

Unveiling the dynamic duo : How AI acts as the moderator between human intelligence and consumer buying behavior in automobile industry

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Abstract

The automobile industry stands at the forefront of technological innovation, where advancements in artificial intelligence (AI) have revolutionized the way consumers navigate the purchasing process. This study investigated the moderating effect of Artificial Intelligence (AI) between Human Intelligence (HI) and consumer buying behavior in the automobile industry. Results revealed significant enhancements of AI on human intelligence, with beta coefficients surpassing direct human intelligence effects. Both Human Intelligence and AI exhibit positive direct effects on consumer behavior ($\beta = 0.54$, $p = 0.001$ and $\beta = 0.45$, $p = 0.001$ respectively), alongside a substantial AI moderation effect ($\beta = 0.621$, $p = 0.000$). These findings underscored the significance of integrating AI-driven strategies alongside human intelligence for effective consumer engagement. Managerial implications suggested automobile dealers must adopt AI technologies to enhance customer experiences and tailor marketing strategies accordingly. Future research could delve into the long-term effects of AI integration and explore moderating effects of other variables across industries, contributing to a broader understanding of AI's role in shaping consumer behavior and informing strategic decision-making. Additionally, the increase in R-square from 0.689 before moderation to 0.722 after moderation highlights the added explanatory power of the model, emphasizing the significance of AI's moderating effect in enhancing our understanding of consumer behavior in the automobile industry.

Subject Classification: 36J99.

Keywords: Artificial intelligence, Human intelligence, Consumer behavior, Automobile industry, Technological innovation.

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1. Introduction

The Indian automobile market and consumers' decision-making process have seen a radical transformation due to technological advancements in the industry. This is because AI advancements have revolutionized how consumers make decisions. AI programs offer personalized recommendations based on user preferences and previous data. Predictive modelling, data analytics, and machine learning are used in understanding consumer behavior[1][2]. Furthermore, technologies like ChatGPT and Virtual Assistance provide crucial assistance in the process of consumer decision-making process [3][4] starting from initial phase to final phase [4]. Since AI is becoming more and more prevalent in every sector and industry, it becomes important in understanding its role as moderator between HI and CBB.

Moreover, due to evolving demographic profile of customers, it is becoming important for manufactures and retailers dealing in automobile to understand the social, economic, values and lifestyle as significant factors to understand the impact of AI on consumer purchase behavior [5]. The integration of AI not only enables customer to pick right product but also helps organization to adjust their product offering more effectively due to changing consumer preferences [3]. Additionally, manufacturers may use AI driven features to create innovative features, design marketing campaigns that can influence targeted audience. Hence, understanding the role of AI in the context of market competitiveness, customer delight is essential.

The use of AI facilitates customers in selecting appropriate products and assists organizations in adapting their product offerings more efficiently in response to evolving consumer preferences. Moreover, manufacturers may employ AI-driven functionalities to develop unique features and construct marketing campaigns that can impact the intended population. Therefore, comprehending the function of AI in relation to market competitiveness and consumer satisfaction is essential.

The Indian car industry is expanding swiftly due to the burgeoning middle class and a significant proportion of the youth demographic. According to IBEF, the automotive sector is being driven by substantial Foreign Direct Investment (FDI) and governmental policy assistance, positioning it as the third the largest producer. Furthermore, much research has been conducted to comprehend the function of HI on CBB; yet, there is a notable deficiency of studies examining the interaction of AI with other factors to evaluate its moderating or interactive effects on

CBB[6][7]. This gap underscored the urgent necessity to analyze and assess the complex interplay between customer intelligence and purchasing behavior, artificial intelligence, and consumer buying behavior in the context of automobile purchase in the era of AI-driven automotive commerce.

2. Literature Review

The automobile industry has been the subject of extensive research due to the importance of consumer purchasing behaviour in comprehending market trends, consumer preferences, and the role of various factors that influence purchase decisions. In the context of research, understanding of the trio-AI, CBB and HI becomes important.

