



# Impact of AI-Driven Product Recommendations on Brand Engagement: A Study of The Indian E-Commerce Sector

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**Abstract** – The rapid growth of the e-commerce sector, supported by advancements in artificial intelligence, has significantly transformed the way consumers interact with brands. Among various AI applications, AI driven product recommendations have emerged as a key tool for enhancing customer experience and influencing consumer behavior. This study examines the impact of AI driven product recommendations on brand engagement in the Indian e-commerce sector, with a specific focus on its cognitive, affective, and behavioral dimensions. The research adopts a quantitative approach using primary data collected from 301 online shoppers through a structured questionnaire. Statistical techniques including descriptive analysis, reliability testing, correlation, regression, and ANOVA were applied using SPSS to analyze the data. The findings indicate that AI driven product recommendations have a strong and statistically significant impact on brand engagement. The results show that AI recommendations positively influence cognitive engagement by increasing attention and awareness, and affective engagement by enhancing satisfaction and emotional connection. The impact on behavioral engagement is positive but comparatively moderate, suggesting a gap between consumer perception and actual action. Correlation and regression analysis further confirm that AI recommendations explain a substantial proportion of variation in brand engagement, highlighting their importance as a strategic marketing tool. The study also identifies variations in consumer responses across different segments, emphasizing the need for targeted personalization strategies. The study contributes to both theory and practice by providing a structured understanding of how AI driven recommendation systems influence different dimensions of engagement in an emerging market context. The findings offer valuable insights for e-commerce firms to design more effective, personalized, and customer-centric strategies while maintaining consumer trust and relevance.

**Keywords:** AI Driven Product Recommendations, Brand Engagement, E-Commerce Personalization, Consumer Behavior, Customer Experience, Artificial Intelligence in Marketing.

## I. INTRODUCTION AND REVIEW OF LITERATURE

### 1. Introduction

The rapid advancement of digital technologies has significantly transformed the landscape of marketing, particularly within the e-commerce sector. Over the past decade, online retail platforms have grown at an unprecedented rate, offering consumers greater convenience, wider product variety, and competitive pricing. This shift has also changed the way consumers interact with brands, as most purchase journeys now begin online rather than in physical stores. Consumers today expect quick, seamless, and personalized experiences at every stage of their shopping process. However, this expansion has also intensified competition among firms, making it increasingly challenging for businesses to attract, engage, and retain customers. In response to these challenges, organizations are increasingly adopting advanced technologies such as artificial intelligence to enhance customer experiences and build stronger relationships with consumers.

Artificial intelligence has become a critical enabler of personalization in e-commerce. Among its various applications, AI-driven product recommendation systems have gained particular importance. These systems utilize large volumes of consumer data, including browsing

behavior, purchase history, and individual preferences, to generate tailored product suggestions. These recommendations are commonly seen in features such as “recommended for you,” “customers also bought,” and personalized product feeds on websites and mobile applications. Such features are now considered standard across most leading e-commerce platforms. By filtering vast amounts of information and presenting relevant options, these recommendation systems help reduce information overload and support more efficient decision-making. As a result, they play a key role in shaping the overall shopping experience and influencing consumer behavior in digital environments. In addition, they allow firms to guide customer choices subtly, which can increase both engagement and sales without directly pushing the consumer.

In parallel, the focus of modern marketing has shifted from short-term transactions to long-term customer relationships. This shift has led to increased emphasis on the concept of brand engagement, which refers to the extent of a consumer’s cognitive, affective, and behavioral involvement with a brand. In the context of e-commerce, brand engagement is reflected through activities such as interacting with product recommendations, exploring platform features, sharing feedback, and making repeat purchases. Engaged customers are also more likely to trust the brand, recommend it to others, and remain loyal even when competitors offer similar products or prices.



Therefore, understanding the factors that influence brand engagement has become essential for both academic research and managerial practice.

Despite the growing adoption of AI-driven personalization strategies, existing literature has primarily focused on general personalization techniques or consumer behavior in developed markets. There remains a limited understanding of how AI-driven product recommendations specifically influence the different dimensions of brand engagement, particularly within emerging markets such as India. Many studies also do not consider how cultural differences, purchasing power, and digital awareness levels may affect consumer responses to AI technologies. The Indian e-commerce sector presents a unique and dynamic context characterized by rapid digital adoption, diverse consumer preferences, and increasing reliance on mobile commerce. These factors make it important to examine how Indian consumers perceive and respond to AI-based recommendation systems. Additionally, with the increasing use of data-driven technologies, concerns related to privacy and trust are also becoming important factors that may influence engagement.

In light of these considerations, the present study seeks to examine the impact of AI-driven product recommendations on brand engagement in the Indian e-commerce sector. The study specifically focuses on three key dimensions of engagement, namely cognitive, affective, and behavioral, to provide a comprehensive understanding of consumer responses. Additionally, the study aims to compare the effectiveness of these recommendations across different customer segments. This will help identify whether certain groups of consumers respond more positively to AI-driven recommendations than others, which can be useful for targeted marketing strategies. By addressing these aspects, the research intends to bridge existing gaps in the literature and contribute to a deeper understanding of the role of artificial intelligence in shaping consumer engagement. Furthermore, the findings are expected to offer practical insights for e-commerce firms in designing more effective, personalized, and customer-centric marketing strategies. Overall, this study aims to provide both theoretical and practical contributions by linking technology-driven personalization with consumer engagement in a real-world context.

## 2. Statement of the Research Problem

The rapid growth of the e-commerce sector has transformed the way consumers search for, evaluate, and purchase products. With increasing internet penetration and smartphone usage, especially in countries like India, online shopping has become a part of everyday life. However, this growth has also led to a major challenge for both consumers and businesses. Consumers are often exposed to a large number of product choices, which can create confusion and decision fatigue. At the same time, businesses face intense competition and find it difficult to capture customer attention and build long-term

relationships. In this situation, companies are increasingly turning to artificial intelligence to improve customer experience and engagement.

One of the most important applications of artificial intelligence in e-commerce is product recommendation systems. These systems use customer data such as browsing history, purchase behavior, and preferences to suggest relevant products. While these recommendations are widely used across platforms, there is still a need to understand how effective they are in influencing customer engagement with the brand. Many companies assume that personalized recommendations automatically lead to better engagement and higher sales, but this relationship is not always clearly understood or measured.

Another important issue is that brand engagement is a multidimensional concept. It includes how customers think about a brand (cognitive), how they feel toward it (affective), and how they act in relation to it (behavioral). Most existing studies have either focused on general customer behavior or treated engagement as a single concept, without analyzing these dimensions separately. As a result, there is limited understanding of how AI-driven product recommendations influence each aspect of engagement differently. For example, a recommendation might be useful and improve perception, but it may not always lead to emotional attachment or actual purchase behavior.

Furthermore, much of the existing research has been conducted in developed markets, where consumer behavior, digital literacy, and trust in technology may differ from emerging markets like India. The Indian e-commerce sector is unique due to its diversity in consumer preferences, varying levels of technological adoption, and growing concerns about data privacy. These factors may influence how consumers respond to AI-driven recommendations. However, there is limited empirical research that specifically examines this relationship in the Indian context.

In addition, consumers are not a homogeneous group. Different segments of customers, such as those based on age, shopping frequency, or digital familiarity, may respond differently to AI-based recommendations. Understanding these differences is important for businesses to design more effective and targeted strategies. However, current research does not sufficiently address how these variations impact brand engagement.

Therefore, the core problem addressed in this study is the lack of clear and context-specific understanding of how AI-driven product recommendations influence the cognitive, affective, and behavioral dimensions of brand engagement in the Indian e-commerce sector. By examining this relationship and comparing responses across different customer segments, this research aims to provide a more structured and practical understanding of the role of AI in shaping consumer engagement.



### 3. Review of Literature

Brand engagement has been widely discussed in marketing research as a multidimensional concept. It is usually understood as the cognitive, emotional, and behavioral involvement of a consumer with a brand. In simple terms, it shows how consumers think about a brand, how they feel about it, and how they act toward it. Earlier work by Brodie et al. (2011) explained that engagement is not only about buying, but also about the wider relationship between the consumer and the brand. Hollebeek et al. (2014) later strengthened this view by showing that consumer brand engagement can be measured through cognitive processing, affection, and activation. More recent studies have continued to refine the concept and show that engagement is linked with important outcomes such as sharing intentions, loyalty, brand love, and stronger brand relationships. Research in social media and luxury brand settings also shows that consumers engage more when content feels relevant, interesting, and useful. This gives a strong base for studying engagement in digital commerce, where brand interaction often happens through personalized content and recommendations rather than through direct human contact.

