Original Article

AI and Virtual Shopping: The Role of a Digital Shopping Assistant in Online Retail Playing a Diderot Effect

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Abstract

Purpose: This paper aims to explore how AI-based digital shopping assistants can be used to prompt and enhance the Diderot effect in online shopping settings. The main aim is to investigate the effect of psychological factors, personalization strategies and design of the virtual environment on consumer purchasing behaviors and satisfaction in the AI-enhanced e-commerce systems. Within digital retail conditions, with high competition and constantly shifting consumer demands, and the necessity of individual experiences, the psychological processes that underlie AI-based shopping behaviors are the key to business Success

Design: The present study involved a quantitative research design that relied on structural equation modeling (SEM) to test more complex relationships between product characteristics related to AI shopping assistant (feature), psychological triggers, and consumer consequences. The study design was that of a primary data survey that included a set of structured questionnaires that were sent to various online stores, which included 847 online consumers aged 18-65 years who were familiar with the AI-based recommendation systems.

Findings: The investigation demonstrates that AI-driven digital shopping assistants are potent amplifiers of the Diderot effect, and the enhancement of the psychological factors are the most significant predictors of AI shopping provocation (=0.623). The research confirms that AI purchase triggers act as the key mediators that have a substantial impact on the level of Diderot effect (8712) and increase customer satisfaction at the same time (0.576). The quality of virtual environment design, the quality of recommendation algorithm, and the amount of personalization are all important factors that contribute to the success of AI-based shopping experiences.Originality/Value: The paper is the first comprehensive empirical study of how AI-based digital shopping assistants can strategically use the Diderot effect in online retail setting and provides new insights into the psychological processes involved in the development of complementary purchase decisions in online settings.Research

Type: Empirical Research.

Keywords: Artificial Intelligence, Digital Shopping Assistant, Diderot Effect, Online Shopping, Consumer Behavior, E-commerce, Recommendation Systems, Customer Satisfaction, Purchase Decision Making, Virtual Shopping Environment.

Introduction

The e-marketing of the retail world has also brought the age of the digital transformation of the shopping process, where artificial intelligence is fundamentally changing the way people shop, and AI-enabled digital assistants in shopping become advanced psychological triggers that can provoke the famous Diderot effect in online space. The Diderot effect, named after French philosopher Denis Diderot, who noticed that once a person has one new thing, they tend to keep on purchasing items to achieve a sense of balance and wholeness, now has a new manifestation in the form of smart algorithms that learn and react to consumer psychology like never before (Ariely and Silva, 2021). [1])

In the current state, AI shopping assistants are using massive amounts of data, machine learning, and behavior analytics to develop personal recommendation platforms that do not just recommend what the consumer wants but actively influence buying behavior through recommending related items that create an illusion of need and aesthetic harmony. In contrast with conventional retail settings where the Diderot effect was achieved either by accidental encounter or by being influenced by sales staff, the online shopping assistant coordinates this psychological phenomenon in a more systematic way through the complex recommendation system and the virtual setting, and the real-time personalization policy.

1. The artificial intelligence in retail has been adopted in recent times.

It is an AI that offers personalized shopping experience based on the high-level algorithms, which analyze the behavioral patterns and preferences of a consumer and contextual conditions to make their recommendations. Even in online retail, AI is already transforming user experiences dramatically, and personalized offers are replacing the endless product lists to fulfill consumer demands to receive an individualized customer experience. The difficulty in comprehending the preferences and wants of customers has resulted in AI solutions that are able to customize the recommendations and products without even knowing what the customer wants (Huang and Rust, 2021) [2].Such technological development is a paradigm shift of the current reactive customer care model to the proactive consumer behavior change model, whereby AI systems can serve as invisibly present shopping companions that know the consumer psychology more than the consumer does himself. The benefit to online stores is more accessibility and personalization, as the desire of the current customers to the strict requirements is fulfilled, and the income grows on the long haul.

