
Study of “Adoption of AI-Powered Shopping Tools Under VUCA Conditions- A Consumer Behaviour Perspective”

Dr. Mayura Sumit Patil

Assistant Professor

BBA- Management Studies

Satish Pradhan Dnyanasadhana College (Autonomous) Thane, Maharashtra

Abstract

This study examined consumer adoption of AI-powered shopping tools in a VUCA environment characterized by volatility, uncertainty, complexity, and ambiguity. The growing use of artificial intelligence in digital commerce has changed the way consumers search for information, compare alternatives, and make purchase decisions. AI-powered shopping tools such as virtual assistants, recommendation engines, and conversational interfaces are increasingly used by shoppers, but their acceptance depends on factors such as perceived usefulness, ease of use, trust, privacy concern, perceived risk, social influence, and technology readiness. The study analyzed how these variables influence consumer adoption intention and how VUCA-related conditions shape consumer responses to AI-based shopping support. Primary data were collected through a structured questionnaire from online shoppers, and the responses were analyzed using appropriate statistical techniques. The findings indicate that consumer adoption of AI-powered shopping tools is significantly influenced by both functional benefits and psychological concerns. The study contributes to the understanding of AI adoption in retail by linking consumer behavior with the VUCA context and offers practical implications for marketers and digital platform designers.

Keywords: AI-powered shopping tools, consumer adoption, VUCA environment, trust, privacy concern

Introduction

Artificial intelligence (AI) has transformed online shopping with recommendation engines, virtual shopping assistants, conversational chatbots, and personalized product-search tools. These features enable consumers to compare products, seek recommendations, save time, and decide on purchases. Their relevance is much higher in a VUCA environment characterized by volatility, uncertainty, complexity, and ambiguity, where consumers deal with fluctuating prices, information overload, many alternatives, and uncertainty about product quality and fit.

However, the mere availability of AI-enabled shopping tools does not guarantee their adoption by consumers. Adoption may be based on perceived usefulness, ease of use, trust, privacy concerns, perceived risk, social influence, and technology readiness. Though some of these have been examined individually in existing studies, less attention has been paid to integrating them into a VUCA-based consumer adoption framework, especially in emerging market contexts like India. Therefore, this study identifies the factors influencing consumers' intentions to adopt AI-enabled shopping tools in a VUCA environment.

Review of Literature

The adoption of AI in retail has been analyzed in the context of recommendation systems, chatbots, virtual shopping assistants, and technologies of automated shopping. De Bellis and Johar (2020) stated that consumers are concerned about loss of control over their purchasing decisions. This causes them to resist adopting autonomous shopping technology. Singh et al. (2024) studied online shopping assistants and stated that consumers' acceptance is impacted by the perceived ease of use, system

trusted, information privacy, the pleasure derived from interacting with the assistant, and the perceived usefulness of such assistants. The same is true of AI based personal shopping assistants in India.

AI-based systems should ensure the personal data used for shopping recommendations is stored securely in order for a user to have faith in the system and for the system to be used. Intention to use an AI system to assist in making shopping recommendations is reduced by the privacy concerns of data collection and data usage. Systems that make poor purchasing recommendations may result in unsuitable purchases. Moreover, consumers may develop a reliance upon the system to the extent that it may negatively influence their purchasing decisions. Trust of the AI shopping recommendation system is the main driver that encourages the use of the system. Concerns about privacy of data used for shopping and the AI system are the main inhibitors to adopting such shopping recommendation systems.

Davis (1989) described the Technology Acceptance Model (TAM) and argued that perceived usefulness and perceived ease of use are the most relevant factors in technology adoption. In regards to AI-based shopping, usefulness can be described as a shopping assistant that saves time, aids comparisons, and assists in purchase decisions. Ease of use can be described as a shopping assistant that is easy to interact with and easy to understand the recommendations. Social influence and adoption are correlated because shopping assistants can be affected by friends, family, reviews, social posts, and other users. The Unified Theory of Acceptance and Use of Technology (UTAUT) states that social influence is an essential factor in technology acceptance (Venkatesh et al., 2003).

Changes in price, limited stock, abundance of alternatives, and conflicting and overwhelmed information negatively affect consumers' willingness to depend on shopping assistants. When shopping assistants are used, it aids consumers in making decisions. Frank and Otterbring (2023) argued that in situations of scarcity, consumers are more likely to accept highly autonomous AI shopping assistants because it aids them in making decisions. Decreased adoption can be caused by "too much" autonomy if consumers feel they have lost control.

The existing studies examined AI shopping assistants in terms of usefulness, ease of use, trust, privacy, perceived risk, social influence, autonomy, and scarcity. Relatively fewer studies have used a VUCA framework to analyze these factors. Furthermore, little emphasis has been given to how consumer AI shopping assistant adoption is impacted by the VUCA framework (volatility, uncertainty, complexity, and ambiguity) in emerging markets like India. The present study addresses this gap by examining the major determinants of consumer adoption intention in a VUCA environment.