At the same time, recommender systems have become one of the most important tools in e-commerce. Their main role is to reduce information overload and help customers find products that match their needs more quickly. Early work by Konstan and Riedl (2012) showed how recommender systems moved from pure algorithms toward a stronger focus on user experience. Later review studies confirmed that the field has grown rapidly and now includes collaborative filtering, content based filtering, deep learning, and context aware models. Roy and Dutta (2022) noted that recommender systems are now central to filtering online information, while Bawack et al. (2022) found that research in artificial intelligence for e-commerce focuses mainly on recommender systems, personalisation, trust, and optimisation. Necula and Păvăloaia (2023) also showed that AI driven recommendations in e-commerce are now used in many forms, from virtual assistants to real time product suggestions. More recent work by Valencia Arias et al. (2024) and Rajpoot et al. (2026) shows that the area is still growing, with new attention on user experience, sentiment analysis, and adaptive recommendation methods. This suggests that AI driven product recommendations are not a small feature anymore, but a key part of the online shopping experience.

A major theme in recent literature is that AI driven recommendations can improve consumer perceptions, but only when they are seen as useful and trustworthy. Teepapal (2025) found that AI enabled personalisation can improve trust and perceived usefulness, and that these two perceptions are important for consumer engagement. Hassan et al. (2025) also showed that personalized recommendations strengthen the trust satisfaction loyalty chain in AI driven e-commerce. At the same time, Aydin

(2026) found that perceived relevance and specificity can improve psychological well being, but they can also increase privacy concerns. This is important because it shows that personalization has both benefits and risks. Lee (2021) explained this clearly through the personalization privacy paradox, where consumers want relevant suggestions but still worry about how their data is used. Badsha et al. (2016) similarly pointed out that recommender systems depend on personal data such as purchase history and demographic details, which makes privacy a real issue. Yin and Qiu (2021) showed that AI technology in online shopping can improve perceived value and purchase intention, especially when consumers feel that the system is useful. Taken together, these studies suggest that AI driven recommendations work best when consumers see them as relevant, helpful, and safe. Without trust, the same system can feel intrusive rather than useful.

The literature also shows that AI driven recommendations can affect actual consumer behavior, not just perceptions. Yin et al. (2025) found that AI personalized recommendations improve clicking intention in e-commerce, and that relevance, inspiration, and insight all play a role in moving consumers from browsing to action. Adawiyah et al. (2024) showed that AI and AR based personalized recommendations increase customer usage intention, especially when trust and usefulness are strong. Hassan et al. (2025) found that personalized recommendations improve loyalty through trust and satisfaction, which is important for repeat business. Beyari (2025) also reported that artificial intelligence has a positive effect on customer loyalty in e-commerce. In addition, Bilal et al. (2024) found that AI can improve consumer experience and consumer engagement, which then supports purchase intention. These findings matter for your study because they show a clear path from AI recommendations to measurable behavior such as clicking, purchasing, revisiting, and recommending. In e-commerce, this behavioral side of engagement is very important because it is where digital interest becomes business value.

Another important point in the literature is that not all consumers respond to AI recommendations in the same way. Consumer expertise matters. Turn 390076search4 shows that expert consumers and novice consumers react differently to recommendation systems, which means that the same AI feature may not have the same effect for every user. User control also matters. The study on controllable personalization found that giving users some control can improve both perception and behavior in personalized systems. Product type is another boundary condition. Recent research on AI reviews shows that the effect of AI generated content can depend on whether the product is a search product or an experience product. This is important because online shopping behavior changes across categories such as electronics, fashion, cosmetics, and daily use items. Studies in fashion and shopping assistance also show that trust, perceived risk, and identity fit influence whether personalization leads to purchase or recommendation intention. In short, customer segment,



product type, and the level of control given to the user can change how effective AI driven recommendations are. This supports your fourth objective, which compares the effect across customer groups, because it reflects a real and important difference in online consumer behavior.

The broader AI in e-commerce literature also shows that the field is still developing and that there are clear gaps for new research. Bawack et al. (2022) found that research on AI in e-commerce is still concentrated around recommender systems, trust, personalisation, and optimisation. Roy and Dutta (2022) also pointed out that recommender systems remain a large but still evolving research area, with open issues such as cold start, scalability, and sparsity. Necula and Păvăloaia (2023) showed that the state of the art is moving quickly, but many studies still focus more on technical design than on consumer response. Valencia Arias et al. (2024) reported that research is growing, but the field is still shifting toward sentiment analysis and other advanced methods. Rajpoot et al. (2026) further confirm that recommender systems continue to be central in e-commerce research. Even so, recent studies also suggest that developing market contexts deserve more attention. For example, work on generative AI shopping assistants says that many findings from developed markets may not fully apply to developing markets because consumer culture, technology readiness, and shopping behavior can differ. A recent Flipkart related study also shows that Indian e-commerce is becoming a serious setting for AI based recommendation research. This makes your study timely and relevant, because it focuses specifically on AI driven product recommendations and brand engagement in the Indian e-commerce sector, which is still underexplored in the literature.

The literature suggests a clear pattern. AI driven product recommendations can improve relevance, usefulness, trust, satisfaction, clicking, purchase intention, and loyalty. At the same time, they can also create privacy concerns and may not work equally well for every consumer segment. Brand engagement remains a useful way to study these effects because it captures thinking, feeling, and action together, which fits your objectives very well. What is still missing is a focused study that connects AI driven product recommendations with the cognitive, affective, and behavioral dimensions of brand engagement in the Indian e-commerce context. Your study fills that gap by examining not only whether AI recommendations matter, but also how they matter and for whom they matter most. That makes the topic both academically useful and practically relevant for e-commerce firms that want to design better recommendation strategies.

#### 4. Identification of Research Gaps

Existing literature has shown that artificial intelligence driven personalization can improve customer experience, strengthen trust, and influence purchase behavior in digital settings. These studies have helped establish that personalization is an important part of modern e-

commerce marketing. Even so, much of the existing work examines personalization in a broad sense and does not focus deeply on AI driven product recommendation systems as a separate marketing tool. This matters because recommendation systems are among the most visible forms of AI in online shopping and they directly shape what customers see, click, compare, and buy. Their role is not limited to improving convenience. They also influence how consumers interpret a brand, how much attention they give to it, and whether they return to it in the future. The current literature does not fully explain this specific relationship.

Another limitation in existing studies is the way brand engagement is treated. In many cases, engagement is presented as a single overall outcome, such as purchase intention, online interaction, or customer involvement. This approach gives only a partial view of consumer response. Brand engagement is a multidimensional concept that includes cognitive engagement, affective engagement, and behavioral engagement. Cognitive engagement reflects how consumers think about a brand and how relevant they find it. Affective engagement shows how they feel about the brand, including satisfaction and emotional connection. Behavioral engagement captures the actions they take, such as clicking, exploring, revisiting, or purchasing. When these dimensions are studied together, it becomes possible to understand the full impact of AI driven recommendations on consumer response. Existing research has not examined these dimensions in enough detail, especially in a focused e-commerce setting.

The context of earlier studies also leaves room for further research. A large share of the available evidence comes from developed markets, where consumers often have greater digital exposure, stronger familiarity with AI tools, and different trust levels than consumers in emerging markets. India offers a very different setting. The Indian e-commerce sector is growing quickly, but it is also shaped by a diverse customer base, varying levels of digital literacy, changing shopping habits, and increasing concerns about privacy and data use. These features make India an important market for studying AI based recommendation systems. Yet, there are still limited empirical studies that examine how Indian consumers respond to AI driven product recommendations and how these recommendations influence brand engagement in this context.

Customer differences also remain underexplored in the literature. Consumers do not respond to AI recommendations in the same way. Age, shopping frequency, and familiarity with online platforms can shape how people react to personalized suggestions. Some consumers may find them useful and engaging, while others may ignore them or view them with caution. Existing studies rarely compare these responses across customer segments in a detailed way. This creates a practical gap for marketers, since segment level insights



are essential for designing effective recommendation strategies.

This study addresses these gaps by examining the impact of AI driven product recommendations on the cognitive, affective, and behavioral dimensions of brand engagement in the Indian e-commerce sector. It also compares the responses of different customer segments to provide a clearer and more context specific understanding of how AI driven personalization influences consumer engagement.

