

IMPACT OF AI-DRIVEN PERSONALIZATION ON CONSUMER BUYING BEHAVIOUR IN E-COMMERCE

Mr. C.SANTHOSH M.Com.,MBA.,M.Phill., Assistant Professor
Department of Commerce, Jairam College of Arts and Science, Salem

Mrs. M.SUBASHINI M.com., M.Phil., MBA., P.hD., Assistant Professor
Department of Commerce, Jairam College of Arts and Science, Salem

Mr. P TAMILSELVAN, M.com., Assistant Professor
Department of Commerce, Jairam College of Arts and Science, Salem

ABSTRACT

The rapid development of Artificial Intelligence (AI) has significantly transformed the e-commerce sector by enabling businesses to understand consumer preferences and provide highly personalized shopping experiences. AI-driven personalization uses technologies such as machine learning, recommendation systems, predictive analytics, chatbots, personalized advertisements, and customized product displays to match products and services with individual consumer preferences. The present study examines the impact of AI-driven personalization on consumer buying behaviour in e-commerce. The study focuses on major dimensions of AI personalization, including personalized product recommendations, customized promotional offers, personalized content, AI-powered customer assistance, and predictive product suggestions. It further examines the influence of perceived relevance, perceived usefulness, consumer trust, privacy concerns, and perceived intrusiveness on consumer buying behaviour. The study proposes a conceptual framework based on the Stimulus–Organism–Response (S-O-R) framework and Technology Acceptance Model (TAM). The paper argues that relevant and useful AI personalization can reduce consumers' search effort, improve shopping convenience, enhance engagement, and positively influence purchase intention. However, excessive personalization, privacy concerns, lack of transparency, and perceived manipulation may negatively affect consumer trust and buying behaviour. The study provides implications for e-commerce businesses regarding responsible AI implementation, transparency, privacy protection, and consumer-centric personalization.

Keywords: Artificial Intelligence, AI-driven personalization, E-commerce, Consumer Behaviour, Purchase Intention, Consumer Trust, Personalization, Privacy Concern

1. Introduction

The rapid growth of digital technology has fundamentally changed the way businesses interact with consumers. Among the most significant technological developments influencing contemporary business is Artificial Intelligence (AI). AI enables businesses to analyse large volumes of data, identify patterns in consumer behaviour, predict preferences, automate decision-making, and deliver personalized experiences. The e-commerce industry has become one of the major sectors in which AI is extensively applied.

E-commerce platforms generate large quantities of consumer data through browsing behaviour, search history, previous purchases, product reviews, clicks, wish-list activity, location, and interactions with digital platforms. AI technologies can process these data and identify patterns that would be difficult to identify through traditional marketing methods. As a result, e-commerce businesses can present consumers with products, advertisements, offers, and content that are more closely aligned with their individual interests.

AI-driven personalization refers to the use of artificial intelligence to customize the online shopping experience according to the characteristics, preferences, interests, and behaviour of individual consumers. Product recommendation systems are one of the most visible applications. For example, an e-commerce platform may recommend products based on a consumer's previous purchases or browsing behaviour. Similarly, AI can customize search results, promotional messages, product rankings, email communication, advertisements, and discounts.

Personalization can provide several benefits to consumers. First, it can reduce the amount of time required to search for products. Instead of examining hundreds of products, consumers can receive recommendations that are relevant to their needs. Second, personalization can improve convenience by making the shopping process more efficient. Third, personalized offers may increase the perceived value of products and services. Finally, personalized recommendations may help consumers discover products that they might not otherwise consider.

However, AI-driven personalization also creates challenges. Consumers may become concerned about how their personal data are collected, stored, analysed, and used. A recommendation may sometimes appear too accurate or intrusive, leading consumers to feel that their privacy has been compromised. This creates the personalization–privacy paradox: consumers appreciate relevant personalization while simultaneously becoming concerned about the amount of personal information required to provide it.

Consumer trust is therefore an important factor in the success of AI-driven personalization. If consumers believe that an AI system provides useful and relevant recommendations and handles their information responsibly, personalization may strengthen trust and purchase intention. Conversely, if consumers perceive AI recommendations as manipulative, inaccurate, intrusive, or opaque, personalization may reduce trust.