2. About the Diderot Effect

The Diderot effect is a phenomena that was first discovered in consumer behavior during the 18th century which explains why once one has one item they are more likely to buy another item, and another, until they have the sense that they have achieved harmony and completeness in their possessions. Online, this psychological effect has been enhanced with the help of AI-driven recommendation tools that allow introducing complementary products at the most appropriate times of the consumer experience. It has been revealed that digital space intensifies the Diderot effect by 23 points, relative to physical retail stores because of the accessibility of comparison shopping and access to relevant products instantly using AI recommendation systems (Ariely and Silva, 2021) [3]). Online consumers get the feeling of completion anxiety more often, which gives rise to greater psychological motivations to purchase complements, which AI systems can exploit strategically.

3. Statement of the Problem

The swift development of artificial intelligence in e-commerce has introduced previously unseen opportunities in individualized shopping experience, but the psychology of consumer behavior in AI-enhanced context is not well understood. Although the use of AI-driven digital shopping assistants and recommendation systems has been proven to have great potential to enhance customer satisfaction and raise revenue by providing relevant product recommendations, one crucial gap that must be filled is how these technologies initiate and amplify the psychological effect of the so-called Diderot effect. The existing studies are not fully informed about the importance of AI-based personalization in the process of consumer decision making other than mere product suggestions, in fact, the aspects of designing virtual environment and the psychological considerations. This knowledge gap is especially problematic when retailers tend to use AI systems to predict customer needs and push purchasing patterns more often without clear understanding of the psychological implications of their technological applications.

Review of Literature

The article by Huang and Rust (2021) [4]. explored the strategic adoption of artificial intelligence in marketing processes, with the authors paying attention to how AI-driven recommendation systems can change the customer interaction patterns in online shopping settings. The longitudinal study of 15,000 online customers of various e-commerce platforms showed that personalization based on AI raises the rates of conversion by 35 as opposed to the standard, non-personalized, recommendation-based systems. The study has proven that AI systems with real-time adaptation to personal preferences develop much more efficient customer touchpoints. Chen, Wang, and Xie (2020) [5], studied comparative effectiveness of various online social interaction mechanisms in shaping consumer behavior, in this case, comparing word-of-mouth communication and observational learning in the digital setting. Their natural experiment design consisting of 8,500 participants demonstrated that the machine learning algorithms that analyze the data of social interactions are able to detect the purchasing patterns and preferences that would otherwise be overlooked with the help of analytical methods. The paper has discovered that AI systems with social proof mechanisms are 42 percent more successful in transforming the behaviors of browsing into a real purchase. Ariely and Silva (2021) [6]. engaged in an extensive meta-analysis analysis of 47 papers in determining how the Diderot effect is realized and enhanced in online shopping as compared to shopping in physical retail outlets. Their study found that the impacts of digital spaces increase the Diderot effect by 23 percent because online shopping allows them to compare products and

find more products by using AI-recommended products. The paper determined that the completion anxiety felt by consumers in an online setting is greater and builds more significant psychological motivations towards complementary purchases. Wang and Li (2023) [7]). discussed the phenomenon of machine customers in the era of artificial intelligence and examined the ways in which AI chatbots and virtual shopping assistants form the parasocial relationships with consumers in online retailing settings. Their test involving 2,300 participants proved that consumers who intend to use AI assistants on a regular basis show 28 times higher rates of purchase completion and are more emotionally bonded to brands. The study showed that AI systems with natural language processing and contextualized understanding are able to cut the decision fatigue by a half, as well as, enhance the purchase satisfaction ratings.

1 Research Objectives

1. To examine the role of psychological factors enhancement on AI purchase trigger efficacy in the online shopping contexts.
2. To assess the influence of using personal data and designing a virtual environment on the development of AI-based purchase triggers.
3. To examine the nature of mediation of the correlation between technological factors and the intensity of the Diderot effect by AI purchase triggers.
4. To determine how the recommendation algorithm accuracy and the level of personalization enhance the Diderot effect with online shoppers.
5. To test the hypothesis about the relationship between the intensity of the Diderot effect and customer satisfaction during AI-assisted shopping.
6. To find out how the use of AI shopping assistants influences the speed of the purchasing decision and the efficiency of the whole shopping.
7. To conduct research in the area of the inclusion of social commerce features in artificial intelligence-based shopping assistant systems.

2 Research Design

In the given study, a quantitative research design with structural equation modeling (SEM) was used to test the correlation between AI shopping assistant features, Diderot effect intensity and customer outcomes. The study employed the stratified random sampling method among the various e-commerce websites where it was focused on online customers aged 18-65 who have accessed AI-enabled shopping assistants or recommendation systems.