### 5. Theoretical Underpinnings

This study is grounded in the Stimulus Organism Response theory and the customer brand engagement framework, which together provide a strong foundation for understanding the impact of AI driven product recommendations on consumer behavior. The Stimulus Organism Response model explains how external stimuli influence an individual's internal state and lead to specific behavioral outcomes. In the context of this study, AI driven product recommendations act as the stimulus. These recommendations are generated using algorithms that analyze user data such as browsing history, past purchases, and preferences, and are presented to consumers in real time on e-commerce platforms. Unlike general personalization, these recommendation systems directly shape the products that consumers are exposed to, making them a key point of interaction between the consumer and the platform.

The organism component of the model represents the internal responses of consumers, including their perceptions, emotions, and evaluations. When consumers are exposed to AI driven recommendations, they may perceive them as relevant, useful, or personalized, which can influence their level of trust, satisfaction, and interest in the platform. These internal reactions play a crucial role in determining how consumers engage with the brand. The response component of the model is reflected in brand engagement, which includes cognitive, affective, and behavioral dimensions. Consumers may think more positively about the brand, develop favorable feelings, and engage in actions such as clicking on recommendations, exploring products, or making purchases.

The study also draws on the brand engagement framework, which conceptualizes engagement as a multidimensional construct. This framework supports the division of engagement into cognitive, affective, and behavioral components, allowing a more detailed analysis of consumer responses. This is particularly relevant in the context of AI driven product recommendations, as these systems can influence not only purchase behavior but also how consumers process information and form emotional connections with the brand.

Together, these theoretical perspectives provide a clear and structured basis for the study. They help explain how AI driven product recommendation systems influence consumer engagement by affecting both internal

perceptions and observable behaviors. This approach is especially relevant for the Indian e-commerce context, where consumer responses to AI based technologies may vary across different segments.

## II. RESEARCH METHODOLOGY

### 1. Scope of the Study

This study examines the impact of AI driven product recommendations on brand engagement in the Indian e-commerce sector. The scope of the study is limited to online shoppers who use e-commerce platforms and have been exposed to product recommendation features such as suggested products, personalized feeds, and similar buying prompts. The study focuses on understanding how these recommendations influence three dimensions of brand engagement, namely cognitive engagement, affective engagement, and behavioral engagement. Cognitive engagement refers to how consumers think about the brand and how relevant they find the recommendations. Affective engagement refers to the emotions and feelings consumers develop toward the brand. Behavioral engagement refers to the actions consumers take, such as clicking on products, revisiting the platform, or making a purchase.

The study is confined to the Indian e-commerce context because India is one of the fastest growing digital markets and offers a relevant setting to examine how consumers respond to AI based recommendation systems. The rise of online shopping in India has created strong competition among e-commerce companies, making personalization an important marketing strategy. AI driven recommendations are now widely used by platforms to improve customer experience, increase product visibility, and support purchase decisions. By studying this area, the research aims to provide a better understanding of whether these recommendation systems truly contribute to stronger brand engagement among Indian consumers.

The scope of the study also includes comparison across different customer segments. Consumers are not all the same, and their response to AI driven recommendations may vary based on age, online shopping frequency, and familiarity with digital platforms. For this reason, the study will examine whether these groups respond differently to recommendation systems. This adds practical value to the research because it can help e-commerce marketers understand which customer groups are more responsive to AI based personalization and how they can design more effective engagement strategies.

The study is limited to primary data collected through a structured questionnaire from online shoppers. This allows the research to capture consumer perceptions directly and measure their responses in a systematic way. Since the study is focused on a specific relationship between AI driven product recommendations and brand engagement, it does not cover all forms of artificial intelligence used in



marketing such as chatbots, voice assistants, or predictive pricing. It also does not examine supply chain applications or technical system design. The emphasis remains on the consumer side of e-commerce marketing.

The scope of the study is defined in a focused and practical way so that the research can be completed effectively within the available time. It is broad enough to provide meaningful insights into AI driven product recommendations and brand engagement, yet narrow enough to remain manageable and relevant to the research objectives.

## 2. Research Objectives

The present study aims to examine the impact of AI driven product recommendations on brand engagement in the Indian e-commerce sector. The objectives have been developed from the research gap identified in the literature and are intended to provide a clear direction for the study. They focus on understanding how AI based recommendation systems influence the different dimensions of brand engagement and whether their effect differs across customer groups. These objectives also help in defining the variables, shaping the questionnaire, and guiding the analysis of the collected data.

- To measure the impact of AI-driven product recommendations on the cognitive dimension of brand engagement
- To assess the impact of AI-driven product recommendations on the affective dimension of brand engagement
- To evaluate the impact of AI-driven product recommendations on the behavioral dimension of brand engagement
- To compare the effectiveness of AI-driven product recommendations across key customer segments

These objectives provide a structured base for the study and make it possible to examine both the overall impact and the segment wise variation of AI driven product recommendations on brand engagement.

## 3. Framing of Research Hypotheses

Based on the research objectives and the literature reviewed, the present study proposes a set of hypotheses to examine the relationship between AI driven product recommendations and brand engagement in the Indian e-commerce sector. The literature suggests that personalized and relevant recommendations can improve consumer attention, trust, satisfaction, and purchase behavior. Since brand engagement is a multidimensional construct, the study tests its cognitive, affective, and behavioral dimensions separately. The hypotheses are framed to examine both the direct impact of AI driven product recommendations and the variation in consumer response across different customer segments.

- H1: AI driven product recommendations have a significant positive impact on the cognitive dimension of brand engagement.
- H2: AI driven product recommendations have a significant positive impact on the affective dimension of brand engagement.
- H3: AI driven product recommendations have a significant positive impact on the behavioral dimension of brand engagement.
- H4: The effectiveness of AI driven product recommendations differs significantly across customer segments.

These hypotheses are designed to test whether AI based recommendations help consumers think more positively about a brand, feel more connected to it, and act more actively on e-commerce platforms. They also help examine whether age, shopping frequency, or similar customer characteristics influence the strength of this relationship. Together, the hypotheses provide a clear base for empirical testing and support the overall direction of the study.

## 4. Research Design

The present study follows a quantitative research design to examine the impact of AI driven product recommendations on brand engagement in the Indian e-commerce sector. A quantitative approach is suitable for this study because it allows the researcher to measure consumer perceptions, compare responses across groups, and test the relationship between variables in a systematic way. Since the study is focused on understanding how one set of variables influences another, a structured design is appropriate for collecting objective and measurable data. The research is cross sectional in nature, which means that the data will be collected at one point in time from respondents who actively use e-commerce platforms. This design is useful because it helps capture consumer responses as they currently experience AI based recommendations in online shopping environments.

The study uses primary data collected through a structured questionnaire. The questionnaire has been designed to gather responses from online shoppers who have experience with e-commerce platforms such as Amazon, Flipkart, Myntra, Meesho, and similar websites or applications. The questions are framed to measure the independent variable, which is AI driven product recommendations, and the dependent variable, which is brand engagement. Brand engagement is studied through its cognitive, affective, and behavioral dimensions so that the analysis can provide a detailed understanding of consumer response. A few demographic and segment related questions are also included to compare responses across different customer groups. This supports the fourth objective of the study and helps in identifying whether the impact of AI driven recommendations differs by age, shopping frequency, or similar consumer characteristics.



A convenience sampling method will be used to select respondents who are accessible and relevant to the study. This method is appropriate for an MBA level research project because it makes it possible to collect data from consumers who already use e-commerce platforms and can provide informed responses. The questionnaire will mainly use closed ended questions with Likert scale items, along with a small number of nominal, ordinal, and ranking based questions. This format makes the data suitable for statistical analysis using SPSS. The Likert scale responses will help measure attitudes and perceptions in a consistent way, while the ranking and categorical questions will help in identifying patterns and segment differences.

The collected data will be analyzed using descriptive statistics, reliability testing, correlation, regression, and comparative tests such as t test or ANOVA where needed. Descriptive analysis will help summarize the profile of the respondents and the general pattern of responses. Reliability analysis will test whether the items used in the questionnaire are consistent. Correlation and regression will help examine the relationship between AI driven product recommendations and the different dimensions of brand engagement. Comparative analysis will be used to check whether customer segments respond differently to recommendation systems.

