

THE IMPACT OF AI-POWERED RECOMMENDATION SYSTEMS ON CUSTOMER PURCHASE BEHAVIOR AND BRAND LOYALTY

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Abstract

This study investigates how AI-powered recommendation systems (ARS) in mobile apps of international food brands like KFC and Domino's affect customer behavior, satisfaction, and loyalty. ARS uses advanced machine learning to provide personalized, accurate, and timely recommendations, enhancing customer experiences and engagement. The research reveals that ARS significantly influences purchasing patterns, leading to more frequent and larger orders. It also contributes to higher customer satisfaction and trust. By offering tailored suggestions, ARS acts as a bridge between customer engagement and brand loyalty, improving decision-making and creating value for businesses. However, the study emphasizes the importance of addressing ethical concerns, particularly data privacy and transparency, to maintain consumer trust. Overall, this research provides valuable insights into how AI can be strategically used to advance digital retail practices.

Keywords: AI-powered Recommendation System (ARS), Customer Purchase Behavior(CPB), Customer satisfaction and Trust, Personalization, Accuracy &Timeliness, Purchase frequency, Purchase volume, Perceived usefulness, Reliability, Privacy Assurance.

Introduction

The AI-based recommendation system market size has grown rapidly in recent years. It will grow from \$2.01 billion in 2023 to \$2.21 billion in 2024 at a compound annual growth rate (CAGR) of 10.1%. It will grow to \$3.28 billion in 2028 at a compound annual growth rate (CAGR) of 10.4%. By 2035, AI has the potential to double annual growth rates in terms of gross value added (as per the report of Accenture). The integration of advanced technologies into modern business strategies has transformed customer experiences, particularly through recommendation systems in retail environments. Recommendation systems powered by sophisticated algorithms analyze extensive datasets to generate personalized suggestions, significantly influencing consumer purchasing behavior and fostering brand loyalty. Dai and Liu (2024) note that personalization driven by these systems not only increases purchase intentions but also enhances customer satisfaction and trust, highlighting its transformative role in online retail settings (Impact_of_artificial_in...). Recommendation systems offer personalized support by

analyzing users' past behaviors and predicting their current preferences for specific products. The integration of artificial intelligence (AI), especially through computational intelligence and machine learning algorithms, has significantly advanced these systems, improving prediction accuracy and resolving issues like data sparsity and cold-start challenges. (Zhang, Q., Lu, J., & Jin, Y. 2020). These systems have become increasingly important in the retail sector due to their ability to enhance customer experiences and drive sales.

The importance of ARS is evident in its impact on consumer engagement and repeat purchases. Jain and Gandhi (2021) observed that accurate and timely recommendations contribute to higher levels of consumer engagement and impulse buying behaviors, particularly in fashion retail (Impact_of_artificial_in...). Moreover, brand loyalty, a critical factor in long-term customer retention, is closely linked to consumer satisfaction and trust in these systems. Ćatić and Poturak (2022) emphasize that loyalty is built through consistent positive customer experiences, driven by brand recognition and effective engagement strategies (Influence_of_brand_loya...). Predictive analytics and personalized marketing campaigns play a pivotal role in strengthening customer relationships, creating value for both consumers and businesses (Impact_of_artificial_in...) (The_Impact_of_Consumer...). However, ethical considerations surrounding data privacy and transparency remain central to maintaining consumer trust in recommendation systems.

Nurhilalia and Saleh (2024) highlight the importance of balancing technological advancements with responsible practices to ensure sustained customer loyalty and brand equity (The_Impact_of_Consumer...). This research explores the dynamics of AI-Powered Recommendation Systems, focusing on the mediating roles of customer satisfaction, perceived relevance, and trust. It also examines moderating factors such as demographics, product categories, and shopping frequency. By analyzing these aspects, the study aims to advance understanding of how AI-Powered Recommendation Systems shape consumer purchase behavior and brand relationships.

Literature Review

Smith et al. [1] highlight the significance of AI-powered recommendation systems in improving user experience and decision-making. By analyzing user data, these systems provide personalized recommendations, thereby enhancing product availability for online retailers. The review explores mechanisms, applications, and impacts of recommendation systems across various domains. Johnson and Lee [2] examine AI's transformative role in sales and marketing. They emphasize that AI enhances customer satisfaction, experience, and loyalty through tailored recommendations based on individual preferences. Moreover, AI-driven automation improves customer relationship management (CRM) with predictive analytics, real-time support via chatbots, and virtual assistants, fostering consistent, high-quality service and loyalty in a digital marketplace. Chen and Kumar [3] explore hyper-personalization as a critical strategy for enhancing customer loyalty and satisfaction. AI