3 Sampling Design

Target Population: Online shoppers aged 1865 that have utilized AI-based shopping assistants or recommendation systems.
Sample Size: 847 respondents
Sampling Method: Stratified random sampling of the various e-commerce platforms.
Geographic Scope: Multi-platform analysis comprising of large e-commerce sites that have AI-powered recommendation engine.

4 Data Collection Method

Online structured questionnaires were given to e-commerce sites and the primary data was collected using online questionnaires. Validated scales that assessed the increase in psychological factors, the use of personal data, development of virtual environment, integration of social commerce, accuracy of the recommendation algorithm, the level of personalization, purchase triggers on AI, Diderot effect intensity, customer satisfaction, and speed of purchase decision were presented in the questionnaire.

Analysis and Interpretation

Table 1: KMO and Bartlett's Test

Test	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.742
Bartlett's Test of Sphericity	
Approx. Chi-Square	156.873
Df	28
Sig.	.000

Interpretation: The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.742, which exceeds the minimum threshold of 0.6 and indicates that the sample is adequate for factor analysis to proceed. The KMO value of 0.742 suggests that the variables share sufficient common variance, making factor analysis appropriate for this dataset. Bartlett's Test of Sphericity yields a chi-square value of 156.873 with 28 degrees of freedom and a significance level of 0.000 ($p < 0.001$), indicating that the correlation matrix is not an identity matrix and that there are significant

relationships among the variables. The significant Bartlett's test confirms that the data is suitable for factor analysis, as it demonstrates that the variables are sufficiently correlated to warrant dimensional reduction techniques.

Table 2: Regression Weights - AI Shopping Assistant and Diderot Effect

DV		IV	Estimate	S.E.	C.R.	Beta	p
AI Purchase Triggers	<---	Psychological Factor Enhancement	0.847	0.052	16.289	0.623	0.001
AI Purchase Triggers	<---	Personal Data Utilization	0.142	0.031	4.581	0.189	0.001
AI Purchase Triggers	<---	Virtual Environment Design	0.268	0.038	7.053	0.297	0.001
AI Purchase Triggers	<---	Social Commerce Integration	0.089	0.041	2.171	0.086	0.030
Diderot Effect Intensity	<---	AI Purchase Triggers	1.742	0.087	20.023	0.712	0.001
Diderot Effect Intensity	<---	Recommendation Algorithm Accuracy	0.456	0.065	7.015	0.234	0.001
Diderot Effect Intensity	<---	Personalization Level	0.321	0.058	5.534	0.198	0.001
Customer Satisfaction	<---	Diderot Effect Intensity	0.793	0.049	16.184	0.576	0.001
Customer Satisfaction	<---	AI Purchase Triggers	0.485	0.071	6.831	0.243	0.001
Customer Satisfaction	<---	Virtual Environment Design	0.227	0.054	4.204	0.156	0.001
Purchase Decision Speed	<---	AI Purchase Triggers	1.234	0.094	13.128	0.521	0.001
Purchase Decision Speed	<---	Psychological Factor Enhancement	0.398	0.067	5.940	0.218	0.001

Interpretation: The results of the analysis show that the psychological factor improvement is the best predictor of AI purchase triggers with a = of 0.623 (p=0.001) which means that AI systems that utilize psychological principles of scarcity, social proof and cognitive biases are successful in generating purchase impulses. The design of virtual environments also has a high influence on the effectiveness of AI triggers (0.297, p<0.001) because well-designed user interfaces and digital atmospherics are very useful in facilitating the acceptance of AI recommendations.

Results and Findings

The analysis of digital shopping assistants based on the AI and the effect they have on the Diderot effect shows that there are several important points that should be considered: Formation of AI Purchase Triggers: The psychological factor improvement appeared to be the strongest predictor (0.623) and AI systems that consider psychological principles strategically proved to be more effective in generating purchase behaviors. Design of the virtual environment (0.297) and use of personal data (0.189) also play a significant role in the formation of AI triggers. Diderot Effect Amplification: The intensity of the Diderot effects is mostly dependent on AI purchase triggers (=0.712), which makes AI systems efficient amplifiers of other purchase behaviors. The Diderot effect is further promoted by the recommendation algorithm accuracy (= 0.234) and degrees of personalization (= 0.198). Customer Satisfaction Outcomes: Despite the suppositions regarding consumer manipulation, the intensity of the Diderot effect has a positive direct effect on customer satisfaction (0.576) and therefore, complementary purchase journeys are well orchestrated to add value to customers, as opposed to subtract value.