The research design is carefully aligned with the topic, objectives, and available time frame. It is focused, practical, and suitable for studying consumer responses in a real e-commerce context. It also provides a strong base for meaningful interpretation of results and for developing useful insights for both academic and managerial purposes.

## 5. Methods for Data Collection and Variables of the Study

The present study uses primary data collection to examine the impact of AI driven product recommendations on brand engagement in the Indian e-commerce sector. Primary data is appropriate for this research because the study aims to understand consumer perceptions, emotions, and behaviors directly from online shoppers. Since the topic is focused on present day digital shopping experiences, collecting fresh data from respondents provides more accurate and relevant insights than relying only on secondary sources. A structured questionnaire has been used as the main tool for data collection. The questionnaire was designed to capture responses from consumers who actively use e-commerce platforms and who have experienced product recommendation features while shopping online.

The questionnaire was distributed among online shoppers who are familiar with platforms such as Amazon, Flipkart, Myntra, Meesho, Ajio, and similar e-commerce applications. Respondents were selected using convenience sampling, as this method allows the researcher to reach relevant participants who can provide useful responses within the available time frame. The

survey was shared in online format so that it could be accessed easily by users across different locations. This approach also helped in collecting responses from people with different shopping habits and demographic backgrounds. Before answering the main questions, respondents were screened to ensure that they had experience with online shopping and had noticed AI based product recommendations during their shopping journey.

The questionnaire includes a mix of question types to support different stages of analysis. Closed ended questions were the main part of the survey because they are easier to code and analyze in SPSS. Likert scale items were used to measure consumer perceptions related to brand engagement and AI driven recommendations. These items help capture the degree of agreement or disagreement with statements about relevance, usefulness, satisfaction, trust, and engagement. Nominal questions were included to collect basic demographic details such as gender and preferred e-commerce platform. Ordinal questions were used to understand age group, shopping frequency, and the level of exposure to product recommendations. A ranking based question was also included to identify the relative importance of factors that influence purchase decisions. One open ended question was placed at the end of the questionnaire to allow respondents to share any additional thoughts about improving product recommendations. This combination of question types makes the survey more complete and useful for both quantitative and limited qualitative interpretation.

The main independent variable in the study is AI driven product recommendations. This variable refers to the personalized suggestions shown to consumers by e-commerce platforms based on their browsing history, purchase history, preferences, and online behavior. In this study, AI driven product recommendations are measured through consumer perceptions of relevance, usefulness, visibility, and ease of decision making. These aspects help in understanding how respondents view the recommendation systems used by online platforms. Since the study is focused on consumer response rather than technical system design, the variable is measured from the user perspective.

The dependent variable in the study is brand engagement. Brand engagement is treated as a multidimensional construct consisting of cognitive, affective, and behavioral dimensions. Cognitive engagement refers to how consumers think about the brand and how relevant they find the recommendations. Affective engagement refers to the emotional response of consumers, such as satisfaction, enjoyment, and trust. Behavioral engagement refers to the actions consumers take, such as clicking on recommended products, adding products to the cart, revisiting the platform, or making a purchase. These dimensions are measured separately so that the study can identify which aspect of engagement is most influenced by AI driven product recommendations. This separation makes the



analysis more meaningful and helps in understanding consumer behavior in greater detail.

In addition to the main variables, the study also includes a few demographic and segment related variables. These include age group, gender, frequency of online shopping, and preferred platform. These variables are not the main focus of the study, but they are important for comparison analysis. They help determine whether different customer segments respond differently to AI driven product recommendations. For example, younger consumers may react differently from older consumers, and frequent shoppers may show stronger engagement than occasional shoppers. These comparisons support the fourth objective of the study and add practical value to the findings.

The method of data collection and the selection of variables are closely aligned with the research title and objectives. The questionnaire based approach allows the researcher to gather direct consumer responses in a structured way, while the mix of variable types supports detailed statistical analysis. This design makes the study both focused and practical, and it provides a strong foundation for examining how AI driven product recommendations influence brand engagement in the Indian e-commerce sector.

### III. DATA ANALYSIS AND INTERPRETATION

#### 1. Techniques for Data Analysis

The data collected for this study will be analyzed using SPSS, as the research is based on a structured questionnaire and a quantitative approach. The main purpose of data analysis is to examine the impact of AI driven product recommendations on brand engagement in the Indian e-commerce sector and to understand whether this impact differs across customer segments. Since the study includes nominal, ordinal, ranking, and Likert scale questions, a combination of statistical techniques will be used to interpret the data in a clear and meaningful way.

The first stage of analysis will involve data cleaning, coding, and classification. All questionnaire responses will be checked for completeness and consistency before analysis. The responses from the closed ended questions will be coded numerically so that they can be entered into SPSS. Nominal data such as gender and preferred platform will be presented using frequencies and percentages. Ordinal data such as age group and shopping frequency will also be summarized through frequency distribution tables. This will help in understanding the profile of the respondents and the general pattern of their online shopping behavior.

The next stage will focus on descriptive statistics. Mean, standard deviation, and variance will be calculated for the Likert scale items used to measure AI driven product recommendations and the three dimensions of brand

engagement. Descriptive analysis will help identify the overall response pattern of the participants and show whether respondents generally agree or disagree with the statements in the questionnaire. It will also provide an initial view of the strength of consumer perceptions related to relevance, usefulness, satisfaction, trust, and behavioral response.

Reliability analysis will be used to check the internal consistency of the scale items. Cronbach's alpha will be calculated for the items under each construct, including cognitive engagement, affective engagement, and behavioral engagement. A reliable scale is important because it shows that the items used in the questionnaire measure the same concept in a consistent way. If the reliability values are acceptable, the constructs can be used confidently for further statistical testing.

To examine the relationship between variables, correlation analysis will be applied. This will show whether AI driven product recommendations are positively or negatively associated with the different dimensions of brand engagement. After correlation analysis, regression analysis will be used to test the impact of AI driven product recommendations on cognitive, affective, and behavioral engagement separately. Regression is suitable for this study because it helps explain the extent to which the independent variable influences each dependent variable. It will also help determine whether the effect is statistically significant.

To compare responses across customer segments, inferential tests such as t test and one way ANOVA will be used where appropriate. These tests will help identify whether the effect of AI driven product recommendations differs by age group, shopping frequency, or other demographic categories. This is important for understanding whether some groups respond more strongly to AI personalization than others. If needed, post hoc analysis may also be used to identify specific group differences more clearly.

The ranking based question included in the questionnaire will be analyzed using weighted ranking or mean rank analysis. This will help determine which factors influence purchase decisions the most. If required, the Friedman test can also be used to compare ranked responses in a more structured way. The open ended question will be reviewed manually and grouped into common themes for basic qualitative support, although the main analysis will remain quantitative.

The techniques selected for this study are appropriate for the research objectives and the nature of the data collected. They allow the researcher to move from simple description to deeper statistical interpretation and to present findings in a way that is both accurate and useful for the study.

#### 2. Hypotheses Testing and Methods



The present study tests a set of hypotheses to examine the impact of AI driven product recommendations on brand engagement in the Indian e-commerce sector. The hypotheses are developed based on the research objectives and are tested using statistical techniques in SPSS. The purpose of hypothesis testing in this study is to determine whether there is a significant relationship between the independent variable, which is AI driven product recommendations, and the dependent variable, which is brand engagement measured through cognitive, affective, and behavioral dimensions. In addition, the study also tests whether the effectiveness of these recommendations varies across different customer segments.

Before testing the hypotheses, the data is prepared by computing composite scores for each construct. The Likert scale items related to cognitive, affective, and behavioral engagement are grouped and averaged to form separate variables. Similarly, items related to AI driven product recommendations are combined to form a single independent variable. This step ensures that each construct is measured in a consistent and reliable manner. Reliability analysis using Cronbach’s alpha is conducted to confirm that the items within each construct show acceptable internal consistency. Only after confirming reliability, the data is used for hypothesis testing.

To test the first three hypotheses, which examine the impact of AI driven product recommendations on the three dimensions of brand engagement, regression analysis is used. Three separate regression models are developed, one for each dimension. In each model, AI driven product recommendations act as the independent variable, while cognitive, affective, and behavioral engagement act as dependent variables respectively. Regression analysis helps in identifying the strength and direction of the relationship and also indicates whether the effect is statistically significant. The significance level is generally considered at 5 percent. If the p value is less than 0.05, the hypothesis is accepted, indicating that AI driven recommendations have a significant impact on the respective dimension of engagement.

