Impact of AI on Consumers' Purchase Intention Towards Online Grocery Shopping in India

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Abstract

In recent years, the rapid advancement of technology, specifically in Artificial Intelligence (AI), has considerably impacted consumer satisfaction in the e-retailing sector. The time-saving benefits and convenience of shopping in the comfort of their home with AI induce people to adopt digital technologies, reflecting a change in consumer behaviour. While existing studies have focused on examining TAM (technology acceptance model) components' influence on technology acceptance, there is a lack of India-specific focus in studies and limited consideration of AI technologies like voice search or chatbots' impact on purchase intention. This study extends the application of TAM components to the Indian online grocery sector.

This study bridges a critical research gap by revealing the interplay between AI technologies and consumer behavior in India's INR 760.2billion online grocery market. Using India's grocery sector, the contribution of the study is in the recommendation of developing a technology-based consumer experience enhancement framework for online grocery platforms to effectively target consumers, particularly in regions with similar socio-economic characteristics.

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This study utilises the PLS-SEM (partial least squares structural equation modelling) model on 231 samples to analyse data and examine the impact of AI-driven technology on consumers' online grocery shopping behaviour. PLS-SEM is instrumental in handling complex models with multiple constructs. This method is considered ideal for handling complex models with multiple constructs and primary research with smaller sample size. The application of this method also validated the conceptual framework by confirming strong construct reliability and validity. The analysis revealed that AI features like personalized recommendations, chatbots, and voice assistants improved the shopping experience by making it more efficient and easier. This enhanced user experience led to increased purchase intentions. This could be seen by the significant moderating role of AI technology and TAM components interaction on attitude towards AI.

Keywords: Artificial intelligence (AI), technology acceptance model (TAM), partial least squared structural equation modelling (PLS-SEM), purchase intention, online grocery shopping.

1 Introduction

The grocery shopping sector of India is an ageless market. In 2024, the Indian online grocery market was valued at INR 760.2 billion (Grand View Research, n.d.) with the prediction that by 2028, the market will be valued at INR 1864.33 billion with a Compound annual growth rate (CAGR) of 19.55% (PS Newswire 2023). With the emergence of new online grocery stores like Bigbasket, Grofers, Zopnow, Local Banya and Peppertap, sales have grown ata 20–25% rate (Sarvepalli and Udaya Shankar 2016). A further wave of transformation came in 2022 when more than 50% of the grocery stores in India became addressable by their online grocery platforms (Financial Times 2023). Despite the rapid growth of online grocery retail in India, there remains a significant research gap in understanding how AI-driven technologies influence consumer shopping behavior in this sector.

Before the development of AI technologies, consumers could only understand product information through advertising, promotions, and other means, and choosing of products required a lot of time and effort. With the development of the Internet and e-commerce, more and more products are being put on the shelves, but due to the large number of products, it is difficult to meet the personalized needs of each buyer (Song, 2023). AI is a catalyst

in redefining and improving the shopping experience of retail customers as well as the business experience of retailers in the sector of online grocery (Oosthuizen et al. 2023). These technologies help retailers address customer demand using innovations like personalized recommendation engines, voice search and chatbots (Wilson, Johnson, and Brown 2024). The usage of AI-driven tools helps create an effective shopping experience, simplifying the decision-making process, and enhancing user interaction. Using historical data, AI-integrated systems help retailers predict customer demands resulting in providing more personalized recommendations to consumers (Aggarwal 2023; Basha and Shyam 2024). The usage of voice search functionality could simplify the shopping process by allowing users to select and browse products conveniently without much navigation (Villegas-Ch, Amores-Falconi, and Coronel-Silva 2023). For instance, FreshCart has integrated AI which helps in reducing the logistics cost of the company by 15% with an eventual increase of 20% in customer retention rate (Kumar 2024). Many other companies like JioMart or Blinkit use AI technology in the form of chatbots or voice search to resolve their customer queries and fulfil customer demand (Yadav 2022; Das 2022; Skyram 2023). These instances show how AI technologies not only improve the operational process but also contribute to influencing consumer purchase behaviour.

TAM remains an important framework for studying the change in consumer behaviour due to technology (Martín-García, Redolat, and Pinazo-Hernandis 2021). These researchers identified that components like PEU and PU are important for evaluating the consumer response to emerging technologies (Baroni et al. 2022; Ananda et al. 2020). Although existing studies have focused on examining TAM's relevance for general online shopping, but still unique opportunities and the impact on the online grocery sector are still under explored. Even there has been less research on how AI-driven technologies are influencing consumer purchase intention majorly for the Indian market. This study will focus on addressing this research gap by defining how AI technologies are used in the online grocery sector of India. Also, the examination will be done to understand the influence on purchase intention and consumer attitude within the TAM framework. The findings will help retailers use AI to drive positive purchasing attitudes among consumers and enhance customer experience.

In consideration of this purpose of study, the paper is structured as follows: Section 4 presents the review of existing literature on the TAM model and important components identified in the study, Section 5 defines the research methodology, Section 6 states the data analysis, and Sections 7,

8 and 9 concludes the study by stating study conclusions, its implications, contributions and limitations.

2 Aim of Study

The study aims to assess the impact of AI on the consumer's purchase intention towards online grocery shopping in India using the TAM model.

3 Literature Review

TAM Model

Fred Davis is the founder of the TAM. The theory was first developed in 1989 by Davis (Kotilainen et al. 2021). The purpose behind the development of this framework was to give direction to the organizations and their stakeholders regarding new e-technology or e-services, their benefits and the best procedures to accept and utilize these technologies. The TAM model is based on the belief that the intent behind adopting a technology is affected by the perceived usefulness of the technology and the convenience of using it (Aljarrah, Elrehail, and Aababneh 2016). The TAM Model measures the effectiveness of new technology, and its corresponding acceptance/rejection based on four internal variables, namely, PEU, PU, attitude toward use (ATU) and behavioural intention to use (BI) (Kowalska-Pyzalska 2023). Over time, the TAM Model has evolved drastically and is considered a highly relevant tool for assessing human behaviour in the context of the potential reception and refutation of any innovative technology (Kowalska-Pyzalska 2023). Thus, it can be concluded that TAM is a framework that accesses the intention of the targeted users to accept or discard a new technology. So, the TAM Model can be considered ideal for the present study in finding out the level of acceptance of AI among Indian online customers and its impact on their purchase behaviour.