2.1 *Human Intelligence in Automobile Purchases*

Customers prefer cars based on their knowledge, experience, lifestyle and socio economic status [8]. However, human intelligence is crucial in decision making process [9]. With time, consumers awareness and concern for the environment have increased due to which they intend to buy vehicles which are either e-vehicle, or consumes less fuel, produce less pollution and is highly sustainable [5]. Family, friends, and close connections are additional places where consumers are influenced by their decision-making process [9].

Car buyers typically examine their values and interests. Brand loyalty, perceived social standing, safety features, fuel efficiency, and technology improvements might affect their selections [10]. Personal preferences regarding aesthetics, performance, and comfort may also influence the decision [11][20]. Consumers' confidence in assessing car features depends on their knowledge, experience, and research. In-depth automotive knowledge and expertise may help shoppers evaluate features and specifications. Expert evaluations, internet forums, and automotive specialists may help others choose [12]. Automobile environmental concerns are increasingly affecting customer purchases. Carbon emissions, fuel efficiency, sustainable materials, and electric or hybrid choices are becoming more important to environmentally concerned consumers [5]. According to [13], consumer behavior is also influenced by ease of use of technology and its usefulness.

Customers' readiness to modify their minds after learning new facts varies. Some people may be open to new knowledge regarding car features,

performance, safety ratings, and environmental effect, while others may be more set in their ways [14]. Family and friend recommendations might affect car purchases. Consumer choices are typically influenced by credible recommendations [9].

2.2 Artificial Intelligence in Automobile Purchases:

With the assistance of AI-driven solutions, artificial intelligence is playing a vital part in the transformation of consumer decision making. This is via the provision of suggestions through the use of machine learning algorithms and data analytics, as well as through the engagement of customers through the comprehension of their requirements and preferences [1, 2]. In addition, tools like as chatbots, generative chatgpts, and virtual assistants make it possible for customers to evaluate attributes such as comfort, safety, and mileage between vehicles [2]. The confidence of customers is growing with the assistance of artificial intelligence since AI delivers data that is relevant, accurate, transparent, and includes interaction quality. [3] As a result, the perceived reliability of customers is increased as a result of artificial intelligence, which in turn has a beneficial influence on purchase. A study conducted by [4] discovered that consumers utilize artificial intelligence (AI) to simplify their complicated decision-making process because they believe that AI enhances the accuracy of data, compare vehicles, answer queries about features and analyzes huge amounts of data to deliver a solution that is devoid of bias, which is what customers want in comparison to other conventional ways. [3]. A study by [7] found that due to accuracy, relevance and utility of AI generated information, the AI has the power and potential to influence consumers choice and can present alternative to change their choices.

2.3 Consumer Buying Behavior

The purchasing decisions of consumers for vehicle items such as cars are influenced by a variety of elements, including price, design, comfort, safety, and the reputation of the brand [21]. In addition, customers' decision-making processes entail many processes, including problem recognition, information collection, alternative evaluations, and decision-making [15]. This is because automobiles are products that need a high level of engagement from customers. Based on the information fathers and the alternatives generated, consumer select the options that matches closely with the requirements and preferences [10]. In addition, the study [10] also found that marketing and advertising had a significant influence

on the consumer's intention and attitude with regard to the purchase of an automobile [9].

Moreover, there are few consumers who are more devoted to their brand and therefore marketers have difficulty in convincing them to switch to other brand [6]. Hence in such scenario, price act as a key in the decision-making process of consumers [4]. Although there may be a small number of customers who are eager to pick an alternative, there may also be other consumers who are resistant to changing their preferences. Few customers demonstrate various traits by seeking assessment and advice from a reliable source. This is because they feel that the opinions and experiences of their peers strengthen their decision-making and increase their confidence when it comes to selecting their car [9].

