บทบาทของฟีเจอร์การถ่ายทอดสดที่ใช้ปัญญาประดิษฐ์ในการกำหนดความตั้งใจซื้อของผู้บริโภครถยนต์ไฟฟ้าพลังงานใหม่: การวิเคราะห์เชิงเปรียบเทียบคุณภาพแบบชุดฟัซซี

The Role of AI-based Live Streaming Features in Shaping Consumer's Purchase Intentions for New Energy Electric Vehicles: Fuzzy-set Qualitative Comparative Analysis (fsQCA)

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บทคัดย่อ

      การเปลี่ยนแปลงของอุตสาหกรรมยานยนต์ไปสู่ยานยนต์ที่เป็นมิตรต่อสิ่งแวดล้อมสร้างความท้าทายในการเพิ่มความตั้งใจซื้อของผู้บริโภคต่อยานยนต์ไฟฟ้าพลังงานใหม่ และความก้าวหน้าของเทคโนโลยีปัญญาประดิษฐ์นั้นได้ทำให้เกิดโอกาสใหม่ในการสร้างปฏิสัมพันธ์กับผู้บริโภค การวิจัยนี้มีวัตถุประสงค์ 1) เพื่อศึกษาบทบาทของฟีเจอร์การถ่ายทอดสดที่ใช้ปัญญาประดิษฐ์ที่มีต่อความตั้งใจซื้อของผู้บริโภครถยนต์ไฟฟ้าพลังงานใหม่ และ 2) เพื่อพัฒนาโมเดลการถ่ายทอดสดที่ใช้ปัญญาประดิษฐ์ในการเพิ่มความตั้งใจซื้อของผู้บริโภครถยนต์ไฟฟ้าพลังงานใหม่ การวิจัยนี้ใช้วิธีการวิเคราะห์เชิงเปรียบเทียบคุณภาพแบบชุดฟัซซี ภายใต้กรอบแนวคิดการตอบสนองต่อสิ่งกระตุ้นภายนอก เก็บรวบรวมข้อมูลด้วยแบบสอบถามผ่านแพลตฟอร์มออนไลน์จากกลุ่มตัวอย่าง 301 คน เป็นผู้ที่เป็นเจ้าของหรือใช้รถยนต์ไฟฟ้าพลังงานใหม่ วิเคราะห์ข้อมูลโดยการปรับชุดฟัซซีหาความสัมพันธ์ระหว่างตัวแปร กำหนดเงื่อนไขที่จำเป็นและเพียงพอของความตั้งใจซื้อ ผลการวิจัยแสดงให้เห็นว่าเนื้อหาที่ใช้ปัญญาประดิษฐ์มีความสำคัญต่อความตั้งใจซื้อรถยนต์ไฟฟ้าพลังงานใหม่ โดยมีบทบาทสำคัญในการสร้างความสนใจและการมีส่วนร่วมของผู้บริโภค นอกจากนี้ เนื้อหาของการถ่ายทอดสดที่คุณภาพสูง การสร้างปฏิสัมพันธ์กับผู้ชม และการนำเสนอผลิตภัณฑ์ที่ดึงดูดใจในการถ่ายทอดสด

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เป็นปัจจัยที่เพียงพอในการกำหนดความตั้งใจซื้อของผู้บริโภค การวิจัยนี้เน้นย้ำถึงความสำคัญของปัจจัยการตลาดแบบดั้งเดิม โดยพบว่าความไว้วางใจถือเป็นองค์ประกอบสำคัญร่วมกับเนื้อหาที่ใช้ปัญญาประดิษฐ์ในการกำหนดความตั้งใจซื้อของผู้บริโภครถยนต์ไฟฟ้าพลังงานใหม่ด้วย ผลการวิจัยนี้แสดงให้เห็นว่า กลยุทธ์ที่หลอมรวมการตลาดที่ขับเคลื่อนด้วยปัญญาประดิษฐ์กับแนวทางการตลาดแบบดั้งเดิมจะช่วยเพิ่มความตั้งใจซื้อของผู้บริโภครถยนต์ไฟฟ้าพลังงานใหม่ได้

คำสำคัญ

การถ่ายทอดสดที่ใช้ปัญญาประดิษฐ์ ความตั้งใจซื้อของผู้บริโภค รถยนต์ไฟฟ้าพลังงานใหม่ การวิเคราะห์เชิงเปรียบเทียบคุณภาพแบบชุดฟัซซี