Perceived Usefulness (PU)

PU is an important component of the TAM model that defines the degree by which an individual believes that using a particular technology will contribute towards enhancing their own performance (Na et al. 2022; Davis 1986). Previous studies have identified that PU has affected the attitude of an individual towards adopting a technology (Nagy and Hajdu, 2021). Geddam, Nethravathi, and Hussian (2024) evaluated the influence of PU on the attitude

towards AI for the IT employees of Bengaluru, India. The analysis identified the existence of a positive influence of PU on attitude towards AI. Denaputri and Usman (2020) conducted a study to find out how technology acceptance impacts the online purchase intention of customers in the retail sector. The study using the TAM model identified that PU affects the level of trust of the customers in the new technology. Even PU influences the purchase intention of the customers. Wang et al. (2023) studied the impact of AI technology on the purchase intention of consumers who make purchases through e-commerce sites in the retail sector. The researcher also used the TAM model for analysis with the inclusion of variables such as PU. The analysis also showed that PU impacts the acceptance as well as its use by this targeted population. These studies focused on evaluating the impact of PU on attitude towards AI for online shopping. But all of these studies have not explored the linkage between PU and the consumers for the online grocery segment. As the need of the study is to have more understanding of the role of AI for the online grocery shopping thus, this study states the hypothesis for examining the influence.

Hypothesis 1: PU positively impacts the attitude of online customers towards the AI-based online grocery shoppingin India.

Perceived Ease of Use (PEU)

PEU is another component of the TAM model which states the degree to which an individual accepts that the developed new technology will be easy to adopt without requiring a steep learning curve or extensive physical efforts (Na et al. 2022; Davis 1986). Nagy and Hajduin 2021 researched the consumer acceptance of AI-based online shopping experience in the retail sector. The analysis using the TAM model showed that the PEU of technology influences the attitude of consumers toward technology-based online shopping. The study also found that trust is a key variable that influences consumer attitudes towards AI. Geddam, Nethravathi, and Hussian (2024) also focused on including PEU as an important component of influencing AI adoption by IT employees in Bengaluru, India. The analysis revealed that PEU have a positive influence on influence the attitude of employees to use of AI technologies. Existing studies have identified the significant role of PEU in influencing the attitude towards AI of consumers however the focus of studies has been generally on online shopping without examination of PEU's role in online grocery shopping, therefore, below stated hypothesis has been formulated.

Hypothesis 2: PEU positively impacts the attitude of online customers towards an AI-based online grocery shopping environment in India.

Technology Attitude

Technology attitude is defined as the extent to which a person feels about learning or using technology (Tinmaz 2009). Employees' attitudes to technology have an important role in their behaviour of adopting AI (Lichtenthaler 2019). The existing researchers have identified that the technology attitude of an individual is influenced by many factors. Montag et al. (2023) mentioned that technology self-efficacy and the trust in automated technology of an individual have contributed to influencing the attitude towards AI. Also, Schepman and Rodway (2022) highlighted that higher corporate distrust leads to the presence of a negative attitude of an employee towards AI. Therefore, there are many technological attitude aspects of an employee which have contributed to influencing the attitude towards AI. However, as existing research as not focused on evaluating the impact empirically for the online grocery shopping environment and especially for India, thus, below stated hypothesis is formulated.

Hypothesis 3: Technology attitude positively impacts the attitude of online customers towards an AI-based online grocery shopping environment in India.

Attitude Towards AI

The attitude of an individual towards technology could influence the behaviour of the person (Eickhoff and Zhevak 2023). Existing studies have identified that the presence of more enthusiasm among consumers towards AI use could result in having a positive attitude towards AI. This existence of a positive attitude results in having a higher purchase intention for shopping (Jain and Gandhi 2021). Arachchi and Samarasinghe (2023) also with an evaluation of consumers for the retail industry in Sri Lanka mentioned that there is a positive role of attitude towards AI on the purchase intention of consumers. These studies defined the positive contribution of attitude towards AI, however, as there has been limited focus on assessing the impact of online shopping, especially grocery shopping, therefore, this study proposed the below hypothesis.

Hypothesis 4: The attitude of online customers towards the AI-based online grocery shopping experience positively impacts the purchase intention of customers in online grocery shopping environment in India.

Purchase Intention

Purchase intention is defined as the behaviour of an individual wherein a person desires to choose a product or buy it based on their experience in consuming, wanting or using a product. As purchase intention is the first step of the purchasing behaviour of a person, therefore, it is an important element for motivating product purchases by a consumer (Andrina et al. 2022). Nguyen, Thi Thu Truong, and Le-Anh (2023) intended to study the trends in online purchase behaviour of retail sector customers by applying the TAM model. Interpretation of data collected through a questionnaire-based survey revealed that TAM factors, perceived value, and perceived enjoyment significantly impact online purchase behaviour. Arachchi and Samarasinghe (2023) also examined the purchase interest and willingness of E-commerce customers in an AI-powered environment. The analysis by the researchers revealed that PU and PEU related to AI technology positively impact the purchase intention of customers. The existing studies identified the important contribution of TAM components in influencing the purchasing behaviour of consumers. Though existing studies assessed the linkage, but the examination of the TAM component's impact on online grocery shopping is lacking. Hence, this study proposed the conceptual framework for assessing the impact of TAM components.

AI Technology

The rapid growth of technology has contributed towards the making of a highly dynamic e-commerce environment. Many companies adopt these technologies to gain a competitive advantage (Manikandan and Bhuvaneswari 2024). Some of the significant innovative technologies in the field are as follows:

Voice search based

A significant technology in the field of online shopping is AI-based Voice Search (Manikandan and Bhuvaneswari 2024). Mahajan (2023) while studying the AI technology acceptance and consumer purchase intention focused on including the TAM components i.e. PU and PEU. Herein, the researcher specifically focused on voice assistant (VA) technology. The analysis demonstrated that PU and PEU have positive influence on the attitude of consumers towards acceptance of technology. Herein, though the researcher evaluated the linkage between TAM component and attitude towards AI but herein the important role was of the selected AI technology i.e. VA. In today's time,

AI-based Voice Search has a significant presence in terms of revolutionising the Indian e-commerce industry. The significance of AI in India's grocery market is complicated by varying literacy rates and diverse consumer preferences across different regions of India. Voice Search has relevance in India's online grocery market because it overcomes literacy barriers. Therefore, voice search is limited to serving towards searching for products, reading reviews promptly and placing orders in a customized manner (Skyram 2024). More than 28% of online product search enquiries are done in India through AI-enabled voice search technology (Raman 2021). In India, where grocery product names can be in multiple languages or dialects, voice search provides an intuitive way to find specific items. As AI-based Voice Search helps businesses collect data regarding various aspects of customer needs and satisfaction, this innovative technology has shown the potential to garner retail customers' satisfaction and customer loyalty (Ersoy 2022; Manikandan and Bhuvaneswari 2024). Thus, the usage of VA technology could have a significant influence on affecting perception of consumer.