Purchase Decision Efficiency: AI purchase prompts are much faster to make purchase decisions (0.521), which proves that AI support eliminates cognitive load and simplifies the process of shopping.

Conclusion

This thorough research confirms that online shopping assistants based on AI are a disruptive technology that can use the Diderot effect with an ethical perspective in an effort to achieve a win-win situation between clients and companies. The study conclusively shows that psychological factor improvement is the most important of all aspects that make AI effective, and AI purchase triggers are effective mediators that can boost the Diderot effect and, at the same time, increase customer satisfaction.As opposed to the conventional thinking that the Diderot effect takes advantage of consumers, this paper has shown that in the right context, with the use of more advanced AI systems, the complementary buying behaviors indeed add to customer satisfaction and positive shopping experiences. The results confirm the presence of the significance of virtual environment design in online retail and point out the potential of social commerce integration.Above all, the study confirms the idea that AI systems can make the purchase decision-making process easier and stay ethical, which implies that the future of e-commerce is in psychologically-generative digital assistants sensitive to get to know more about the consumer motivation and react to it. Such a shift of the traditional transactional AI to the psychologically-advanced shopping assistants provides the retailers with sustainable competitive advantages, assuming that they focus on creating customer value rather than exploiting it in the short-term.

Suggestions

Advancement: Embracing psychological principles in AI algorithms at the expense of ethical values should be prioritized.

•Establish holistic Diderot effect deployment systems that would add value to a customer.

•Invest in advanced virtual environments design to help with the acceptance of AI recommendations.

• Improve the accuracy of the recommendation algorithms and personalization at the same time.
• Rapidly increase the social commerce integration in AI systems.
• Use AI-based decision support systems to lower the cognitive load of consumers.
• Establish cross-functional teams that consist of AI knowledge and consumer psychology knowledge.
• The creation of complex customer satisfaction monitoring systems on AI-enhanced experience.
• Strategy complementary product ecosystem.
• Develop AI ethics and transparency framework to allow consumer confidence.

References

1. Ariely, D., & Silva, A. (2021). The Diderot effect in online space: Online shopping behavior meta-analysis. J Consumer Psychology, 34(2), 123-145.
2. Chen, L., Wang, M., & Xie, R. (2020). Social interaction mechanism and consumer behaviour: Digital word-of-mouth machine learning. Journal of Marketing Research, 57(4), 678-695.
3. Hoffman, D. L., & Novak, T. P. (2022). Internet of Things environments Consumer and object experiences: An assemblage theory approach to AI shopping assistants. 48(6) Journal of Consumer Research, 1024-1048.
4. Huang, M. H., & Rust, R. T. (2021). Artificial intelligence in marketing: Is strategic implementation of AI-powered recommendation systems the key to transforming the customer engagement process? Journal of the Academy of Marketing Science, 49(3), 456-478.
5. Mehta, A., Sharma, P., & Swami, S. (2021). Perceived benefits and online shopping attitude: How virtual environments based on AI can mimic physical retail experiences. Computers in Human Behavior, 118, 106-124.
6. Parasuraman, A., & Colby, C. L. (2021). Technology Readiness Index 2.0: The level of using AI-based technologies in retail. Journal of Service Research, 24(2), 234-256.
7. Sherman, E., & Smith, R. B. (2022). Digital atmosphere: How to build immersive AI-driven shopping experiences in online shopping. Journal of Retailing, 98(1), 87-104.
8. Tam, K. Y., & Ho, S. Y. (2020). Web personalization and psychological ownership: The effectiveness of AI-driven product recommendations and the understanding of them. Information Systems Research, 31(4), 1187-1205.
9. Wang, L., & Li, M. (2023). The age of AI machine customers: Parasocial customer-AI shopping assistant relationships. Journal of Business Research, 142, 847-862.