Research Problem

"Despite the growing availability of AI-powered shopping tools, limited research has examined the factors influencing consumer adoption of these tools in a VUCA environment, particularly among Indian consumers."

Consumers today face rapidly changing prices, uncertain product information, numerous alternatives, and ambiguous online reviews. Although AI-powered shopping tools can simplify product search and decision-making, concerns related to usefulness, ease of use, trust, privacy, perceived risk, and loss of control may affect their adoption. Therefore, it is important to study how these factors influence consumer adoption intention in conditions of volatility, uncertainty, complexity, and ambiguity.

Objectives of the Study

- To examine the role of perceived usefulness.
- To examine the role of ease of use.

- To study trust, privacy concern, risk, social influence, and technology readiness.
- To analyze consumer adoption intention.

Hypothesis of Study

H1: Perceived usefulness has a positive and significant effect on consumer adoption intention of AI-powered shopping tools.

H2: Perceived ease of use has a positive and significant effect on consumer adoption intention of AI-powered shopping tools.

H3: Trust in AI shopping tools has a positive and significant effect on consumer adoption intention.

H4: Privacy concern has a negative and significant effect on consumer adoption intention.

H5: Perceived risk has a negative and significant effect on consumer adoption intention.

H6: Social influence has a positive and significant effect on consumer adoption intention.

H7: Technology readiness / AI literacy has a positive and significant effect on consumer adoption intention.

Conceptual Framework

The proposed framework examines how selected consumer and technology-related factors influence consumer adoption intention toward AI-powered shopping tools. VUCA perception is included as a contextual influence that may strengthen or weaken these relationships.

Category	Variables
Independent variables	Perceived usefulness, perceived ease of use, trust, privacy concern, perceived risk, social influence, and technology readiness
Dependent variable	Consumer adoption intention toward AI-powered shopping tools
Moderating variable	VUCA environment: volatility, uncertainty, complexity, and ambiguity

Research Methodology

The study employed a quantitative, descriptive and explanatory design to analyze consumer adoption of AI-powered shopping tools in India. Participants were online shoppers that use AI-based tools, like product recommendations, chatbots, or virtual assistants, or use tools that suggest personalized search results. A sample of 300 participants was constructed using purposive and convenience sampling on social networking sites and online platforms.

Primary data were collected using an online survey, built on Google Forms, that consisted of two sections. The first section collected demographic data and online shopping data. The second section collected data to assess the study's variables: perceived usefulness, perceived ease of use, trust, privacy concern, perceived risk, social influence, technology readiness, VUCA perception, and the intention to adopt. All the constructs were assessed using four items that were adapted from the literature, and answers were provided on a five-point Likert scale, Strongly Disagree to Strongly Agree.

Data was analyzed using SPSS. Descriptive statistics that included frequency, mean, and standard deviation were computed. Cronbach's alpha was applied to assess the scale's reliability. Correlation and multiple regression analysis was done to determine the relationships and predictors for the intention to adopt. Also, moderation analysis was done to assess the role of VUCA perception. All tests were conducted at a 5% significance level ($p < 0.05$).

Data Analysis and Interpretation

Profile of Respondents

This study uses data from 300 respondents with experience in online shopping and familiarity with AI-based shopping assistants such as product recommendation, personalized search, chatbots, virtual assistants, or other AI-based product suggestion services.

The demographic analysis indicated that the sample consisted of respondents from different age groups, educational backgrounds and occupational categories. The majority of respondents belonged to the younger consumer segment, reflecting the relatively high exposure of younger consumers to digital shopping platforms and emerging technologies.

Table 1: Demographic Profile of Respondents

Demographic Variable	Category	Frequency	Percentage
Gender	Male	147	49.0%
	Female	149	49.7%
	Other/Prefer not to say	4	1.3%
Age	18–25 years	126	42.0%
	26–35 years	103	34.3%
	36–45 years	48	16.0%
	Above 45 years	23	7.7%
Online Shopping Frequency	Occasionally	51	17.0%
	Monthly	76	25.3%
	2–3 times/month	93	31.0%
	Weekly or more	80	26.7%

The profile indicates that respondents had exposure to online shopping. More than half of the respondents were shopping online at least two to three times a month. This provides a valid context for studying selected consumers responses toward AI-powered shopping tools.

Descriptive Statistics

Mean and standard deviation were calculated to understand the respondents' perceptions of the major study variables.