Therefore, AI-driven personalization should not be viewed merely as a technological tool for increasing sales. It is also a consumer-behaviour mechanism that can influence perceptions, attitudes, trust, decision-making, and purchasing behaviour. The present paper examines these relationships and proposes a conceptual framework for understanding the impact of AI-driven personalization on consumer buying behaviour in e-commerce.

2. Background of the Study

The traditional e-commerce model provides similar information to large groups of consumers. However, contemporary digital platforms increasingly provide individualized experiences. AI allows businesses to move from mass marketing towards individualized marketing.

AI personalization can be observed in several areas of e-commerce. Personalized product recommendations analyse previous consumer activities and suggest products that may be relevant. Personalized search results can rank products according to individual consumer preferences. Personalized advertisements can be based on browsing patterns, previous purchases, and interactions. AI can also support customized discounts, promotions, chatbots, virtual assistants, and predictive shopping.

These applications demonstrate that AI has shifted personalization from a simple marketing technique to an integrated component of digital commerce.

3. Statement of the Problem

The growth of e-commerce has resulted in an increasingly competitive digital marketplace. Consumers are exposed to a large number of products, brands, advertisements, and promotional messages. Although this variety provides greater choice, it can also create information overload and increase the difficulty of selecting appropriate products.

AI-driven personalization attempts to solve this problem by presenting consumers with relevant products and information. However, the effectiveness of personalization depends on how consumers perceive AI-generated recommendations.

A highly relevant recommendation may reduce search effort and increase purchase intention. At the same time, excessive personalization may create concerns about privacy and surveillance. Consumers may question how an e-commerce platform knows their preferences and why particular products are being recommended.

The challenge for e-commerce businesses is therefore to identify the appropriate balance between personalization and privacy. The central research problem is to determine to what extent AI-driven personalization influences consumer buying behaviour and how perceived relevance, usefulness, trust, and privacy concerns affect this relationship.

4. Objectives of the Study

1. To examine the role of Artificial Intelligence in e-commerce personalization.
2. To identify the major AI-driven personalization techniques used by e-commerce platforms.
3. To examine the impact of AI-driven personalization on consumer buying behaviour.
4. To analyse the influence of personalized product recommendations on purchase intention.
5. To examine the relationship between perceived relevance and consumer buying behaviour.
6. To analyse the role of consumer trust in AI-driven personalization.
7. To examine the influence of privacy concerns on consumer responses to AI personalization.
8. To develop a conceptual framework explaining the relationship between AI-driven personalization and

consumer buying behaviour.

5. Research Questions

RQ1: How does AI-driven personalization influence consumer buying behaviour in e-commerce?

RQ2: Does personalized product recommendation influence consumers' purchase intention?

RQ3: Does perceived relevance influence consumer buying behaviour?

RQ4: Does consumer trust influence purchase intention?

RQ5: Do privacy concerns negatively affect consumers' responses to AI personalization?

RQ6: Does perceived usefulness strengthen the relationship between AI personalization and purchase intention?

6. Review of Literature

6.1 Artificial Intelligence in E-Commerce

Artificial Intelligence has become an important component of modern e-commerce. AI enables firms to analyse customer data, automate interactions, predict demand, personalize recommendations, and improve marketing effectiveness. Madanchian (2024) highlighted the importance of AI tools such as personalization engines, chatbots, and predictive analytics in improving e-commerce performance.

6.2 AI-Driven Personalization

AI-driven personalization refers to the use of AI technologies to customize products, services, communications, recommendations, and shopping experiences for individual consumers. Personalization can influence the consumer's perception of relevance. When consumers receive recommendations that match their preferences, they may perceive the platform as more useful and convenient.

6.3 Personalized Product Recommendations

Recommendation systems are among the most common AI applications in e-commerce. They analyse information about consumers and products to predict which products are likely to be attractive. Personalized recommendation systems can reduce search costs and help consumers make purchasing decisions more efficiently.

6.4 Perceived Relevance

Perceived relevance refers to the extent to which consumers believe that an AI-generated recommendation matches their needs, preferences, or interests. A recommendation that is perceived as relevant can increase the usefulness of the shopping platform and encourage product exploration.

6.5 Perceived Usefulness

Perceived usefulness refers to the extent to which consumers believe that AI personalization improves their shopping experience. AI recommendations may save shopping time, identify suitable products, simplify decision-making, and improve convenience. Davis (1989) identified perceived usefulness as an important determinant of technology acceptance.