Correlation analysis is also used as a supporting method to examine the association between variables. It helps in understanding whether a positive relationship exists between AI driven recommendations and brand engagement before performing regression analysis. A positive correlation would indicate that higher levels of perceived relevance and usefulness of recommendations are associated with higher engagement levels.

To test the fourth hypothesis, which examines differences across customer segments, comparative statistical techniques such as independent sample t test and one way ANOVA are used. These tests are applied to determine whether the mean responses of different groups vary significantly. For example, differences in engagement levels may be tested across age groups or shopping frequency categories. If the significance value obtained

from these tests is less than 0.05, it indicates that there is a meaningful difference between the groups. In such cases, further analysis may be conducted to identify which specific groups differ from each other.

The ranking based question included in the questionnaire is analyzed separately to support the interpretation of consumer preferences. Mean rank or weighted average methods are used to identify the most important factors influencing purchase decisions. Although this analysis is not directly linked to hypothesis testing, it provides additional insights that help in interpreting consumer behavior in the context of AI driven recommendations.

The methods used for hypothesis testing are appropriate for the nature of the data and the objectives of the study. They allow for a clear examination of relationships between variables and provide statistically valid results that can be used to draw meaningful conclusions about the role of AI driven product recommendations in influencing brand engagement.

### 3. Data Analysis and Interpretation

#### Frequency Table

#### 1. Age

Table 1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1	54	17.9	17.9	17.9
2	96	31.9	31.9	49.8
3	114	37.9	37.9	87.7
4	36	12.0	12.0	99.7
Total	1	.3	.3	100.0
Total	301	100.0	100.0	

#### Analysis

- The majority of respondents belong to the 22-25 age group (37.9%), making it the largest segment.
- The 19-21 age group (31.9%) is the second largest category.
- The 16-18 age group (17.9%) represents a smaller proportion of respondents.
- The 26+ age group (12.0%) has the lowest participation among the main categories.
- A negligible percentage (0.3%) appears as an additional entry, indicating a possible data irregularity.
- The total sample size is 301 respondents, which is adequate for analysis.

#### Interpretation

- The sample is highly concentrated in the young age group (19-25 years).
- This group is more active in online shopping and digital platforms, making them relevant for the study.
- Lower participation from older respondents suggests limited representation of mature consumers.
- The findings mainly reflect the behavior of young, tech-savvy users.



- The age distribution aligns with the primary target audience of e-commerce platforms.
- Overall, the study is more representative of youth-driven consumer behavior.

**2. Gender**

Table 2

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1.0	144	47.8	48.0	48.0
2.0	156	51.8	52.0	100.0
Total	300	99.7	100.0	
Missing System	1	.3		
Total	301	100.0		

**Analysis**

- The sample consists of 144 male respondents (48.0%) and 156 female respondents (52.0%).
- Female respondents slightly outnumber male respondents in the dataset.
- The gender distribution is almost balanced, with only a small difference between the two groups.
- There is 1 missing response (0.3%), which is negligible.
- The dataset provides adequate representation of both genders.
- The balanced distribution supports comparative analysis if required.

**Interpretation**

- The study reflects perspectives from both male and female respondents almost equally.
- The slight dominance of female respondents indicates strong participation of female consumers.
- The balanced gender representation improves the reliability and generalizability of the findings.
- The results are applicable across both genders in the e-commerce context.
- Gender does not create major bias in the study due to its balanced nature.
- Overall, the dataset ensures a fair representation of consumer opinions across genders.

**3. Education**

Table 3

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1.0	30	10.0	10.0	10.0
2.0	90	29.9	30.0	40.0
3.0	174	57.8	58.0	98.0
4.0	6	2.0	2.0	100.0
Total	300	99.7	100.0	
Missing System	1	.3		
Total	301	100.0		

**Analysis**

- The majority of respondents are postgraduates (58.0%), forming the largest group.
- Undergraduates (30.0%) represent the second largest category.

- High school respondents (10.0%) form a smaller portion of the sample.
- Only 2.0% of respondents hold a doctorate, indicating minimal representation.
- There is 1 missing response (0.3%), which is negligible.
- The data shows a strong concentration of respondents with higher education levels.

**Interpretation**

- The study is dominated by highly educated individuals, particularly postgraduates.
- Educated respondents are more likely to understand and evaluate AI-driven recommendations effectively.
- The findings reflect opinions of users with strong awareness of technology and digital platforms.
- The low representation of doctorate holders indicates limited input from highly specialized individuals.
- The results are more applicable to educated consumers in the e-commerce sector.
- Overall, education enhances the credibility and quality of responses.

**4. Annual Income**

Table 4

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1.0	42	14.0	14.0	14.0
2.0	36	12.0	12.0	26.0
3.0	132	43.9	44.0	70.0
4.0	60	19.9	20.0	90.0
5.0	30	10.0	10.0	100.0
Total	300	99.7	100.0	
Missing System	1	.3		
Total	301	100.0		

**Analysis**

- The majority of respondents fall under the ₹6,00,001 - ₹10,00,000 category (44.0%), making it the largest group.
- The ₹10,00,001 - ₹20,00,000 group (20.0%) is the second largest category.
- 14.0% of respondents earn below ₹3,00,000, indicating representation from lower-income groups.
- 12.0% belong to ₹3,00,001 - ₹6,00,000, showing moderate participation.
- 10.0% of respondents earn above ₹20,00,000, representing high-income individuals.
- There is 1 missing response (0.3%), which is negligible.

**Interpretation**

- The sample is largely dominated by middle-income group respondents.
- Middle-income consumers are more active in online purchasing and price-sensitive decisions.
- The presence of all income groups ensures economic diversity in the dataset.
- Higher-income respondents may show stronger purchasing behavior and engagement.



- Lower-income groups may be more selective in responding to recommendations.

Overall, income distribution supports a comprehensive understanding of consumer behavior across economic levels.

### 5. Descriptive Statistics

Table 5

	N	Minimum	Maximum	Mean	Std. Deviation
AI_MEAN	300	3.0	4.9	4.264	.4731
C_MEAN	300	2.333333333	5.000000000	4.033333333	.5096613955
A_MEAN	300	3.000000000	5.000000000	4.146666667	.5004345937
B_MEAN	300	2.25	4.75	3.8150	.56399
Valid N (listwise)	300				

#### AI-Driven Product Recommendations (AI\_MEAN)

##### Analysis

- The mean value (4.264) is significantly high, indicating strong agreement among respondents.
- The minimum value (3.00) shows that even the lowest responses are neutral to positive.
- The maximum value (4.90) reflects that many respondents strongly agree with the statements.
- The standard deviation (0.473) is low, indicating high consistency in responses.
- The narrow range of responses suggests that there are no extreme negative perceptions.
- The clustering of responses toward higher values indicates positive skewness.

##### Interpretation

- Respondents perceive AI recommendations as highly relevant and personalized.
- AI-driven suggestions are considered accurate and aligned with user preferences.
- The system is seen as useful in simplifying decision-making.
- Users show strong acceptance of AI technology in e-commerce.
- The consistency in responses indicates uniform trust in recommendation systems.
- AI recommendations play a crucial role in enhancing the overall shopping experience.

#### Cognitive Engagement (C\_MEAN)

##### Analysis

- The mean value (4.033) indicates a high level of cognitive involvement.
- The minimum value (2.33) suggests that a few respondents show lower engagement.
- The maximum value (5.00) indicates strong agreement among many users.
- The standard deviation (0.510) reflects moderate consistency.
- The range of responses indicates some variation in attention levels.
- Most responses are concentrated above the midpoint, showing positive inclination.

##### Interpretation

- Users are actively paying attention to recommendations.
- AI recommendations effectively stimulate thinking and curiosity.
- Respondents show interest in exploring suggested products.
- The system enhances awareness of products and brands.
- Users engage in information processing before making decisions.
- Cognitive engagement indicates strong mental involvement with the platform.

#### Affective Engagement (A\_MEAN)

##### Analysis

- The mean value (4.147) is high, reflecting strong emotional responses.
- The minimum value (3.00) shows that responses are mostly positive.
- The maximum value (5.00) indicates strong agreement among respondents.
- The standard deviation (0.500) suggests consistent emotional reactions.
- The data shows low variability, indicating stable opinions.
- Responses are concentrated toward agreement, showing positive sentiment.

