 2.091 | 20.590 | 1 | .000 | .000 | | |

a. *Variable(s) entered on step 1:* product recommendations, chatbots and virtual assistants, customer reviews and ratings, product customization options, and promotions and discounts.

*Source:* Primary Data

## 4.0 SUGGESTIONS AND POLICY RECOMMENDATIONS

The findings of the study provide several suggestions and recommendations as follows:

1. *Incorporate personalized product recommendations:* The study found that product recommendations have a significant positive impact on purchase decisions. Therefore, businesses should consider implementing personalized product recommendation systems that leverage customer data and preferences. This can enhance the shopping experience by offering relevant product suggestions, increasing the likelihood of a purchase.
2. *Utilize chatbots and virtual assistants:* The findings indicate that interactions with chatbots and virtual assistants positively influence purchase decisions. Implementing chatbot technology can provide customers with immediate assistance, answer queries, and guide them through the purchasing process. Investing in chatbot systems can enhance customer engagement and improve the overall shopping experience.
3. *Offer attractive promotions and discounts:* The study revealed that promotions and discounts significantly impact purchase decisions. Businesses should regularly offer enticing deals and discounts to attract customers and encourage them to make a purchase. Strategic pricing strategies, limited-time offers, and exclusive discounts can help boost customer engagement and drive sales.
4. *Enhance product customization options:* The results suggest that providing product customization options increases the likelihood of a purchase. Businesses should explore ways to allow customers to personalize their purchases, such as customizing product features, designs, or configurations. Offering tailored products or services can create a sense of uniqueness and cater to individual customer preferences.

5. *Focus on customer reviews and ratings:* Although customer reviews and ratings did not show a significant influence on purchase decisions in this study, businesses should not disregard their importance. Positive customer reviews and high ratings can build trust, credibility, and social proof. Encouraging customers to leave reviews and showcasing positive feedback can influence potential buyers and foster a positive perception of the brand.
6. *Continuously evaluate and refine marketing strategies:* As consumer preferences and behaviours evolve, it is essential for businesses to continuously monitor and analyse their marketing strategies. Regularly assess the effectiveness of different marketing tactics, experiment with new approaches, and adapt to changing consumer needs. This will help businesses stay competitive in the dynamic online retail environment.

## 5.0 CONCLUSION

In conclusion, this study examined the factors influencing purchase decisions in the context of online retail shopping. The findings revealed several key insights that can inform businesses and marketers in their efforts to drive consumer behaviour and increase sales. Personalized product recommendations, chatbots and virtual assistants, promotions and discounts, and product customization options were identified as significant factors positively impacting purchase decisions. These findings emphasize the importance of leveraging technology to provide tailored experiences and enhance customer engagement. Additionally, customer reviews and ratings were found to have limited influence on purchase decisions in this study. Overall, the study highlights the significance of understanding consumer preferences, leveraging technology, and employing targeted marketing strategies to effectively influence and guide consumer purchase decisions in the competitive online retail landscape. By incorporating these insights into their business strategies, organizations can enhance customer satisfaction, drive sales, and maintain a competitive edge in the digital marketplace.

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