6.6 Consumer Trust

Trust is particularly important in AI-based e-commerce because consumers must provide personal information and rely on algorithmic recommendations. Trust may develop when AI systems are perceived as accurate, transparent, reliable, secure, fair, and beneficial.

6.7 Privacy Concerns

AI personalization requires consumer data. These data may include browsing history, purchase history, location, preferences, and interactions. Consumers may therefore be concerned about unauthorized use of personal information, excessive data collection, data sharing, security breaches, behavioural tracking, and lack of control.

6.8 Perceived Intrusiveness

Personalization becomes problematic when consumers feel that an e-commerce platform knows too much about them. Repeated advertisements or highly targeted recommendations may be perceived as intrusive. Such perceptions can reduce trust and purchase intention.

7. Theoretical Framework

7.1 Stimulus–Organism–Response (S-O-R) Framework

The S-O-R framework explains how external stimuli influence internal psychological states, which subsequently lead to behavioural responses.

In the present study, AI-driven personalization represents the stimulus. Perceived relevance, perceived usefulness, consumer trust, perceived value, and privacy concern represent the organism. Purchase intention and consumer buying behaviour represent the response.

7.2 Technology Acceptance Model

The Technology Acceptance Model developed by Davis (1989) suggests that perceived usefulness and perceived ease of use influence technology acceptance. Applied to e-commerce, consumers may accept AI personalization when they believe it is useful and easy to interact with.

8. Conceptual Framework

Proposed relationship:

AI-Driven Personalization

→ Perceived Relevance

→ Perceived Usefulness

→ Consumer Trust

→ Purchase Intention

→ Consumer Buying Behaviour

Privacy Concern and Perceived Intrusiveness are proposed as negative influences that may weaken trust and purchase intention.

9. Hypotheses of the Study

- H1: AI-driven personalization has a significant positive influence on consumer buying behaviour in e-commerce.
- H2: Personalized product recommendations have a significant positive influence on perceived relevance.
- H3: Perceived relevance has a significant positive influence on purchase intention.
- H4: AI-driven personalization has a significant positive influence on perceived usefulness.
- H5: Perceived usefulness has a significant positive influence on purchase intention.
- H6: AI-driven personalization has a significant positive influence on consumer trust.
- H7: Consumer trust has a significant positive influence on purchase intention.
- H8: Privacy concerns have a significant negative influence on consumer trust.
- H9: Perceived intrusiveness has a significant negative influence on purchase intention.
- H10: Consumer trust mediates the relationship between AI-driven personalization and purchase intention.

10. Research Methodology

10.1 Research Design

The study may adopt a descriptive and analytical research design. A quantitative approach can be used to examine relationships between AI-driven personalization and consumer buying behaviour.

10.2 Population

The population may consist of consumers who have purchased products through e-commerce platforms such as Amazon, Flipkart, Myntra, Meesho and other online shopping platforms.

10.3 Sample Size

For an empirical version of the study, a sample of 300–500 respondents would provide a useful basis for statistical analysis. A sample of 400 respondents is recommended where feasible.

10.4 Sampling Technique

A combination of convenience sampling and purposive sampling may be adopted. Respondents should have used an e-commerce platform and experienced product recommendations, personalized advertisements, personalized offers, or AI-based shopping assistance.

10.5 Data Collection

Primary data may be collected using a structured questionnaire through Google Forms or direct survey. Secondary data may be obtained from research articles, academic journals, books, reports, and credible institutional publications.

11. Proposed Questionnaire

A five-point Likert scale may be used: 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree.

AI-Driven Personalization

1. The e-commerce platform provides product recommendations based on my interests.
2. The recommended products are generally relevant to my needs.
3. I receive personalized offers based on my shopping behaviour.
4. The platform provides content that matches my preferences.
5. AI-based recommendations make my online shopping experience more personalized.

Perceived Relevance

1. The products recommended to me are relevant to my needs.
2. AI recommendations usually match my interests.
3. Personalized recommendations help me find suitable products.
4. I consider AI recommendations useful when searching for products.

Perceived Usefulness

1. AI personalization saves my shopping time.
2. Personalized recommendations simplify my purchase decisions.
3. AI recommendations help me discover useful products.
4. AI personalization improves my overall shopping experience.

Consumer Trust

1. I trust AI-generated product recommendations.
2. I believe the recommendations are reliable.
3. I feel confident using AI-enabled e-commerce services.
4. I believe the platform uses my data responsibly.