Objectives of Research:

- To examine the impact of human intelligence and artificial intelligence on consumer buying behavior in the automobile industry.
- To assess the extent to which consumers trust AI recommendations and adapt their preferences based on AI-generated insights during the automobile purchasing process.

Hypotheses:

H1: Consumers' trust in AI recommendations positively influences their willingness to consider AI-driven features during the automobile purchasing process.

H2: The integration of human intelligence and artificial intelligence enhances the accuracy and relevance of automobile recommendations, leading to increased consumer satisfaction.

H3: Consumers who trust AI recommendations are more likely to adapt their preferences based on AI-generated personalized recommendations for automobile purchases.

Conceptual Framework -To test the hypothesis, conceptual framework is being illustrated in figure1.

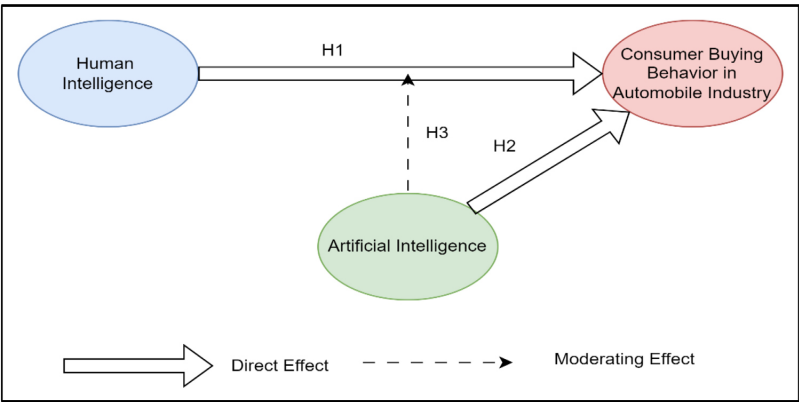


Figure 1
Framework

Source: Authors Compilation

3. Research Design

To achieve the goals that we set out to accomplish with our research, the current study worked on three different aspects of our research. Human Intelligence, Artificial Intelligence, and Consumer Purchasing Behavior are the three concepts that are being discussed here. The items of human intelligence were picked from [16][17][18] [1][2][3] , consumer buying behavior[9][10][12][11]. An excellently designed questionnaire using a Likert scale with a range of 1 to 5 was developed on the basis of the review of the relevant literature. To determining the extent to which artificial intelligence plays a role in consumer purchasing behavior with regard to the acquisition of a vehicle, data from a total of 454 out of 500 respondents was collected from various car showrooms. For this purpose, a method of sampling that was both stratified and judgmental was utilized.

In addition, a reliability and understandability test is being carried out on the first fifty responses from respondents in order to evaluate the degree to which respondents have difficulty comprehending the questionnaire. Redesigning the questionnaire in response to the feedback received, it was then distributed to the respondents for their feedback. To determining the moderating effect that AI has on the connection between HI and CBB, descriptive analysis and PLS-SEM using boot strapping with bias-corrected accelerated boot strap with two-tailed is used with 0.05 significance level and investigations were carried out.

4. Data Analysis

The collected data has been analysed using descriptive analysis and PLS-SEM to examine both the direct effects and moderating effects. The analysis is presented in the subsequent section.

The demographic characteristics shown in Table 1 of car buyers indicate that the majority are young and male. Specifically, those under the age of 30 make up the greatest share, accounting for 35.17% of the sample, while men make up 65.06%. Regarding income, a notable proportion lies between the 10-20 lakhs range (51.72%), with the second highest percentage being individuals earning less than 10 lakhs (21.15%). 53.33% of buyers choose 4-wheelers, while 46.67% choose 2-wheelers.