Abstract

The automotive industry's shift toward eco-friendly vehicles has created challenges in boosting consumer purchase intentions for new energy electric vehicles (NEEVs), while rapid AI advancements in marketing present new opportunities for consumer engagement. The objectives of this research were: 1) to study the role of AI-based live streaming features on consumer purchase intentions for new energy electric vehicles (NEEVs), and 2) to develop a comprehensive model of AI-based live streaming to enhance consumer purchase intentions for new energy electric vehicles. The study employed a Fuzzy-set Qualitative Comparative Analysis (fsQCA) methodology within the Stimulus-Organism-Response (SOR) perspective. It involved a structured survey that was distributed to a sample of 301 consumers via an online platform targeting those who owned or used NEEVs. The research utilized fuzzy set calibration to analyze the relationships between variables and to determine the conditions that were necessary and sufficient for high purchase intentions. Results showed that AI content was essential for high consumer purchase intentions, playing a key role in generating interest and engagement. Combining high-quality AI content, effective AI audience interaction, and compelling AI product displays was found to be sufficient for achieving high purchase intentions. The research highlighted the ongoing importance of traditional marketing factors, with trust being a crucial element alongside AI content. The findings suggested that the most effective strategies integrated AI-driven approaches with traditional marketing elements, offering insights into optimizing both to enhance consumer purchase intentions for NEEVs.

Keywords

AI-based live streaming, Consumer purchase intentions, New Energy Electric Vehicles, Fuzzy-set Qualitative Comparative Analysis

Introduction

In recent years, the automotive industry had experienced a transformative shift towards new energy electric vehicles (NEEVs), largely driven by technological advancements and heightened consumer awareness of environmental sustainability (Lei et al., 2024, 178). New energy electric vehicles (NEEVs) referred to electric vehicles (EVs) that used alternative energy sources instead of traditional fossil fuels. They covered Battery Electric Vehicles (BEVs), Plug-in Hybrid Electric Vehicles (PHEVs), and Fuel Cell Electric Vehicles (FCEVs) (Hao et al., 2024, 1-2). The "New Energy Vehicle" (NEV) program included extensive support for NEEV manufacturing, infrastructure development (especially charging stations), and technological innovation. As a result, NEEVs are expected to play a pivotal role in China's efforts to achieve its climate goals and lead the global electric vehicle market (Khaleel et al., 2024, 1).

This shift was particularly pronounced in China, which has emerged as a global leader in the adoption and production of NEEVs due to its strong governmental policies, large market size, and rapid technological advancements. Focusing on China in this research is important because the country is the world's largest market for NEEVs, with sales surging by over 50% in 2023, reaching approximately 7.5 million units, up from 5 million units in 2022 (Hongjua & Xiny, 2024, 30). This rapid growth underscores the escalating consumer demand and the automotive sector's transition towards greener technologies. Furthermore, as the market for NEEVs becomes increasingly competitive, China's adoption of innovative marketing strategies, such as AI-based live streaming, has set trends that may influence global marketing practices (Abhulimen & Ejike, 2024, 2561). This method utilizes AI to enhance product presentations and engage consumers in real-time, offering dynamic and interactive experiences aimed at influencing purchase intentions more effectively than traditional methods (Chen & Yang, 2023, 1601).

AI-based live streaming significantly differs from traditional live streaming, making it crucial for marketing. It offers personalization by analyzing viewer data in real time, tailoring content to individual preferences and enhancing engagement (Babatunde et al., 2024, 936). The interactivity of AI platforms, with features like live polls and Q&A sessions, fosters

ISSN: 3027-8414 (Online)

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community, essential for high-involvement purchases. Additionally, data-driven insights allow marketers to optimize strategies based on viewer behavior, while AI-generated visuals highlight key selling points effectively (Campbell et al., 2020, 232). Targeted advertising further enables brands to reach specific audience segments, increasing engagement. AI-based live streaming is vital for educating consumers, building trust, enhancing purchase intentions, and adapting to evolving consumer preferences in the NEEVs market.

Despite growing use of AI-driven marketing tools, there was a significant gap in understanding their impact on consumer's purchase intentions, particularly for high-involvement purchases like NEEVs. Existing research often overlooked the specific role of AI-based live streaming, focusing instead on traditional marketing elements or broader digital strategies (Khan & Mishra, 2024, 66).