Chatbots

Chatbot is another type of software that imitates human communication through voice and/or text-based interactions (Adamopoulou and Moussiades 2020). Çelik, Hüseyinli, and Can (2022) while discussing the purchase intention of consumers of Azerbaijan and Turkey in e-shopping focused on assessing the influence of PU on the attitude towards AI. Herein, the researcher selected chatbots as the AI technology. The analysis revealed the positive contribution of PU on the attitude towards chatbot technology. Han (2021) suggests that imitating a human like communication in chatbot design enhances consumers' shopping experience and purchase intentions by eliciting a greater sense of social presence and enjoyment. This shows in the growing preference of consumers towards Chatbots. Also in India, a chatbot is used by 51% of retail customers for product searches and shopping recommendations due to their personalized services which enhance e-shopping satisfaction (India Retailing Bureau 2024; Kappi and Marlina 2023). This high adoption rate is particularly significant in the grocery sector, where customers often need real-time assistance with product selection, substitutions, and delivery scheduling. The study of Soni and Dubey (2024) specifically presented that chatbots add the needed human touch to customer service by operating as virtual assistants for customers. This makes the shopping experience through chatbots engaging. The study by Luo et al. (2019) showed that chatbots can simulate conversations using voice or text commands. Thus,

the usage of chatbots has contributed to influencing consumer attitudes while using online shopping due to their ability to personalize the e-shopping experience and meet the precise needs of individual customers.

Personalized recommendations

Personalized product recommendation systems were developed to solve the problem of information overload and improve the user shopping experience. With the rapid development of the Internet and e-commerce, consumers are facing a massive selection of products, making it difficult to find the products they are truly interested in (Song, 2023). Personalized Recommendations become especially powerful in the grocery shopping context because of the recurring nature of grocery purchases. From the review of the literature, personalized recommendations have been found as a distinctive feature of AI-based online shopping environment. Personalized recommendations have become essential for e-commerce platforms in India to enhance revenue and customer engagement (Mehta et al. 2021). A study by Adawiyah et al. (2024) assessed the change in usage intention and attitude of consumers in the online shopping of cosmetics. The examination includes personalized recommendations technology as the focus area. Herein significant role of PU on attitude towards technology was identified revealing the growing preference of consumers towards technologies providing personalized recommendations. Moreover, Song (2023) found that algorithmic product recommendations are positively correlated with consumers' impulse purchase intentions. The diversity of recommendations has a stronger correlation with impulse buying than the accuracy. In India, the preference for online shopping accelerated with the recent pandemic. Local retail businesses transitioned to the online platforms for providing accurate recommendations for the customers. In grocery shopping, this translates to understanding household consumption patterns, suggesting restocking times, and recommending complementary products based on typical Indian meal compositions. Therefore, usage of personalization in e-commerce sites could contribute towards improving product discovery by considering recent browsing behaviour, current sales trends, and user's general interests (Jannach and Ludewig 2017). A study of Stanciu and Rindasu (2021) shows that AI-based shopping apps collect the personal information of customers to offer personalized shopping recommendations on types of products, their features and pricing. Thus, advancements in AI technology in the form of personalized recommendations contribute to providing a better shopping experience and raising the purchase intention of the consumer in the growing Indian e-commerce market.

The positive influence of Perceived Usefulness (PU) and Perceived Ease of Use (PEU) on consumer attitudes suggests that Indian consumers are more likely to adopt AI-powered grocery shopping platforms when they clearly understand the benefits and find the technology easy to use. Researchers such as Nazir et al. (2023), Chowdhury, Basu, and Singh (2024), and Subbaiah et al. (2024) mentioned that the emergence of AI technologies has a positive contribution in influencing the experience of consumers resulting in affecting their purchase intention. Even Chowdhury, Basu, and Singh (2024) stated that factors which major affect the AI-based purchase intention are the usage of technologies like personalized recommendations or chatbots. Therefore, it can be defined that the emergence of AI technologies has contributed to influencing the purchase intention of consumers however existing studies lack in evaluating the role of different AI technologies in influencing the purchase intention for online grocery shopping and also, especially for India, therefore, this study proposes the below-stated hypothesis.

Hypothesis 5: AI technology has a positive influence on the purchase intention of customers on online grocery shopping websites in India.

Ademtsu, Pathak, and Oduraa (2023) identified that AI technologies have an important contribution in influencing the online shopping experience of consumers. Even the assessment of different technologies like personalized recommendations, voice search and chatbots revealed that the influence of PU or PEU varied on the attitude towards AI and purchase intention varied with technologies. This shows that the selection of AI technology may have contributed in moderating the shopping experience of consumers and their attitudes. Understanding this significance of AI technology, herein the study focusses on including AI technology as the moderating (variable influencing the relationship between two other variables) variable between different components (PU, PEU and technology attitude) and attitude towards AI. For this below stated hypothesis will be tested.

H6: AI technology has a moderating role in influencing the linkage between TAM components (PU and PEU) and technology attitude and the attitude of online customers towards an AI-based online grocery shopping environment in India.

Conceptual Framework

Based on the review of the literature, the proposed conceptual framework for the study is shown in Figure 1.

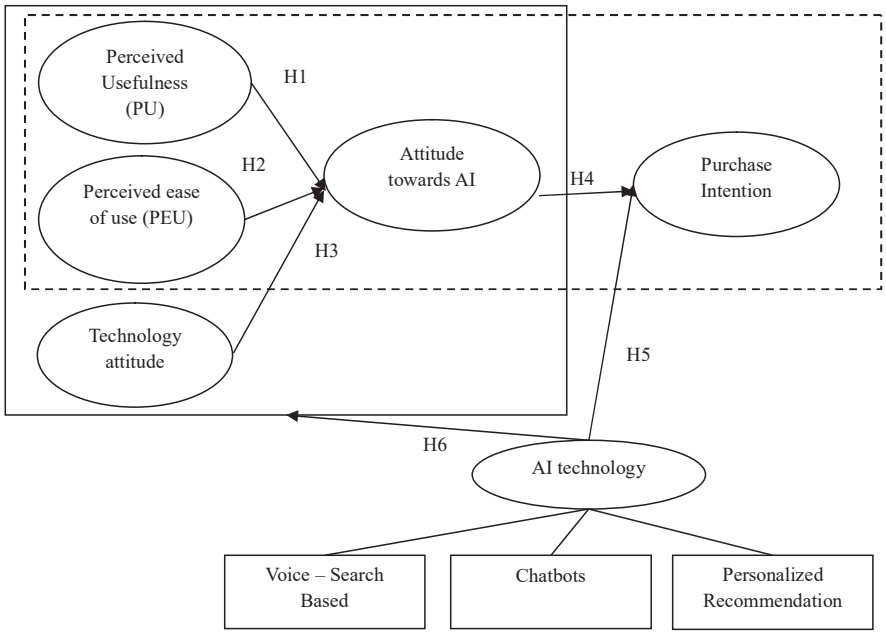

Figure 1 Conceptual framework.