4.1 Demographic Analysis

Table 1
Demographic Profile Analysis

Demographic Profile, Type of Automobile, Region			
		Frequency	Percentage
Age	<30 Years	153	35.17
	30-40	121	27.82
	40-50	83	19.08
	>50	78	17.93
Gender	Male	283	65.06
	Female	152	34.94
Income	<10 lakhs	92	21.15
	10-20 lakhs	225	51.72
	20-30 lakhs	94	21.61
	>30 Lakhs	24	5.52
Type of Vehicle purchasing	2 Wheeler	203	46.67
	4 Wheeler	232	53.33
Automobile purchase location for registration	Delhi	127	29.20
	Noida	129	29.66
	Ghaziabad	52	11.95
	Gurugram	57	13.10
	Faridabad	70	16.09

Source: Authors Analysis

From a geographical standpoint, registrations are dispersed across several places, with Delhi and Noida being the predominant ones, accounting for 29.20% and 29.66% respectively. Following closely are Faridabad, Gurugram, and Ghaziabad. The data indicates a heterogeneous group of consumers, predominantly consisting of younger males with moderate to middle-income levels. These consumers show a preference for 4-wheelers and are mainly located in metropolitan regions within the National Capital Region.

4.2 Exploratory and Confirmatory Factor Analysis

The confirmatory factor analysis (CFA) conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM) confirmed the validity and reliability of the identified construct. According to the results obtained, all key attributes of the construct exhibited factor loadings exceeding 0.7, indicating a strong relationship between the observed indicators and the latent construct [19]. The EFA results are shown in Fig. 2.

Moreover, the composite reliability values for the construct surpassed the recommended threshold of 0.89, indicating high internal consistency and reliability [19]. Additionally, the Average Variance Extracted (AVE) values were above 0.5, suggesting that the variance captured by the construct exceeded the variance due to measurement error, further supporting the construct’s validity. Furthermore, Table 2 presents the values of the attributes, reaffirming the model fit and providing additional evidence of the construct’s validity and reliability.

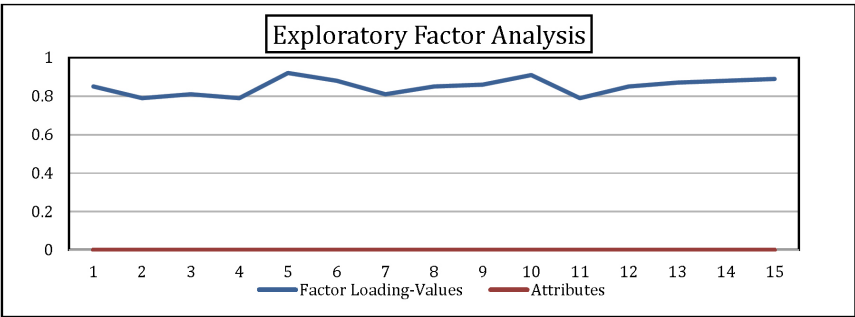


Figure 2
EFA Results

Table 2
Confirmatory Factor Analysis

Statements	Factor Loading	AVE	CR
I trust the recommendations made by AI in guiding automobile purchase decisions?	0.85	0.694	0.91
AI-based systems make me comfortable in automobile purchasing decisions?	0.79		
AI enhances the accuracy and relevance of automobile recommendations for consumers?	0.81		
AI-driven features make you rely on chatbots or virtual assistants, during your automobile purchasing process	0.79		
AI-generated personalised suggestions help to adjust choices	0.92		
Cognitive talents like decision-making and information processing affect vehicle purchasers' buying decisions?	0.88	0.744	0.93
Emotional intelligence, including empathy and customer needs, influence automotive buying behaviour?	0.81		
Social intelligence elements like peer influence and societal trends affect car buyers' decisions	0.85		
Customers' creative thinking and problem-solving skills influence their car purchase	0.86		
Consumers' problem-solving skills influence their ability to navigate challenges and make informed choices regarding automobile purchases	0.91		
I frequently conduct thorough research before making an automobile purchase	0.79	0.73	0.93
Marketing and advertising initiatives impact your car purchase	0.85		
I explore AI tools in the purchase of automobile cars.	0.87		
Pricing affect my car purchasing decision	0.88		
I read consumer reviews before buying a car	0.89		

Source: Authors Analysis

4.3 Moderation Effect

The hypothesis testing in Figure3 & Table 3. conveys significant relationships between the predictor variables (Human Intelligence and AI) and the endogenous variable (Consumer Buying Behaviour, CBB), as well as a significant moderation effect between AI and HI on CBB.