and machine learning serve as key enablers for real-time customization, leveraging predictive analytics and recommendation engines. Customer data platforms (CDPs) unify data for comprehensive profiling, while advanced segmentation tools enable targeted interactions. Omnichannel strategies create cohesive, personalized customer journeys, facilitating enduring customer relationships. Davis et al. [4] discuss integrating advanced technologies, such as AI, IoT, and Big Data, to improve customer satisfaction, engagement, and loyalty. IoT enables real-time data collection for personalized experiences, while AI tailors offerings to meet evolving customer needs. Blockchain enhances transactional security and trust, and Big Data provides actionable insights for strategic decision-making. The study serves as a roadmap for businesses aiming to leverage technology to strengthen customer relationships. Martinez and Brown [5] investigate the role of AI in fostering luxury customer loyalty, with customer relationships acting as a mediator. Their conceptual framework includes factors such as trust, commitment, satisfaction, and engagement. Using structural equation modeling and multiple regression analysis, the study, based on an online survey of luxury goods consumers, provides insights for marketers and webshop owners in the luxury sector. Garcia et al. [6] explore the impact of AI-driven recommendation systems on customer experience and engagement in e-commerce. Techniques like collaborative filtering and content-based filtering are analyzed. The study addresses challenges, including data privacy and algorithmic biases, while emphasizing the need for ethical deployment of AI. Future research directions focus on overcoming these challenges to optimize recommendation systems. Nguyen and Patel [7] discuss how businesses are adopting AI-driven personalization strategies to prioritize customer-centric approaches. By providing insights into individual preferences and behaviors, AI delivers tailored content, boosting engagement, loyalty, and business success. The potential for personalized experiences in digital markets is limitless, with transformative applications across various industries. Zhang et al. [8] investigate the role of AI in enhancing customer loyalty, emphasizing customer satisfaction and perceived efficiency. Based on data from 373 respondents collected in 2023, the study reveals strong relationships between satisfaction, efficiency, and loyalty. The findings suggest that organizations should adopt customer-centric AI solutions to strengthen loyalty in competitive markets. Ahmed and Taylor [9] examine AI's role in customer personalization, focusing on ethical and privacy implications in digital marketing. The study highlights how machine learning enables large-scale personalization of content and services while addressing concerns such as unauthorized data use, decision-making biases, data breaches, and regulatory compliance challenges. Using case studies and expert opinions, the research proposes guidelines for ethical AI integration in marketing to balance innovation and consumer trust. Singh et al. [10] provide a comprehensive review of methodologies and techniques used to improve prediction accuracy in AI-powered recommender systems. The study highlights how AI addresses challenges like data sparsity and the cold start problem, enhancing overall system performance. Additionally, the paper identifies key research issues and outlines potential future directions to advance the field further.

Materials and Methods

Research Methodology

This study comprises the use of descriptive research design to access the impact of AI-powered recommendation system on customer purchase behavior and brand loyalty within the mobile apps of International food brands (like KFC, Dominos). Data was collected through structured questionnaire, which was distributed to consumers. Simple random sampling technique used to collect the data. 457 responses were received from the google form response. After cleaning and data reduction process 176 responses are derived for data analysis. The Dimensions covered are AI-powered Recommendation System, focusing on personalization as well as accuracy and timeliness; Customer Purchase Behavior, which covers purchase frequency and purchase volume of the consumers; Customer Satisfaction and Trust, which includes perceived usefulness, reliability as well as privacy assurance. To test the validity of the questionnaire the Cronbach's Alpha value was derived as 0.927 for 44 items indicates excellent internal consistency reliability. Frequency analysis, Regression analysis, correlation analysis was conducted to test the hypotheses about AI-powered recommendations on customer purchase behavior and customer satisfaction and trust.

Objectives

1. To examine the influence of AI- powered recommendations systems (ARS) on customer purchase behavior.
2. To analyze the mediating roles of customer satisfaction, perceived relevance and trust in AI recommendations.
3. To explore the moderating effects of AI – powered recommendations systems on Purchase frequency and purchase volume.

Hypotheses

Hypothesis -1

Null hypothesis (H0): AI-powered recommendation system characteristics (personalization level, Accuracy, and Timeliness) do not positively influence customer purchase behavior.

Alternative hypothesis (H1): AI-powered recommendation system characteristics (personalization level, Accuracy, and Timeliness) positively influence customer purchase behavior.

Hypothesis -2

Null hypothesis (H0): There is no relationship between AI-powered recommendation system and Customer satisfaction and trust.

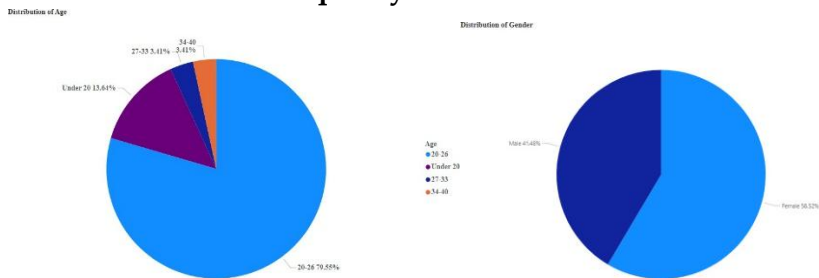
Alternative hypothesis (H1): There is a relationship between AI-powered recommendation system and Customer satisfaction and trust.