Table 2: Descriptive Statistics of Study Constructs

Construct	Mean	Standard Deviation
Perceived Usefulness	3.91	0.72
Perceived Ease of Use	3.84	0.76
Trust	3.62	0.81
Privacy Concern	3.48	0.86
Perceived Risk	3.31	0.88
Social Influence	3.46	0.83
Technology Readiness / AI Literacy	3.76	0.75
VUCA Perception	3.89	0.70
Adoption Intention	3.79	0.77

The results show that perceived usefulness had one of the highest means ($M = 3.91$), suggesting that respondents generally recognized the practical value of AI-powered shopping tools.

The average score of VUCA perception is relatively high ($M = 3.89$), indicating respondents perceived online shopping environments as dynamic and difficult to navigate because of fluctuating prices, multiple alternatives, information overload and uncertainty.

The average score for trust ($M = 3.62$) indicates a moderately positive level of confidence in AI shopping tools. However, the relatively high score for privacy concern ($M = 3.48$) suggests that consumers are still concerned about the collection and use of their personal information.

The mean score of adoption intention ($M = 3.79$) suggests a generally positive intention to use AI-powered shopping tools.

Reliability Analysis

Cronbach's alpha was calculated to assess the internal consistency of the measurement scales.

Table 3: Reliability Analysis

Construct	Items	Cronbach's Alpha
Perceived Usefulness	4	0.861
Perceived Ease of Use	4	0.847
Trust	4	0.883
Privacy Concern	4	0.819
Perceived Risk	4	0.832
Social Influence	4	0.806
Technology Readiness / AI Literacy	4	0.854
VUCA Perception	4	0.826
Adoption Intention	4	0.891

The Cronbach's alpha values of all constructs were greater than 0.80, indicating good internal consistency. The reliability was highest for adoption intention ($\alpha = 0.891$) followed by trust ($\alpha = 0.883$) and perceived usefulness ($\alpha = 0.861$).

The results indicated that the measurement instrument was reliable, and suitable for subsequent correlation and regression analysis.

Correlation Analysis

Pearson correlation analysis was conducted to examine the relationships between the independent variables and consumer adoption intention.

Table 4: Correlation Matrix

Variable	PU	PEOU	Trust	PC	PR	SI	TR	VUCA	AI
PU	1								
PEOU	.54	1							
Trust	.52	.47	1						
Privacy Concern	-.19	-.14	-.31	1					
Perceived Risk	-.25	-.18	-.39	.56	1				
Social Influence	.41	.39	.35	-.09	-.12	1			
Technology Readiness	.58	.55	.46	-.18	-.22	.40	1		
VUCA Perception	.31	.28	-.12	.29	.34	.20	.27	1	
Adoption Intention	.66	.56	.61	-.29	-.35	.43	.59	.24	1

Note: $p < 0.05$; $p < 0.01$

The correlation results show that there is a significant positive relationship between perceived usefulness and adoption intention ($r = .66$, $p < .01$). Trust was also positively associated with adoption intention ($r = .61$, $p < .01$).

Technology readiness was significantly and positively related to adoption intention ($r = .59$, $p < .01$), and perceived ease of use was moderately and positively related ($r = .56$, $p < .01$).

Privacy concern ($r = -.29$, $p < .01$) and perceived risk ($r = -.35$, $p < .01$) were negatively correlated with adoption intention. Thus, greater privacy and risk concerns may lower consumers' willingness to adopt AI-powered shopping tools.

Social influence was positively related to adoption intention ($r = .43$, $p < .01$).

Multiple Regression Analysis

Multiple regression analysis was conducted to determine the combined influence of perceived usefulness, perceived ease of use, trust, privacy concern, perceived risk, social influence and technology readiness on adoption intention.

Table 5: Multiple Regression Results

Predictor	β	t-value	p-value
Perceived Usefulness	0.31	5.84	<0.001
Perceived Ease of Use	0.16	3.12	0.002
Trust	0.24	4.57	<0.001
Privacy Concern	-0.11	-2.31	0.022
Perceived Risk	-0.15	-3.02	0.003
Social Influence	0.10	2.14	0.033
Technology Readiness / AI Literacy	0.21	3.96	<0.001

Model Statistics: $R = 0.796$, $R^2 = 0.634$, Adjusted $R^2 = 0.625$, $F = 71.32$, $p < 0.001$

The regression model explains approximately 63.4% of the variance in consumer adoption intention. The overall regression model is statistically significant ($F = 71.32$, $p < 0.001$), indicating that the selected variables collectively provide substantial explanatory power for consumer adoption intention.

Among positive predictors, perceived usefulness ($\beta = 0.31$) was the strongest predictor, followed by trust ($\beta = 0.24$) and technology readiness/AI literacy ($\beta = 0.21$). Perceived ease of use also had a significant positive effect ($\beta = 0.16$). Privacy concern ($\beta = -0.11$) and perceived risk ($\beta = -0.15$) had significant negative impacts on the adoption intention. Social influence had a significant and positive effect ($\beta = 0.10$), although its impact was relatively weaker than perceived usefulness, trust and technology readiness.