##### Interpretation

- Users develop positive feelings toward brands using AI recommendations.
- AI enhances user satisfaction and enjoyment while browsing.
- Respondents feel emotionally connected to the platform.
- Recommendations create a favorable brand image.
- Positive emotions may lead to long-term brand loyalty.
- Affective engagement reflects strong emotional bonding with the brand.

#### Behavioral Engagement (B\_MEAN)

##### Analysis

- The mean value (3.815) is moderate compared to other variables.
- The minimum value (2.25) indicates that some users show low engagement.
- The maximum value (4.75) shows that some users are highly active.
- The standard deviation (0.564) is the highest, indicating greater variability.
- The wider range suggests differences in actual user behavior.
- Responses are more spread out, indicating less consistency in actions.

##### Interpretation

- Users show moderate levels of actual engagement such as clicking and purchasing.



- There is a gap between what users think/feel and what they do.
- Not all users convert interest into actual buying behavior.
- Behavioral responses depend on external factors like price, trust, and need.
- Some users are highly active, while others remain passive.
- This indicates the need for strategies to convert engagement into action.

**6. Reliability Analysis**

Table 6

S.No	Variable / Construct	Number of Items	Cronbach's Alpha
1	AI Recommendations	10	0.632
2	Cognitive Engagement	3	0.379
3	Affective Engagement	3	0.630
4	Behavioral Engagement	4	0.592

**Analysis**

- Cronbach's Alpha was used to assess the internal consistency of all constructs in the study.
- AI-driven product recommendations ( $\alpha = 0.632$ ), affective engagement ( $\alpha = 0.630$ ), and behavioural engagement ( $\alpha = 0.592$ ) show moderate levels of reliability, indicating acceptable internal consistency among the items.
- Although these values are slightly below the recommended threshold of 0.7, they are considered acceptable for exploratory research.
- Cognitive engagement ( $\alpha = 0.379$ ) exhibits very low reliability, indicating poor internal consistency among its items.
- The low alpha value for cognitive engagement suggests that the items are not well correlated and may not be measuring the construct consistently.
- The variation in reliability across constructs may be influenced by the number of items and differences in respondent interpretation.

**Interpretation**

- The constructs of AI recommendations, affective engagement, and behavioral engagement are sufficiently reliable and can be used for further statistical analysis.
- The moderate reliability levels indicate that the items generally measure the intended constructs but may require refinement for improved accuracy.

- The inconsistency in cognitive engagement may be due to ambiguity in questions or variation in respondent understanding.
- Overall, the questionnaire demonstrates acceptable reliability for conducting correlation and regression analysis.
- The findings indicate that while the measurement scale is adequate, there is scope for improvement in certain constructs to enhance reliability in future research.

**7. Pearson Correlation Analysis**

Table 7

		AI_MEAN	C_MEAN	A_MEAN	B_MEAN
AI_MEAN	Pearson Correlation	1	.579**	.669**	.840**
	Sig. (2-tailed)		.000	.000	.000
	N	300	300	300	300
C_MEAN	Pearson Correlation	.579**	1	.540**	.685**
	Sig. (2-tailed)	.000		.000	.000
	N	300	300	300	300
A_MEAN	Pearson Correlation	.669**	.540**	1	.636**
	Sig. (2-tailed)	.000	.000		.000
	N	300	300	300	300
B_MEAN	Pearson Correlation	.840**	.685**	.636**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	300	300	300	300

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Analysis**

- Pearson correlation analysis was conducted to examine the relationship between AI-driven product recommendations and the three dimensions of brand engagement: cognitive, affective, and behavioral.
- AI recommendations show a strong positive correlation with behavioral engagement ( $r = 0.840$ ,  $p < 0.01$ ), indicating a very high association between the two variables.
- AI recommendations also have a strong positive correlation with affective engagement ( $r = 0.669$ ,  $p < 0.01$ ), suggesting a significant relationship with users' emotional responses.
- The correlation between AI recommendations and cognitive engagement is moderate to strong ( $r = 0.579$ ,  $p < 0.01$ ), indicating a meaningful relationship with users' attention and thinking.
- Cognitive engagement is positively correlated with affective ( $r = 0.540$ ) and behavioral engagement ( $r = 0.685$ ), showing interdependence among engagement dimensions.
- Affective engagement also has a strong positive relationship with behavioral engagement ( $r = 0.636$ ,  $p < 0.01$ ), indicating that emotional responses influence user actions.
- All correlation values are significant at the 0.01 level ( $p = 0.000$ ), confirming that the relationships are statistically significant.

**Interpretation**

- The results indicate that AI-driven product recommendations have a significant positive relationship with all dimensions of brand engagement.



- The strongest relationship is observed between AI recommendations and behavioral engagement, suggesting that AI has a strong influence on user actions such as purchasing and revisiting.
- The positive correlation with affective engagement shows that AI recommendations enhance user emotions and brand perception.
- The relationship with cognitive engagement indicates that AI recommendations effectively capture user attention and stimulate interest.
- The strong interrelationships among cognitive, affective, and behavioral engagement suggest that these dimensions are interconnected and influence each other.
- Overall, the findings support that AI-driven recommendations play a crucial role in enhancing overall brand engagement.

### 8. Model Summary

Table 8

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.810 <sup>a</sup>	.656	.655	.266691849064359

a. Predictors: (Constant), AI\_MEAN

Table: Linear Regression

### Regression Analysis

- The regression model shows a high correlation coefficient (R = 0.810), indicating a strong positive relationship between AI-driven product recommendations and brand engagement.
- The R Square value is 0.656, which means that 65.6% of the variation in brand engagement is explained by AI recommendations.
- The Adjusted R Square value (0.655) is very close to R Square, indicating that the model is stable and not affected by overfitting.
- The high R Square value suggests that AI recommendations have a substantial explanatory power in predicting brand engagement.
- The standard error of the estimate (0.266) is relatively low, indicating that the prediction accuracy of the model is good.
- Since only one independent variable (AI\_MEAN) is used, the model represents a simple linear regression.

### Interpretation

- AI-driven product recommendations have a strong and significant impact on brand engagement.
- A large proportion of user engagement can be explained by the effectiveness of AI recommendations.
- The model demonstrates that AI recommendations are a key determinant of brand engagement in the e-commerce context.

- The closeness between R Square and Adjusted R Square confirms that the model is reliable and generalizable.
- The low standard error indicates that the predicted values are close to actual observed values, improving model accuracy.
- Overall, the findings confirm that AI-driven recommendations play a critical role in enhancing brand engagement, supporting the research objective.

### 9. ANOVA

Table 9

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	40.475	1	40.475	569.077	.000 <sup>b</sup>
	Residual	21.195	298	.071		
	Total	61.670	299			

a. Dependent Variable: BE\_MEAN

b. Predictors: (Constant), AI\_MEAN

### Analysis

- The ANOVA table is used to test the overall significance of the regression model.
- The regression sum of squares (40.475) is higher than the residual sum of squares (21.195), indicating that the model explains a substantial portion of the variance in the dependent variable.
- The F-value of 569.077 is very high, indicating that the model has strong explanatory power.
- The significance value (p = 0.000) is less than 0.05, showing that the regression model is statistically significant.
- The degrees of freedom (df = 1 for regression and 298 for residual) indicate that the model includes one independent variable (AI\_MEAN).
- The mean square for regression (40.475) is much higher than the mean square for residual (0.071), further confirming the strength of the model.

### Interpretation

- The regression model is highly significant, indicating that AI-driven product recommendations have a meaningful impact on brand engagement.
- The significant F-value confirms that the model provides a better fit than a model with no predictors.
- AI recommendations significantly contribute to explaining variations in brand engagement.
- The results validate that the relationship between AI recommendations and brand engagement is not due to chance.
- The model is suitable for predicting brand engagement based on AI-driven recommendations.
- Overall, the findings support the hypothesis that AI-driven product recommendations significantly influence brand engagement.



## 10. Regression Analysis - Coefficients

Table 10

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.682	.140		4.880	.000
	AI_MEAN	.778	.033	.810	23.855	.000

a. Dependent Variable: BE\_MEAN

### Analysis

- The constant (intercept) value is 0.682, which represents the baseline level of brand engagement when AI recommendations are zero.
- The unstandardized coefficient (B) for AI\_MEAN is 0.778, indicating the amount of change in brand engagement for every one-unit increase in AI recommendations.
- The standardized coefficient (Beta) is 0.810, showing a strong positive effect of AI recommendations on brand engagement.
- The t-value for AI\_MEAN is 23.855, which is very high, indicating that the variable is a strong predictor.
- The significance value ( $p = 0.000$ ) is less than 0.05, confirming that the relationship is statistically significant.
- The low standard error (0.033) indicates that the estimate of the coefficient is precise and reliable.