Research Gap

While conducting the study, itwas identified that there is a paucity of India-specific studies on factors determining technology acceptance by e-commerce customers. Existing studies like Denaputri and Usman (2020), Wang et al. (2023), Nagy & Hajdu in 2021 and Nguyen, Thi Thu Truong, and Le-Anh (2023) have identified in their studies that TAM components influence the purchase intention of consumers. The studies identified that the major relevant components of TAM are PU, PEU and technology attitude which contribute to influencing the attitude of consumers towards AI.

Although the studies explored the impact of TAM components by considering different AI technologies, but the studies fail to understand the influence of different AI technologies on the purchase intention of consumers specifically in India. Previous studies have largely overlooked specific AI technologies' influence on consumer purchase intention. The understanding of the specific AI technologies influence is essential for personalizing consumer shopping experience, improving user interaction and predicting consumer preferences.

Even none of these studies were done concerning the consumers of India. Most of the studies currently examining the TAM component influence are based on economies other than India which results in having no account for the Indian consumer's unique cultural and socio-economic dynamics. As the e-commerce market in India is growing, there is a need to fill this gap by targeting the purchase intention of Indian consumers.

This study will address both these gaps by having the examination of AI technologies i.e. voice search, personalized recommendations and chatbots on the purchase intention and consumer attitude within the online grocery segment of India. Even An investigation will be done to assess the relationship between TAM components and consumer purchase intention resulting in having better understanding of technology adoption in Indian e-commerce. With this evaluation, more valuable information could be derived about the role of AI in shaping the Indian online grocery sector consumer behaviour.

4 Research Methodology

As the study focuses on assessing the impact of AI-driven technologies like chatbots, voice search, and personal recommendations, the researcher employed an epistemological research philosophy and interpretivism paradigms. These methods help in the evaluation of information derived from review by statistical examination. The population considered for the research were individuals aged 18 years who were using online grocery shopping applications and were living in the Delhi NCR region. The research was implemented on 300 respondents who were selected randomly to avoid the biasness in the sample selection. To collect the data, a close-ended questionnaire was designed, after carefully reviewing the existing literature. The questionnaire was segregated into three sections. The first section collected the demographic details of the sample. The second section was background analysis which aimed to assess the knowledge of respondents regarding the AI technology and how it enhances grocery shopping experience online. The third section consisted of the statements formulated to measure the impact of AI on influencing consumer behaviour. The data was gathered by distributing the questionnaire through Google Forms. Despite continuous email reminders, the response rate was low, resulting in a sample size of 231. After the data was collected, the demographic and background information of the respondents were analysed using frequency analysis and IBM SPSS software. The hypothesis was tested at a 5% level of significance, using the PLS-SEM model in IBM SPSS AMOS. PLS-SEM is a multivariate data analysis

method that is used to analyse complex relationships between constructs and their independent variables. PLS-SEM is often considered better fit it has less stringent assumptions for predictive research rather than confirmatory analysis, making it a better choice than CB-SEM (Covariance-Based SEM). Moreover, PLS-SEM can also handle non-normal data and smaller sample sizes, whereas CB-SEM requires larger sample sizes and normally distributed data (MacKinnon et al., 2006).

Before moving forward to the PLS-SEM model, the reliability and validity of the model were examined using the Cronbach alpha value and composite reliability (CR), and Average variance extracted (AVE) to ensure that there is no influence of biases on study findings. The threshold values for these estimates are as follows: for Cronbach alpha value and Composite reliability, a value of 0.7 or more is desired, and a value of 0.5 or above is required AVE. The fitness of the model was also measured by using the absolute fit measure (CMIN/DF, RMSEA), incremental fit measure (NFI, CFI, TLI, IFI) and parsimonious fit measure (PGFI, PCFI, PNFI). The respondents who participated voluntarily were included in the study and even due credit was given to authors in the form of in-text citations and references, thereby ensuring the authenticity of the analysis.

5 Data Analysis

To evaluate the impact of AI-driven technologies on consumers' purchase intentions for online groceries, the demographic characteristics of the 231 selected respondents were first assessed.

Figures 2 and 3 demonstrate the findings of demographical analysis. The results show that the chosen participants were educated, predominantly employed, and fell in the age bracket of 26–45 years. The majority of the surveyed individuals were married, males, had a monthly income between Rs. 40,001 – Rs. 60,000 and lived in households of 3–6 members. As these respondents were employed and had sizeable families, their grocery requirements were substantial, ultimately increasing their grocery shopping frequency. Thus, the selected samples are suitable for understanding the impact of AI advancements on consumers'online grocery shopping intentions.

Background analysis of the respondents is depicted in Figures 4 and 5. From the background information, it can be seen, that the respondents possess basic knowledge about AI, with social media being the primary source of information. The assessment shows that respondents engaged in online

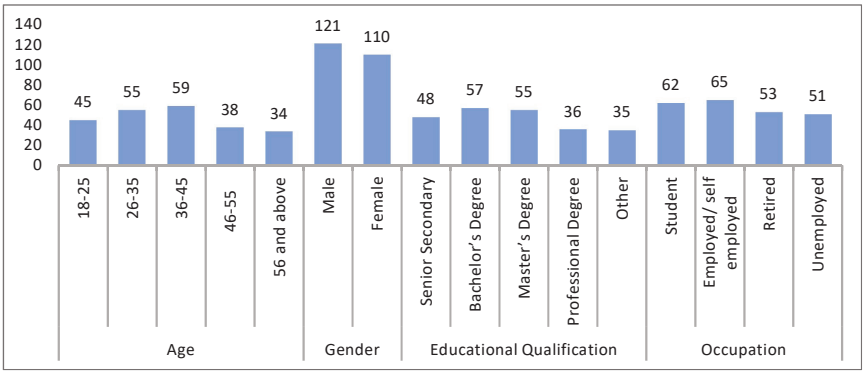

Figure 2 Demographic analysis.