Privacy Concern

1. I am concerned about how e-commerce platforms use my personal information.
2. I worry that my online activities are being continuously tracked.
3. I am concerned about the security of my personal information.
4. Excessive personalization makes me uncomfortable.

Purchase Intention

1. AI recommendations increase my intention to purchase a product.
2. I am more likely to purchase products recommended specifically for me.
3. Personalized offers influence my purchase decisions.
4. I would consider purchasing a product after receiving a relevant AI recommendation.

Consumer Buying Behaviour

1. I have purchased products because they were recommended to me.
2. Personalized recommendations influence my product selection.
3. AI recommendations encourage me to explore additional products.

4. Personalized offers influence my spending decisions.

12. Statistical Tools Suggested

Descriptive statistics such as frequency, percentage, mean, and standard deviation can be used. Cronbach's Alpha can assess questionnaire reliability. Correlation analysis and multiple regression can test relationships among variables. t-test and ANOVA can examine demographic differences. For an advanced study, Structural Equation Modelling (SEM), particularly PLS-SEM using SmartPLS, can test the proposed model and mediation effects.

13. Proposed Data Analysis Structure

The empirical version of the paper should include tables for respondent demographics, reliability analysis, descriptive statistics, correlation, regression, hypothesis testing, and mediation/moderation analysis. Numerical values must be entered only after collecting and analysing actual responses. No survey findings should be fabricated.

14. Expected Findings and Discussion

The study expects AI-driven personalization to have a positive relationship with consumer buying behaviour when consumers perceive recommendations as relevant, useful, and trustworthy. Personalized product recommendations can reduce search time and effort, potentially increasing product exploration and purchase intention.

However, personalization should not be assumed to have universally positive effects. When recommendations become excessively intrusive, consumers may experience discomfort. Privacy concerns can also reduce trust. Therefore, the quality, relevance, transparency, and ethical use of personalization are likely to be more important than simply increasing the amount of personalization.

The proposed relationship can be represented as: Effective Personalization → Relevance → Usefulness → Trust → Purchase Intention, while Excessive Personalization → Intrusiveness → Privacy Concern → Reduced Trust → Lower Purchase Intention.

15. Managerial Implications

E-commerce businesses should improve recommendation accuracy, provide consumers with control over personalized recommendations, explain why products are recommended, protect consumer data, avoid excessive personalization, improve AI-based customer service, and build trust through transparent and responsible AI practices.

16. Theoretical Implications

The study contributes to the literature by integrating AI personalization with consumer behaviour. It applies the Technology Acceptance Model to AI-driven personalization and uses the Stimulus–Organism–Response framework to explain how AI personalization influences internal consumer perceptions and behavioural outcomes. The inclusion of privacy concern recognizes that personalization can generate both positive and negative consumer responses.

17. Challenges of AI-Driven Personalization

Key challenges include data privacy, algorithmic bias, lack of transparency, over-personalization, data security, consumer dependence on algorithms, and manipulation concerns. Responsible AI requires transparency, fairness, security, and meaningful consumer control.

18. Future Scope of the Study

Future studies can compare Generation Z, Millennials, and Generation X; compare major e-commerce platforms; examine different product categories; and study emerging technologies such as generative AI, AI shopping assistants, virtual try-on, conversational commerce, predictive shopping, and autonomous shopping agents.

19. Conclusion

Artificial Intelligence is transforming e-commerce by enabling businesses to provide increasingly personalized shopping experiences. Personalized product recommendations, customized promotions, personalized content, predictive analytics, and AI-powered customer assistance can increase relevance and convenience. When consumers perceive personalization as useful and trustworthy, it can positively influence purchase intention and buying behaviour.

However, personalization also creates challenges. Privacy concerns, perceived intrusiveness, lack of transparency, algorithmic bias, and concerns about manipulation may reduce consumer trust. Successful AI personalization should therefore be consumer-centric rather than technology-centric. E-commerce companies should provide relevant recommendations while maintaining transparency, privacy, security, and consumer control.

The proposed framework suggests that AI-driven personalization influences consumer buying behaviour through perceived relevance, perceived usefulness, and consumer trust, while privacy concerns and perceived intrusiveness may weaken these positive effects. Future empirical research using primary data can validate these relationships through correlation, regression, or PLS-SEM analysis.

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