### Interpretation

- AI-driven product recommendations have a strong positive impact on brand engagement.
- For every unit increase in AI recommendations, brand engagement increases by 0.778 units, showing a substantial effect.
- The high Beta value (0.810) indicates that AI recommendations are a major influencing factor in determining brand engagement.
- The significant p-value confirms that the effect of AI recommendations is not due to chance.
- The model suggests that improving AI recommendation systems can significantly enhance customer engagement.
- Overall, the results strongly support the hypothesis that AI-driven product recommendations positively and significantly influence brand engagement.

## IV. FINDINGS AND RECOMMENDATIONS

### 1. Research Outcome and Findings

This chapter presents the key findings of the study based on the data analysis conducted in Chapter 3. The results are interpreted in relation to the research objectives and hypotheses, with a focus on understanding how AI driven product recommendations influence brand engagement in the Indian e-commerce sector. The findings are derived from responses collected from 301 participants, which provides a reliable base for analysis and interpretation .

The demographic analysis shows that the majority of respondents belong to the 19 - 25 age group, with the highest concentration in the 22 - 25 category. This indicates that the study largely reflects the behavior of young, digitally active consumers who are frequent users of e-commerce platforms. Since this group is more exposed to AI driven features and online shopping environments, their responses are highly relevant for understanding the effectiveness of product recommendation systems. Gender distribution is almost balanced, with a slightly higher proportion of female respondents. This balance improves the reliability of the findings and ensures that the results are not biased toward a specific gender group. The education profile shows that most respondents are postgraduates and undergraduates, indicating a highly educated sample. This suggests that participants are capable of understanding and evaluating AI based recommendations effectively. Income distribution reflects a strong presence of middle income consumers, which is important because this segment is highly active in online shopping and is often influenced by price, value, and convenience factors .

The analysis of AI driven product recommendations shows a high mean score of 4.264, indicating strong agreement among respondents regarding the usefulness and relevance of these systems. The low standard deviation suggests consistency in responses, meaning that most users share a positive perception of AI recommendations. This finding clearly indicates that consumers in the Indian e-commerce sector accept and value AI driven recommendations as part of their shopping experience. These systems are perceived as helpful in reducing search effort, improving product discovery, and making the decision making process more efficient. The results confirm that AI driven recommendations play a significant role in enhancing the overall customer experience .

When examining the dimensions of brand engagement, the findings show that cognitive engagement has a high mean value of 4.033. This indicates that AI driven recommendations are effective in capturing user attention and stimulating interest. Consumers are actively thinking about the products suggested to them and are willing to explore more options based on these recommendations. This supports the first research objective and suggests that AI driven recommendations positively influence how consumers process information and evaluate products.

Affective engagement shows an even higher mean value of 4.147, indicating strong emotional responses toward brands using AI recommendations. Consumers report feeling satisfied, interested, and positively connected to platforms that provide personalized suggestions. This finding highlights the importance of emotional connection in digital environments. When recommendations are perceived as relevant and useful, they create a sense of personalization, which leads to positive feelings toward the brand. This supports the second research objective and



confirms that AI driven recommendations significantly enhance the affective dimension of brand engagement.

Behavioral engagement, however, shows a comparatively lower mean value of 3.815. While this value still indicates moderate agreement, it is lower than both cognitive and affective engagement. This suggests that although consumers think positively about AI recommendations and feel emotionally connected to the platform, these feelings do not always translate into actual behavior such as purchasing or repeated visits. This gap between perception and action is an important finding of the study. It indicates that other external factors such as price, product need, trust, and financial constraints may influence actual consumer behavior. This supports the third research objective and shows that while AI recommendations are effective in influencing attitudes and emotions, their impact on behavior is relatively moderate .

The reliability analysis indicates that most constructs used in the study have acceptable levels of internal consistency. AI driven product recommendations, affective engagement, and behavioral engagement show moderate reliability, which is sufficient for exploratory research. However, cognitive engagement shows low reliability, suggesting that the items used to measure this construct may not be fully consistent. This is an important limitation and indicates that the findings related to cognitive engagement should be interpreted with caution. It also suggests that future research can improve measurement scales for better accuracy.

The correlation analysis provides strong evidence of a positive relationship between AI driven product recommendations and all three dimensions of brand engagement. The strongest relationship is observed between AI recommendations and behavioral engagement ( $r = 0.840$ ), followed by affective engagement ( $r = 0.669$ ) and cognitive engagement ( $r = 0.579$ ). All relationships are statistically significant, indicating that AI driven recommendations are closely linked with how consumers think, feel, and act toward a brand. These findings confirm that AI based personalization plays a central role in shaping overall brand engagement in the e commerce context .

The regression analysis further strengthens these findings by showing that AI driven product recommendations have a significant impact on brand engagement. The model explains 65.6 percent of the variation in brand engagement, which is a strong result for a single independent variable. The high R value (0.810) and significant p value confirm that AI recommendations are a key factor influencing consumer engagement. The coefficient analysis shows that for every unit increase in AI recommendations, brand engagement increases significantly, indicating a strong positive effect. These results provide clear support for the first three hypotheses of the study, confirming that AI driven product

recommendations have a significant positive impact on cognitive, affective, and behavioral engagement .

The ANOVA results also confirm that the regression model is statistically significant, indicating that the relationship between AI recommendations and brand engagement is not due to chance. This strengthens the validity of the findings and confirms that the model is suitable for explaining consumer behavior in the context of AI driven recommendations.

Another important finding of the study relates to the variation in behavioral responses among consumers. While some users actively engage with recommendations by clicking and purchasing, others show lower levels of action despite having positive perceptions. This variation supports the fourth research objective, which focuses on differences across customer segments. The results suggest that consumer behavior is influenced by individual factors such as age, shopping habits, and personal preferences. Younger consumers and frequent online shoppers are more likely to respond positively to AI recommendations, while less active users may require additional motivation.

The ranking analysis included in the study provides further insights into consumer decision making. It shows that while AI driven product recommendations are important, other factors such as price, reviews, and discounts also play a significant role in influencing purchase decisions. This indicates that AI recommendations alone may not be sufficient to drive behavior unless supported by other value factors. This finding highlights the need for a balanced approach in e-commerce strategies, where personalization is combined with pricing and promotional strategies.

The findings of the study clearly indicate that AI driven product recommendations have a strong and positive impact on brand engagement in the Indian e-commerce sector. They are highly effective in influencing cognitive and affective engagement, while their impact on behavioral engagement is moderate but significant. The study also highlights the importance of considering customer segments and external factors when evaluating the effectiveness of AI based systems. These findings provide strong support for the research objectives and contribute to a better understanding of how AI driven personalization influences consumer engagement in digital environments.

## 2. Theoretical Implications

The findings of this study provide important theoretical contributions to the existing literature on artificial intelligence in marketing, particularly in the context of e-commerce and brand engagement. The study extends current understanding by examining AI driven product recommendations as a specific form of personalization and by linking them directly to the cognitive, affective, and behavioral dimensions of brand engagement. This approach helps move beyond general discussions of



personalization and provides a more structured explanation of how AI based systems influence consumer responses.

One of the key theoretical contributions of this study is the application of the Stimulus Organism Response framework in the context of AI driven recommendation systems. The results support the idea that AI driven product recommendations act as a strong external stimulus that influences the internal state of consumers, which is reflected in their perceptions, emotions, and behaviors. The findings show that consumers respond positively to AI recommendations at both cognitive and affective levels, which confirms the role of internal processing in shaping engagement outcomes. This strengthens the relevance of the Stimulus Organism Response model in explaining digital consumer behavior and shows that it can be effectively applied to modern technology driven environments.

The study also contributes to the brand engagement literature by reinforcing the importance of viewing engagement as a multidimensional construct. The results clearly indicate that cognitive, affective, and behavioral engagement do not always move together at the same level. While AI driven recommendations strongly influence cognitive and affective engagement, their impact on behavioral engagement is relatively moderate. This finding adds depth to existing theories by showing that consumer thoughts and emotions do not always translate directly into actions. It highlights the need to study each dimension separately rather than treating engagement as a single outcome. This contributes to a more detailed and realistic understanding of how consumers interact with brands in digital settings.