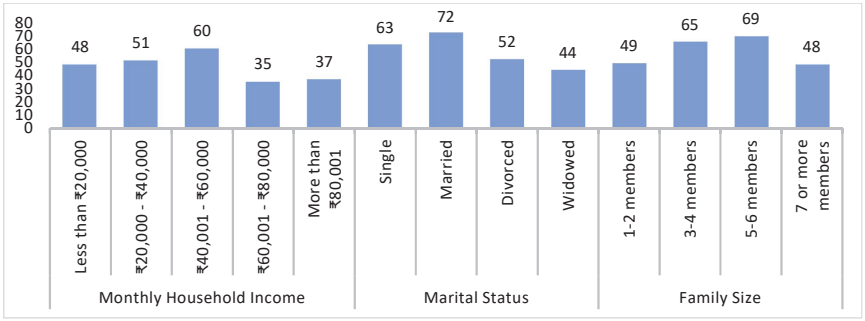

Figure 3 Demographic analysis.

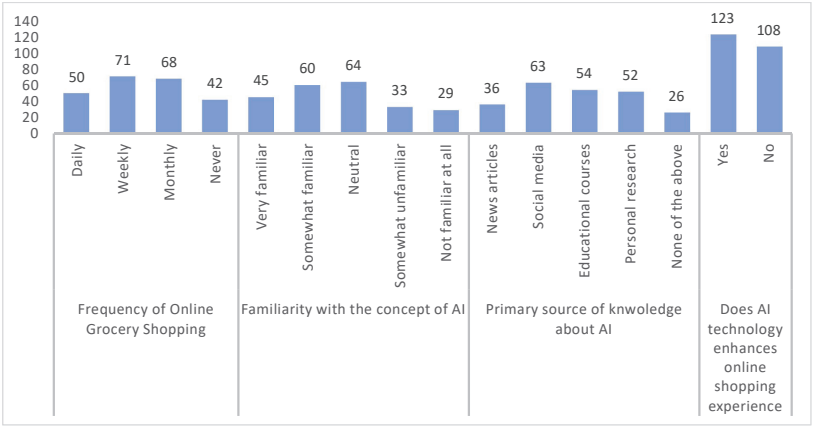

Figure 4 Background analysis.

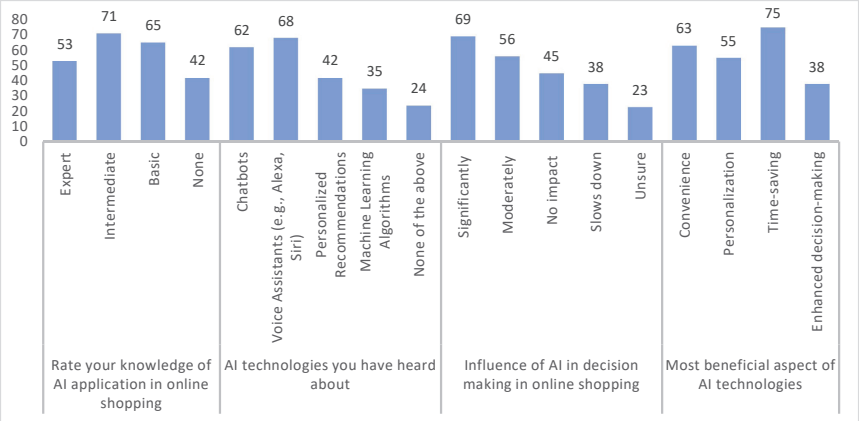

Figure 5 Background analysis.

shopping weekly. It was further highlighted that AI technology enhances consumer shopping experience and the majority of respondents have intermediate knowledge of online shopping applications. Voice assistance was the most liked AI-driven feature. AI significantly influences shopping decisions, saves time, and offers convenience to the user. Since the selected respondents are familiar with the use of AI technology, the selected sample is efficient enough to provide relevant insights into the impact of AI technology on consumers' online grocery shopping intentions.

To examine the impact of AI technologies on Indian customer purchase intention towards online grocery shopping, six main constructs were selected i.e. Perceived Usefulness, Perceived ease of use, Technology attitude, Attitude towards AI, AI technology (chatbots, voice search, personalized recommendations), and Purchase Intention. The model for hypothesis testing was developed using these variables. However, before proceeding further with the building of the PLS-SEM model, it is essential to assess the reliability and validity of the statements incorporated. Cronbach alpha value and composite reliability value are used to determine the reliability of the data. The minimum required limit for Cronbach alpha value and composite reliability (CR) is 0.7 (Hamid, Sami, and Sidek 2017), if the values are less than 0.7 it signifies that the statements are not reliable enough to explain the impact. To measure the convergent validity, the average variance extracted (AVE) value is used, the required limit for which is 0.5 or more. Discriminant validity is also examined using the square root value of AVE (Tilahun, Berhan, and

Tesfaye 2023). The results of the reliability and validity test are presented in the Table 1.

Table 1 shows the statements used for determining the impact, the codes used to refer to the statements, the factor loading value, CR, AVE and the Cronbach alpha value. The results from Table 1 show that the value of composite reliability varies from 0.78 to 0.83 and Cronbach alpha values range between 0.87 to 0.90. As both the CR value and Cronbach alpha value are above 0.7, therefore it can be interpreted that the model is reliable. Table 1 also shows that the AVE value ranges from 0.56 to 0.88, thereby surpassing the required value of 0.5, signifying that all items in the measurement model are statistically significant. The factor loading value for all the constructs approximates to 0.5 or is greater than that, which symbolizes that each of the items is efficient in measuring the respective constructs i.e. there is internal consistency is present.

The results for the discriminant validity are illustrated in Table 2, wherein it was observed that the AVE square root value for all the constructs is more than the intercorrelation between constructs showing the presence of discriminant validity in the model.

After assessing the reliability and validity of the model, the PLS-SEM model is developed to statistically examine the hypothesis as shown in Figure 6.

Many times, the original model may not fit well for deriving association among variables, requiring an evaluation of the model's effectiveness. For the original model shown in Figure 6, the value for model fitness was initially very low. Therefore, the covariance-based linkages between the error term were drawn and a modified model was formulated.

According to research executed by Dash and Paul (2021), it was recommended that the PLS-SEM model is said to be effective if it fulfils the stated criteria: the values of NFI, IFI, CFI, and TLI should be more than 0.9, CMIN/DF should be less than 5, RMSEA should be less than 0.10, and PCFI, PNFI, and PGFI should be greater than 0.5. If these criteria are fulfilled, the model is said to be effective. From the results depicted in Table 3, it can be interpreted that values for PCFI, PGFI, and PNFI are approximately equal to or above 0.5. The CMIN/DF value is less than 5, and the CFI, IFI TLI and NFI values are approximately close to 0.9. As the majority of the indexes are close to the required values, thus, the model can be fitted to test the hypothesis for linkage between the variables.