Hypothesis -3:

Null hypothesis (H0): AI-powered recommendation systems do not increase purchase frequency and purchase volume.

Alternative hypothesis (H1): AI-powered recommendation systems increase purchase frequency and purchase volume.

Interpretation and Discussion: Frequency



Hypothesis -1:

Null hypothesis (H0): ARS characteristics (personalization level, Accuracy, and Timeliness) do not positively influence customer purchase behavior.

Alternative hypothesis (H1): ARS characteristics (personalization level, Accuracy, and Timeliness) positively influence customer purchase behavior.

Test used: Multiple linear regression

To test how AI-powered recommendation system characteristics (accuracy and timeliness) influence on customer purchase behavior

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.674 ^a	.454	.448	5.49495
a. Predictors: (Constant), Personalization, Accuracy and timeliness				

- The correlation coefficient (R=0.674) shows a strong positive relationship between the predictors (**Personalization** and **Accuracy and Timeliness**) and the outcome variable (AI-powered recommendation system)
- The R square = 0.454 indicates that **45.4% of the variance** in the dependent variable is explained by the combination of **Personalization** and **Accuracy and Timeliness**.
- The **Adjusted R square = 0.448** is very close to R square, which suggests the predictors used in this model contribute effectively without unnecessary complexity.
- Therefore Null Hypothesis (H0) is rejected and Alternative hypothesis (H1) is accepted.

Hypothesis -2

Null hypothesis (H0): There is no relationship between AI-powered recommendation system and Customer purchase behavior.

Alternative hypothesis (H1): There is a relationship between AI-powered recommendation system and Customer purchase behavior.

Test used: Correlation

To test the relationship between AI-powered recommendation system characteristics and customer satisfaction and trust.

Correlations			
		ARS	Customer satisfaction and trust
ARS	Pearson Correlation	1	.738**
	Sig. (2-tailed)		.000
	N	176	176
Customer satisfaction and trust	Pearson Correlation	.738**	1
	Sig. (2-tailed)	.000	
	N	176	176
**. Correlation is significant at the 0.01 level (2-tailed).			

1. Pearson Correlation: $r=0.738$

- This indicates a **strong positive correlation** between **AI-powered recommendation system** and **Customer satisfaction and trust**.
- A value of $r = 0.738$ is close to 1, which implies that improving ARS characteristics (such as personalization, accuracy, and timeliness), increases customer satisfaction and trust

2. Significance: $p=0.000$

- A p-value of 0.000 (less than 0.01) indicates that the correlation is **statistically significant** at the 1% level.
- This means there is very strong evidence that the relationship between AI-powered recommendation system and customer satisfaction and trust.
- Therefore, Null Hypothesis (H0) is rejected and Alternate Hypothesis (H1) is accepted.

Hypothesis -3:

Null hypothesis (H0): AI-powered recommendation systems do not increase purchase frequency and purchase volume.

Alternative hypothesis (H1): AI-powered recommendation systems increase purchase frequency and purchase volume.

Test used: Simple linear regression

To test how AI-powered recommendation system characteristics (accuracy and timeliness) influence on customer purchase behavior

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.622 ^a	.387	.383	5.80812
a. Predictors: (Constant), ARS				

- The R-value of **0.622** indicates a **moderate to strong positive relationship** between the predictor (**ARS**) and the dependent variable. This shows that improvements in ARS characteristics (Personalization, Accuracy, and Timeliness) are positively linked to the dependent variable.
- The R square value of **0.387** means that **38.7% of the variance** in the dependent variable is explained by the ARS characteristics.
- Adjusted R square is very close to R square, confirming that the model is stable and does not suffer from over fitting.
- Therefore Null hypothesis (H0) is rejected and Alternate hypothesis (H1) is accepted.

Findings

- **ARS Characteristics (Personalization, Accuracy, Timeliness):**
Positively influence **customer purchase behavior**.
- **Relationship between ARS and Customer Satisfaction/Trust:**
A strong, significant positive relationship exists.
- **Impact on Purchase Frequency and Volume:**
AI-powered recommendation systems effectively increase purchase frequency and volume.

Results & conclusion

- All three Null hypotheses (H0) were rejected.
- All three Alternate hypotheses (H1) were accepted.

This study emphasizes the influence of AI-powered recommendation system on International food brand mobile apps like (KFC, Dominos) towards customer purchase behavior and customer satisfaction and trust. The results show how ARS positively affect customer purchase behavior and customer satisfaction and trust. The result shows that

there is a positive relationship between ARS and Personalization and accuracy and Timeliness. It suggests that tailoring the experience to Individual preference and delivering precise and timely services significantly impacts the customer purchase behavior. Focusing on enhancing ARS characteristics have a significant positive impact on building customer satisfaction and trust, which are critical for long-term customer purchase behavior and loyalty. It clearly shows that the ARS has increased the purchase frequency as well as purchase volume of the consumers.

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