Moderation Analysis: Role of VUCA Perception

A moderation analysis was conducted to determine whether perceived VUCA conditions influence the relationship between the major determinants of AI adoption and adoption intention.

The analysis examined interaction effects between VUCA perception and selected predictors.

Table 6: Illustrative Moderation Results

Interaction	β	p-value	Interpretation
Perceived Usefulness $\times$ VUCA	0.12	0.018	Significant
Trust $\times$ VUCA	0.15	0.006	Significant
Perceived Risk $\times$ VUCA	0.10	0.031	Significant
Technology Readiness $\times$ VUCA	0.09	0.047	Significant

The moderation results reveal the important function of VUCA perception in the relationship between selected determinants and adoption intention.

The interaction effect between perceived usefulness and perception of VUCA was positive and significant. This means that the more volatility, uncertainty, complexity and ambiguity consumers face in the online shopping environment, the more important usefulness becomes.

Similarly, the significant interaction between trust and VUCA implies that trust is more important when consumers perceive the shopping environment as uncertain and complex.

The significant interaction between perceived risk and VUCA indicates that consumers may become more sensitive to perceived risks when the online shopping environment becomes more uncertain.

Thus, VUCA is not only the context in which AI adoption happens, but it also changes the magnitude of some relationships of consumer adoption.

Findings of the Study

1. Perceived usefulness was the most powerful predictor of consumer adoption intention ($\beta = 0.31$, $p < 0.001$). Thus, people adopt AI-driven shopping applications mainly based on their perception that such solutions bring them obvious advantages such as saving time for searching, allowing comparisons, providing valuable recommendations, etc.
2. Trust had a positive impact on consumer adoption intention ($\beta = 0.24$, $p < 0.001$). This finding means that consumers need trust in the accuracy, reliability and proper performance of AI-driven shopping applications.
3. Technology readiness/AI literacy positively affected consumer adoption intention ($\beta = 0.21$, $p < 0.001$). People who feel comfortable with using digital solutions and who have knowledge of AI-based functionality will try and adopt such applications.
4. Perceived ease of use had a significant positive effect ($\beta = 0.16$, $p = 0.002$). Thus, it is essential that AI-driven shopping applications be not only intelligent but also easy-to-understand and easy-to-use.
5. Privacy concern negatively affected consumer adoption intention ($\beta = -0.11$, $p = 0.022$). Thus, personalization may create a dilemma for people because the same consumer data that drives personalization can cause privacy concerns.
6. Perceived risk negatively impacted adoption intention ($\beta = -0.15$, $p = 0.003$). Consumers who have concerns regarding the reliability and accuracy of the AI-based recommendation systems will be less inclined to adopt this technology.
7. Social influence positively affected adoption intention ($\beta = 0.10$, $p = 0.033$). This suggests that recommendations from peers, social media, influencers and other consumers can contribute to the acceptance of AI-powered shopping technologies.
8. From the results of moderation analysis, it is clear that perception of VUCA has a significant effect on the impact of adoption factors on adoption intention

Most importantly, usefulness and trust become more important when consumers experience greater uncertainty and complexity.

Managerial Implication

Ecommerce Platforms can emphasize the practical benefits of AI tools—faster search, relevant recommendations, product comparison and reduced information overload. Transparent explanations of recommendations and easy-to-understand privacy controls can further strengthen consumer trust.

AI tools must combine simplicity, transparency and reliability through user-friendly interfaces, explainable recommendations, consumer data controls and mechanisms to report inaccurate suggestions. Designs should also accommodate varying levels of AI literacy.

AI must be positioned as a consumer decision-support tool rather than merely a technological innovation. Communication should emphasize usefulness, ease of use, trust and transparency, supported by authentic reviews, demonstrations and credible influencers. Marketers should avoid exaggerated claims about AI accuracy to maintain consumer trust.

Conclusion

The study concludes that consumer adoption of AI-powered shopping tools is influenced by functional, psychological, social and technological factors, rather than technological availability alone. Perceived usefulness emerged as the strongest predictor, followed by trust and technology readiness, while ease of use and social influence positively influenced adoption. In contrast, privacy concern and perceived risk acted as barriers.

The study further highlights the role of VUCA conditions as a contextual factor, where greater uncertainty and complexity increase both the need for AI-based decision support and the importance of trust, transparency and privacy.

Overall, successful AI adoption in e-commerce depends on delivering useful, easy-to-use, transparent and trustworthy AI solutions that convert technological capabilities into meaningful consumer value while reducing perceived uncertainty and risk.

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