The regression outcome for the proposed hypothesis is demonstrated in Table 4. The results show that the p-value for almost all the linkages

Table 1 Reliability and validity measures

Statements	Codes	Factor Loading	CR	AVE	Cronbach Alpha
Perceived Usefulness					
Grocery shopping task accomplished effectively	PU1	0.71	0.81	0.72	0.88
Grocery shopping using AI increases consumer productivity	PU2	0.64			
It is easier to find groceries online, helping to meet consumer needs	PU3	0.96			
Personal recommendation by AI tools is useful in making a purchase decision	PU4	0.97			
Online Shopping improves the overall shopping experience	PU5	0.91			
Perceived Ease of Use					
It is easy to interact with AI for grocery shopping	PEU1	0.72	0.81	0.74	0.87
Grocery shopping platforms are user-friendly	PEU2	1.00			
Learning AI tools is straightforward	PEU3	0.99			
Grocery shopping using AI is clear and understandable	PEU4	0.78			
Easy to adapt for grocery shopping	PEU5	0.75			
Technology Attitude					
AI technology is comfortable to use.	TA1	0.41	0.78	0.56	0.88
Positive attitude towards AI	TA2	0.78			
AI is the future of online grocery shopping platforms	TA3	0.96			
Positive experience in online grocery shopping	TA4	0.49			
AI tools facilitate the shopping experience	TA5	0.93			
Attitude Towards AI					
Confident in using AI for grocery shopping	ATAI1	0.87	0.80	0.67	0.87
Favourable opinion for AI	ATAI2	0.92			
Using AI for shopping is enjoyable	ATAI 3	0.64			
AI enhances the overall appeal of for shopping grocery	ATAI 4	0.76			
AI is an essential part of modern online grocery shopping	ATAI 5	0.87			

(*Continued*)

Table 1 Continued

Statements	Codes	Factor Loading	CR	AVE	Cronbach Alpha
Purchase Intention					
Likely to purchase groceries through a shopping platform	PI1	0.89	0.82	0.88	0.89
AI influences the grocery buying decision	PI2	0.93			
recommendations increase intention to complete grocery purchase	PI3	0.96			
AI acts as a key factor in choosing an online shopping platform	PI4	0.90			
AI-driven shopping platforms are recommended	PI5	1.01			
AI Technology					
Voice-based search is convenient	AI1	0.81	0.83	0.69	0.90
The voice-based feature enhances the shopping experience	AI2	0.98			
Chatbots effectively assist in resolving queries	AI3	0.67			
Chatbots help provide quick and accurate information	AI4	0.88			
The personal recommendation makes the experience enjoyable	AI5	0.66			
Recommendations are relevant for shopping for groceries	AI6	0.92			

Table 2 Discriminant validity

	Perceived Usefulness	Perceived Ease of Use	Technology Attitude	Attitude Towards AI	Purchase Intention	AI Technology
Perceived Usefulness	0.85					
Perceived Ease of Use	0.06	0.86				
Technology Attitude	0.52	0.21	0.75			
Attitude Towards AI	−0.01	0.20	−0.05	0.82		
Purchase Intention	0.09	0.00	0.24	0.20	0.94	
AI Technology	0.00	−0.10	0.02	−0.13	0.20	0.83

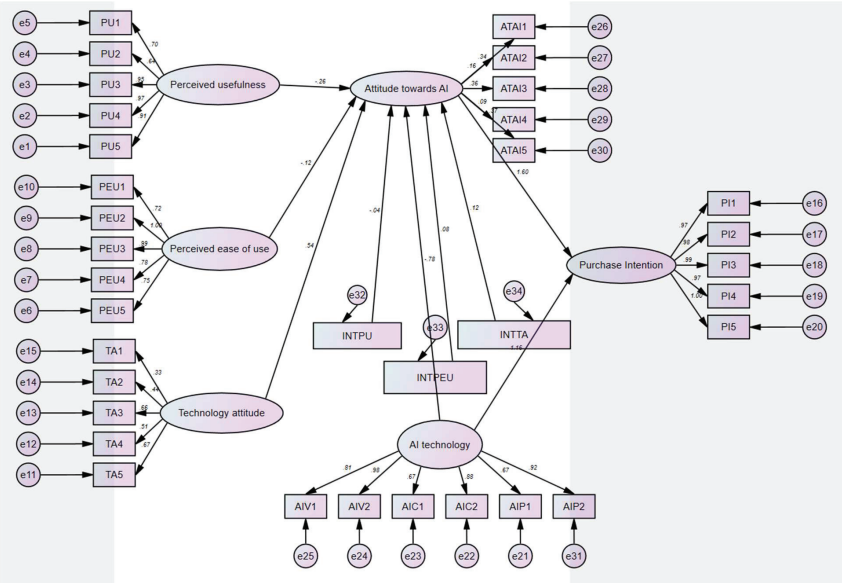

Figure 6 PLS-SEM model.

Table 3 Model fitness indices

Index	Value
Parsimonious Comparative Fit Index (PCFI)	0.60
Parsimonious Goodness of Fit Index (PGFI)	0.48
Parsimonious Normed Fit Index (PNFI)	0.58
Root means square error of approximation (RMSEA)	0.12
CMIN/DF	4.36
Comparative Fit Index (CFI)	0.89
Tucker-Lewis Index (TLI)	0.84
Normed Fit Index (NFI)	0.87
Incremental Fit Index (IFI)	0.90

except for Hypothesis 4, is less than 0.05, indicating the rejection of the null hypothesis. Consequently, it can be inferred from the results, that the null hypothesis of no impact of PU positively impacting the attitude of the online customers towards the AI-based online grocery shopping experience in India (H1), PEU positively impacting the attitude of online customers towards an AI-based online grocery shopping environment in India (H2), Technology attitude positively impacting the attitude of online customers towards an AI-based online grocery shopping environment in India (H3), AI technology

Table 4 Regression results

	Estimate	S.E.	T-value	P-value	Result
Perceived Usefulness → Attitude towards AI(H1)	−0.17	0.05	−3.33	0.00	Accepted
Perceived ease of use → Attitude towards AI(H2)	0.25	0.05	4.80	0.00	Accepted
Technology attitude → Attitude towards AI(H3)	0.08	0.03	2.74	0.01	Accepted
Attitude towards AI → Purchase Intention (H4)	0.02	0.02	1.27	0.21	Not Accepted
AI technology → Purchase Intention (H5)	0.32	0.08	4.10	0.00	Accepted
Perceived Usefulness – AI technology Interaction → Attitude towards AI (H6)	0.29	0.06	4.98	0.00	Accepted
Perceived ease of use – AI technology Interaction → Attitude towards AI (H6)	−0.12	0.04	−2.90	0.00	Accepted
Technology attitude – AI technology Interaction → Attitude towards AI (H6)	−0.23	0.06	−3.62	0.00	Accepted

has a positive influence on the purchase intention of customers in online grocery shopping websites in India (H5), AI technology has a moderating role in influencing the linkage between TAM components and attitude of online customers towards an AI-based online grocery shopping environment in India(H6) can be rejected at a 5 percent significance level.