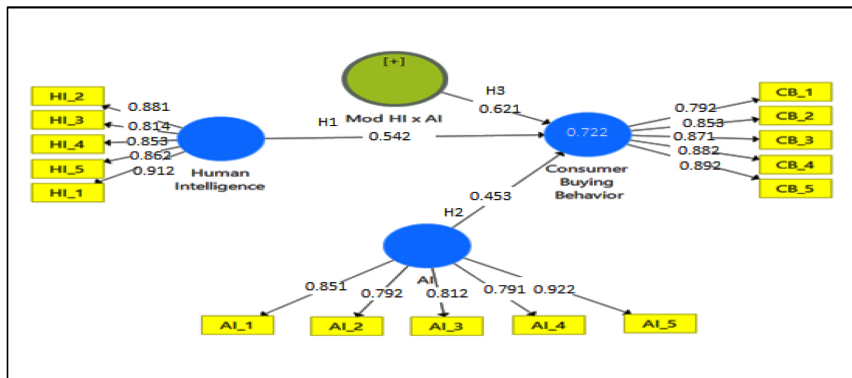


Figure 3
Moderation and direct effect

Source: Authors Analysis

Human Intelligence (HI) Direct Effect on CBB: The beta coefficient of 0.544 with a corresponding t-value of 20.15 and a p-value of 0.003 indicates a strong and statistically significant direct effect of Human Intelligence on Consumer Buying Behavior. This result supports H1, suggesting that Human Intelligence has a significant positive impact on CBB.

AI Direct Effect on CBB: Based on the analysis, it was determined that $\beta=0.452$, $p=0.001$, $t=16.92$ showed that AI significantly influences consumer decisions to buy cars, hence hypothesis H2 is accepted.

Moderation effect analysis of (AI x HI) on CBB:

The relationship between AI and HI on customer purchasing behavior was examined in order to evaluate the moderating impact of AI. With $\beta=0.621$, $p=0.001$, $t=18.98$ was the outcome. It is noteworthy to state that (R^2) rose from 0.689 to 0.722, which is significant. Thus, it increased the percentage of variance explained beyond direct effect of HI on AI. Hence, the interaction effect has significant effect on consumer buying behavior and therefore we support hypothesis H₃.

Table 3
Hypothesis Result

Direct effect and Moderation Effect	Beta Value	P value	t-value	Hypothesis
Human Intelligence -----> CBB	0.544	0.003	20.15	H1-accepted
AI-----> CBB	0.452	0.001	16.92	H2-accepted
Mod AI x HI----> CBB	0.621	0.024	18.98	H3-accepted

Source: Authors Analysis

Overall, the acceptance of all hypotheses underscores the significant roles of Human Intelligence, AI, and their interaction in influencing Consumer Buying Behavior. This suggests that both individual factors and their combined effects should be considered when designing strategies aimed at understanding and influencing consumer behavior.

5. Conclusion and Managerial Implication

The primary aim of the study was to comprehend the role of AI as a moderator between CBB and HI. The findings revealed that the direct effect of AI on CBB was significant, HI on CBB was significant. Additionally, the interaction effect of AI in between HI and CBB too was found significant. Thus, all hypothesis (H1, H2, and H3) were validated. The research conclusion highlighted the importance of Ai with managerial implication for dealers and manufacturers. AI can be integrated into their operations and in their marketing campaigns to provide better customer experience. In addition, AI will help dealers to improve client relationship management.

Furthermore, research that provides scope for future investigations, such as AI, will allow researchers to assess how AI might enhance brand loyalty. Additionally, the moderating influence of demographics may help in understanding the intricate dynamics of digital consumers.

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