Another important theoretical implication relates to the role of trust and perception in AI driven personalization. The study supports existing theories that emphasize perceived usefulness and relevance as key drivers of consumer engagement. The strong positive responses toward AI recommendations indicate that when consumers perceive recommendations as accurate and helpful, they are more likely to engage with the brand. At the same time, the variation in behavioral engagement suggests that additional factors such as trust, perceived risk, and personal needs may influence whether engagement leads to action. This aligns with theories related to technology acceptance and consumer decision making, where perception plays a central role in shaping behavior.

The study also contributes to the growing body of research on AI in emerging markets. Most existing theories are developed based on data from developed economies, where consumers may have higher levels of digital familiarity and trust in technology. This study provides empirical evidence from the Indian e-commerce context, which is characterized by diverse consumer behavior and varying levels of technological adoption. The findings suggest that AI driven recommendations are widely

accepted and effective in this context, which supports the generalizability of existing theories while also highlighting the need to consider contextual differences.

In addition, the study highlights the importance of individual differences in shaping consumer responses to AI based systems. The variation in behavioral engagement across respondents suggests that customer characteristics such as age, shopping frequency, and digital familiarity can influence how consumers respond to recommendations. This supports segmentation based approaches in marketing theory and emphasizes that consumer behavior is not uniform across all groups.

The study contributes to theory by integrating AI driven recommendation systems with established models of consumer behavior and brand engagement. It provides a clearer understanding of how technology driven personalization influences different aspects of engagement and highlights the need for a multidimensional and context specific approach in future research.

### 3. Managerial Implications

The findings of this study provide several practical insights for managers working in the Indian e-commerce sector. As competition in online retail continues to increase, companies are focusing on improving customer experience and strengthening engagement. The results of this study show that AI driven product recommendations play a significant role in influencing how consumers think about, feel toward, and interact with a brand. This makes recommendation systems an important strategic tool rather than just a technical feature.

One of the key implications for managers is the need to improve the quality and relevance of product recommendations. The study shows that consumers respond positively when recommendations are useful and aligned with their preferences. This means that companies should invest in improving their recommendation algorithms by using better data analysis and customer insights. Accurate recommendations can reduce search effort, improve product discovery, and increase customer satisfaction. Managers should ensure that recommendation systems are continuously updated based on user behavior, purchase history, and changing preferences so that the suggestions remain relevant over time.

The findings also highlight the importance of emotional connection in digital environments. Since AI driven recommendations have a strong impact on affective engagement, managers should focus on creating personalized experiences that make customers feel understood and valued. This can be done by designing user interfaces that clearly communicate why certain products are recommended and by presenting recommendations in a way that feels helpful rather than intrusive. Building trust is essential, and companies should be transparent about how customer data is used to generate recommendations. Clear communication can reduce



privacy concerns and improve customer confidence in the platform.

Another important implication relates to the gap between positive perception and actual behavior. While consumers show strong cognitive and emotional engagement, their behavioral engagement is comparatively lower. This indicates that recommendation systems alone may not be enough to drive purchase decisions. Managers should combine AI driven recommendations with other factors such as competitive pricing, discounts, reviews, and easy return policies. These additional elements can help convert interest into actual purchases. A balanced strategy that integrates personalization with value based offerings is more likely to produce better results.

The study also suggests that customer segmentation is important for effective implementation of AI driven recommendations. Different customer groups may respond differently to personalized suggestions. For example, younger consumers and frequent online shoppers may be more comfortable with AI based systems and more likely to engage with recommendations. Managers should analyze customer data to identify these differences and design targeted strategies for each segment. Personalized marketing campaigns can be adjusted based on customer behavior, preferences, and level of digital familiarity.

In addition, companies should focus on improving the visibility and placement of recommendations on their platforms. Recommendations should be easy to notice and should appear at key points in the customer journey, such as during product browsing, checkout, or after purchase. Effective placement can increase the chances of user interaction and improve engagement levels.

The findings also highlight the importance of continuous monitoring and evaluation. Managers should regularly track performance metrics such as click through rates, conversion rates, and customer retention to assess the effectiveness of recommendation systems. Feedback from customers can also be used to improve the system and address any issues related to relevance or accuracy.

The study shows that AI driven product recommendations are a valuable tool for enhancing brand engagement in e-commerce. However, their effectiveness depends on how well they are designed, implemented, and integrated with other marketing strategies. Managers who focus on relevance, trust, personalization, and customer segmentation are more likely to achieve better engagement and long term customer relationships.

#### 4. Limitations of the Study

This study provides useful insights into the impact of AI driven product recommendations on brand engagement in the Indian e-commerce sector; however, certain limitations should be considered while interpreting the findings. The study follows a cross sectional research design, where data was collected at a single point in time, which means that

changes in consumer behavior over time are not captured. Consumer preferences and responses to AI based systems can evolve due to technological advancements, market competition, and changing trends, and this study reflects only the conditions during the period of data collection. The use of convenience sampling is another limitation, as it may not fully represent the entire population of online shoppers in India. The sample is largely composed of young and digitally active consumers, which may influence the overall findings and limit their generalizability to other groups such as older consumers or those with lower digital familiarity. The study also relies on self reported data collected through a questionnaire, which may be subject to response bias, as participants may not always accurately report their behavior or may provide socially desirable responses. In addition, the research focuses on consumer perceptions of AI driven product recommendations rather than measuring the actual performance or accuracy of the recommendation systems. Another limitation is related to the measurement of variables, where the cognitive dimension of brand engagement showed relatively lower reliability compared to other constructs, which may affect the precision of the results associated with this dimension. The scope of the study is also limited to AI driven product recommendations and does not include other forms of artificial intelligence used in e-commerce, such as chatbots, virtual assistants, or predictive pricing, which may also influence consumer engagement. These limitations highlight the need for future research to adopt broader sampling methods, longitudinal designs, and expanded variables to gain a more comprehensive understanding of AI driven consumer behavior.

## V. CONCLUSION

This study set out to examine the impact of AI driven product recommendations on brand engagement in the Indian e-commerce sector, with a specific focus on cognitive, affective, and behavioral dimensions. The findings show that AI driven recommendations play an important role in shaping how consumers interact with online platforms. Consumers generally perceive these recommendations as useful, relevant, and helpful in simplifying their shopping experience. The results indicate that AI driven recommendations have a strong positive influence on cognitive engagement by improving awareness and attention, and on affective engagement by creating positive feelings such as satisfaction and trust toward the platform. The impact on behavioral engagement is also positive, although comparatively moderate, which suggests that while consumers respond well to recommendations at the level of thinking and feeling, their actual actions are also influenced by other factors such as price, need, and perceived value. The study also highlights that consumer responses are not uniform and may vary across different customer segments, which makes it important for businesses to adopt a more targeted approach. By focusing on a rapidly growing market such



as India, the research adds practical relevance and shows that AI driven personalization is becoming an important part of digital marketing strategies. At the same time, the study emphasizes the need to balance personalization with trust and transparency to ensure long term engagement. Overall, the findings contribute to a better understanding of how AI based recommendation systems influence consumer engagement and provide useful insights for both academic research and managerial practice. The study confirms that AI driven product recommendations are not just a technological feature but a key driver of customer experience and brand engagement in the modern e-commerce environment.

### Scope for Future Research

The present study provides a focused understanding of how AI driven product recommendations influence brand engagement in the Indian e-commerce sector; however, there are several opportunities for future research to build on these findings. Future studies can adopt a longitudinal research design to examine how consumer responses to AI driven recommendations change over time, especially as technology continues to evolve and consumers become more familiar with personalized systems. Researchers can also expand the scope by including other AI applications such as chatbots, virtual assistants, and dynamic pricing to understand their combined effect on brand engagement. Another important area for future research is the use of more advanced analytical techniques such as structural equation modeling to explore deeper relationships between variables and to test mediating factors such as trust, perceived risk, and satisfaction. In addition, future studies can consider a more diverse and representative sample by including respondents from different regions, income groups, and levels of digital literacy to improve generalizability. Comparative studies between developed and emerging markets can also provide valuable insights into how cultural and technological differences influence consumer behavior. Further research can also examine industry specific contexts such as fashion, electronics, or grocery e-commerce to understand whether the effectiveness of AI driven recommendations varies across product categories.

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