The null hypothesis of no impact of the attitude of online customers towards the AI-based online grocery shopping experience positively impacts the purchase intention of customers in online grocery shopping websites in India cannot be rejected as the derived p-value is greater than 0.05, leading to rejection of the null hypothesis. The estimated value in Table 4 states the coefficient value for the relationship, defining the nature and extent of the relationship between the variables. Herein, there is a positive association between PEU and attitude towards AI, Technology attitude and attitude towards AI, AI technology and purchase intention, and PU-AI technology Interaction and attitude towards AI. A negative association can be witnessed between PU and attitude towards AI, PEU – AI technology Interaction and attitude towards AI, and Technology attitude – AI technology interaction and attitude towards AI. AI acts as a moderator by altering the direction of effects i.e. PU has a positive affect now while PEU and technology attitude

have a negative influence on attitude towards AI. Therefore, we can say that the TAM component plays a pivotal role in influencing consumer attitudes. PU determines how beneficial the technology is, PEU measures the user-friendliness of technology and technology attitude assesses the consumer's perception of the technology used, making it important to be considered for influencing the purchase intention of consumers.

6 Conclusion

The study identifies the transformative role of AI in shaping the purchase intention and consumer attitude in the Indian online grocery segment, mainly in the Delhi NCR region, addressing gaps in existing literature by focusing on India's unique socio-economic context. It confirms prior findings on the effectiveness of TAM components while extending their application to AI technologies in online grocery shopping. The PLS-SEM model's assumptions were rigorously assessed to ensure robustness and validity. Reliability was confirmed through Cronbach's Alpha and Composite Reliability (CR), with all constructs exceeding the 0.7 threshold. Convergent validity was validated by Average Variance Extracted (AVE) values surpassing 0.5, indicating strong internal correlations within constructs. Discriminant validity, tested using the Fornell-Larcker criterion, demonstrated that all constructs were distinct from one another. Fit indices, including CMIN/DF, RMSEA, NFI, CFI, and TLI, were evaluated, with the model showing acceptable levels after modifications. Regression analysis confirmed significant effects for most hypothesized relationships, underscoring the model's effectiveness in analyzing complex interactions between AI technologies, TAM components, and consumer purchase intentions.

From the study and the existing literature, it can be interpreted that the TAM model contributes to examining how technology contributes to enhancing customer experience. This enhancement could be in terms of providing a feature of quickly adding items to a cart like in companies such as Bigbasket or providing the feature of repeating previous orders to provide a hands-free experience. This linkage identification in the study provides a way for firms to develop user-friendly and easy-to-use technologies and tools to captivate more users. The empirical evaluation of the consumers indicated that PU, PEU and technology attitudes were statistically significant and had a considerable influence over the consumer's attitude towards AI. The AI technology was also statistically significantly affecting the consumer's attitude towards AI. Furthermore, it was depicted that AI technology acts as

a moderating variable between the TAM aspects (PU, PEU, and Technology attitude) and consumer's attitudes towards AI. In PLS-SEM, the moderating role of a variable refers to how the construct influences the direction of the relationship between an independent variable and a dependent variable (Hair et al., 2022). In other words, a moderator changes the effect that the independent variable has on the dependent variable. This means diverse and accurate product search through voice and chatbots and personalized product recommendations, help users discover more products that meet their interests, improving their shopping experience and satisfaction.

The existing study findings also supported Denaputri and Usman (2020) and Wang et al. (2023) findings of having the significant role of TAM components. However, by addressing the unexplored domain i.e. TAM model interplay with AI technologies for online grocery shopping in India, this research adds to existing studies. The novelty of this study lies in the India-focused research on the AI impact onthe online grocery segment and integration of the AI technologies and the TAM components. Also, the unique contribution of the study is in the development of the practical framework for e-retailers which could help in enhancing user experience. Further, the usage of the PLS-SEM model helped in building a more dynamic and complex model for assessing consumer purchase intention. This helped in identifying the significant role of AI technologies in creating positive attitudes among consumers toward the usage of AI.

7 Implications and Contributions to the Study

The empirical study shows that people are now attracted to online shopping for groceries due to AI-driven tools like personal recommendation and voice search. These tools help the user in faster and better decision-making, thereby widening the customer base for e-retailers and building in more trust. The analysis identified that all three technologies have relevant contributions in influencing the attitude towards AI of consumers, so based on the available human and financial resources, online grocery shopping companies could integrate the relevant AI technologies. These findings suggest that a technology-based consumer experience enhancement framework should be designed by the companies wherein the focus is on providing advanced services to consumers. Voice search capabilities can be tailored to address regional language preferences, making the shopping experience inclusive. Additionally, retailers can also employ chatbots for real-time query resolution and personalized assistance, improving customer satisfaction. Regular

feedback mechanisms can be implemented to gather consumer insights, enabling continuous improvement of AI-driven services.

To support this integration into practical engineering applications, there is the implementation of personalized recommendations with machine learning algorithms for having a real-time recommendation engine. This ensures continuous adoption of customer needs. Further, using natural language processing (NLP) technology, AI-based voice recognition tools could be implemented which will help in deriving more accuracy in understanding voice commands. Lastly, conversational AI frameworks can help in providing personalized assistance to customers 24*7 and improving their engagement. Even a feedback mechanism could be included to gather insights into improving the tool. These strategies will help in the easy integration of the proposed framework and supporting e-retailers in deriving the benefit identified in this study i.e. raised purchase intention of consumers towards online grocery in India.

8 Limitations

Although the study was efficient enough to explain the impact of AI-driven Technologies on consumers' behaviour and their purchase intention of grocery online. However, there were some limitations associated with the study, which could be addressed in future research. Firstly, this study is conducted over a fixed time and does not show how the purchase intention of consumers may change over time. Secondly, a small sample of 231 consumers only from the Delhi NCR region was considered to represent the change in purchase intention for all consumers in India. This is a small sample and restricted demographics for the generalization of the results. The restricted geographical scope and the sample size has been due to the practical constraint of limited time and funds availability for a more diverse survey. Also, the study fails to include factors like cultural inferences, socio-economic status, or external market trends in the study along with TAM components for understanding the purchase intention. This has been due to the specific aim of the researcher towards evaluating the TAM component's applicability firstly for the online grocery sector in India before having a broader scope of study due to limited resources. While the study effectively employs PLS-SEM for analyzing consumer behavior and the impact of AI technologies, it does not leverage advanced AI modeling techniques such as machine learning or deep learning. These methods could have provided deeper insights into complex non-linear relationships and dynamic consumer

behaviors, but their implementation was constrained by resource availability and the study's predefined scope. Despite these limitations, the study has meaningful contributions to the Indian online grocery segment, thus, the work is relevant.

9 Future Research

Despite its limitations, such as a limited sample size and geographic scope, the study lays a foundation for future research on emerging AI technologies and their role in shaping consumer behavior in India's evolving e-commerce market. With the need for results generalization for India and other economies like India, future research could expand the sample size and geographic scope to include a more diverse demographic representation. Longitudinal studies could explore how consumer attitudes and purchase intentions evolve with advancements in AI technologies. Another direction would be the exploration of emerging AI technologies like real-time inventory tracking or AR-based shopping assistants for a better understanding of the behaviour of consumers in the e-commerce market. Also, the role of demographics on specific AI applications could be examined in future studies. Moreover, as the study focused on moderating the role of AI technologies, the direct assessment of AI technologies' impact by considering factors like cultural nuances, privacy concerns, and consumer trust could be done for a better view of AI technologies' role in the online grocery market of India. Furthermore, future research should also explore the use of advanced AI modeling techniques like machine learning and NLP to uncover nuanced patterns in consumer behavior. Such methods can enrich the understanding of AI's impact, provide predictive capabilities, and support the development of adaptive frameworks for personalized consumer experiences in the online grocery sector.

Appendixes

Appendix 1: Questionnaire

Section A: Demographic

1. **Age:**
    - 18–25
    - 26–35

- 36–45
- 46–55
- 56 and above

2. **Gender:**
    - Male
    - Female
3. **Educational Qualification:**
    - Senior Secondary
    - Bachelor's Degree
    - Master's Degree
    - Professional Degree
    - Other
4. **Occupation:**
    - Student
    - Employed/ self-employed
    - Retired
    - Unemployed
5. **Monthly Household Income:**
    - Less than ₹20,000
    - ₹20,000 – ₹40,000
    - ₹40,001 – ₹60,000
    - ₹60,001 – ₹80,000
    - More than ₹80,001
6. **Marital Status:**
    - Single
    - Married
    - Divorced
    - Widowed
7. **Family Size:**
    - 1–2 members
    - 3–4 members
    - 5–6 members
    - 7 or more members

Section B: Background

8. **Frequency of Online Grocery Shopping:**
    - Daily
    - Weekly
    - Monthly
    - Never
9. **How familiar are you with the concept of Artificial Intelligence (AI)?**
    - Very familiar
    - Somewhat familiar
    - Neutral
    - Somewhat unfamiliar
    - Not familiar at all
10. **What is your primary source of information about AI technologies?**
    - News articles
    - Social media
    - Educational courses
    - Personal research
    - None of the above
11. **Do you believe that AI technologies can enhance the online shopping experience?**
    - Yes
    - No
12. **How would you rate your knowledge of AI's application in online shopping?**
    - Expert
    - Intermediate
    - Basic
    - None
13. **Which of the following AI technologies have you heard about?**
    - Chatbots
    - Voice Assistants (e.g., Alexa, Siri)
    - Personalized Recommendations
    - Machine Learning Algorithms
    - None of the above

14. **In your opinion, how does AI influence the speed of decision-making in online shopping?**
    - Significantly
    - Moderately
    - No impact
    - Slows down
    - Unsure
15. **Which aspect of AI in online shopping do you find most beneficial?**
    - Convenience
    - Personalization
    - Time-saving
    - Enhanced decision-making
    - None of the above

Section C: Inferential

17. Please indicate your level of agreement with the following statements regarding the impact of AI factors in consumers purchase intention towards online grocery shopping in India. (Rate each from 1 to 5, where 1 is "Strongly Disagree" and 5 is "Strongly Agree")

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Perceived Usefulness (PU)					
AI-based online shopping helps in accomplishing grocery shopping tasks more efficiently.					
Using AI technologies in online grocery shopping increases consumers productivity.					
AI tools make it easier to find groceries that meet consumer's needs.					
AI-based recommendations are useful in making grocery purchase decisions.					
AI features in online grocery shopping improve the overall shopping experience.					

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Perceived Ease of Use (PEU)					
It is easy for to interact with AI-based tools during online grocery shopping.					
AI-based features in online grocery shopping platforms are user-friendly.					
Learning to use AI technologies for online grocery shopping is straightforward.					
The steps to use AI tools in online grocery shopping are clear and understandable.					
I can easily adapt to using AI technologies for online grocery shopping.					
AI tools in online grocery shopping require minimal effort to use.					
Technology Attitude					
I am comfortable using new technologies, including AI, for online grocery shopping.					
I have a positive attitude towards adopting AI in my online grocery shopping routine.					
I believe that AI technologies will positively impact the future of online grocery shopping.					
I am open to trying new AI-based features in online grocery shopping platforms.					
My experience with AI technologies in online grocery shopping has been generally positive.					
I trust AI technologies to improve my online grocery shopping experience.					

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Attitude Towards AI					
I feel confident in AI technologies used in online grocery shopping.					
I have a favorable opinion of AI in online grocery shopping environments.					
I enjoy using AI tools during my online grocery shopping activities.					
AI enhances the overall appeal of online grocery shopping for me.					
I believe that AI is an essential part of modern online grocery shopping.					
Purchase Intention					
I am likely to make a grocery purchase through an AI-powered online shopping platform.					
AI-based features influence my decision to buy groceries online.					
AI recommendations increase my intention to complete a grocery purchase.					
I consider AI a key factor when choosing an online grocery shopping platform.					
I would recommend AI-powered online grocery shopping platforms to others.					

18. Please indicate your level of agreement with the following statements regarding the impact of AI-based online shopping environment in India. (Rate each from 1 to 5, where 1 is "Strongly Disagree" and 5 is "Strongly Agree")

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
AI Technology (Voice-based)					
I find voice-based search in online grocery shopping convenient.					

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Voice-based assistants enhance my online grocery shopping experience.					
AI Technology (Chatbots)					
Chatbots effectively assist me in resolving my queries during online grocery shopping.					
I find chatbots helpful in providing quick and accurate information when grocery shopping.					
AI Technology (Personalized Recommendations)					
Personalized recommendations make my online grocery shopping experience more enjoyable.					
AI-generated recommendations are relevant to my grocery shopping preferences.					

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