Existing research often overlooked the specific role of AI-based live streaming, focusing instead on traditional marketing elements or broader digital strategies (Khan & Mishra, 2024, 66). Traditional marketing elements refer to fundamental components that have long been recognized as key drivers in consumer decision-making. These elements typically include product knowledge, perceived value, and trust (Tan et al., 2022, 1-15; Thakur et al., 2023, 499)—three sub-components that are considered essential for building strong consumer relationships and influencing purchase intentions (Foroughi et al., 2024, 888). Product Knowledge provides consumers with the information needed to make informed decisions, Perceived Value represents the consumer's evaluation of the product's worth relative to its cost, and Trust builds confidence in the brand or product. These three components are sufficient to explain traditional marketing because they address both the cognitive and emotional factors that influence consumer purchase intentions, and their integration has historically been effective in shaping consumer preferences and driving sales (Charton-Vachet et al., 2020, 707).

This research gap was particularly evident when considering the integration of AI features with traditional marketing elements. Although AI technologies offered innovative methods for engaging consumers, there was limited knowledge about how these technologies interacted with established factors such as product knowledge, perceived value, and trust (Ruan et al., 2020, 911). Furthermore, comprehensive models that combined AI-driven and traditional marketing approaches to provide a holistic view of their combined impact on consumer purchase intentions were lacking (Haleem et al., 2022, 119).

Addressing this gap was crucial for both researchers and industry practitioners. By investigating the role of AI-based live streaming features in influencing consumer purchase intentions for new energy electric vehicles (NEEVs) and developing a comprehensive model to enhance these intentions, this study aimed to provide valuable insights into the effectiveness of AI-driven strategies within the automotive industry. The findings were expected to contribute significantly to the academic literature on AI and marketing, offering practical guidance for marketers in NEEVs industry seeking to optimize their strategies in a digital and highly competitive marketplace.

Research Objectives

1. To study the role of AI-based live streaming features on consumer purchase intentions for new energy electric vehicles.

2. To develop a comprehensive model of AI-based live streaming for enhancing consumer purchase intentions for new energy electric vehicles.

Literature Review

1. Stimulus-Organism-Response (SOR) model in AI marketing

The Stimulus-Organism-Response (SOR) model provides a theoretical foundation for understanding how external stimuli (such as AI-based live streaming features) influence internal cognitive and emotional responses (organism), ultimately leading to behavioral outcomes (response) (Donovan et al., 1994, 284). In the context of AI-based live streaming, the stimulus refers to the AI-driven features—such as high-quality content, audience interaction, and product displays—that engage and influence consumers. The organism variables include consumers' product knowledge, perceived value, and trust, which are shaped by the AI-based stimuli and play a critical role in determining their purchase intentions (Mathavan et al., 2024, 101).

In AI-based live streaming, content quality is a vital stimulus that affects consumer interest and engagement. High-quality AI content helps consumers understand the features and benefits of NEEVs, contributing to their product knowledge (Mu, 2023, 193). AI audience interaction, another key stimulus, enhances consumer engagement by allowing real-time feedback and personalized responses to individual questions or concerns (Perez-Vega et al., 2021, 902). AI product displays, which dynamically showcase product features and visual

ISSN: 3027-8414 (Online)

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demonstrations, help create an emotional connection with consumers, leading to higher perceived value and trust in the brand (Junaid & Hussain, 2016, 278).

2. AI-based live streaming in marketing

The increasing adoption of artificial intelligence (AI) in marketing has transformed how brands engage with consumers, particularly through AI-based live streaming. This innovative approach combines real-time engagement with advanced data analytics to create personalized, interactive experiences for consumers. AI-based live streaming allows brands to tailor content to individual viewer preferences by leveraging AI algorithms that analyze user data in real time (Babatunde et al., 2024, 936). For example, AI can dynamically adjust product recommendations, highlight relevant features based on user behavior, and personalize content to suit specific audience segments (Haleem et al., 2022, 119). This high level of personalization enhances the consumer experience, making AI-based live streaming a powerful tool for influencing purchase decisions, particularly for complex and high-involvement products like new energy electric vehicles (NEEVs) (Zou et al., 2024, 1).

AI-based live streaming differs from traditional live streaming by integrating intelligent features such as real-time audience interaction, personalized product recommendations, and dynamic visual content generation (Khan, 2024, 2). For instance, successful campaigns by brands like Xiaomi have used AI to adjust product demonstrations in real-time, engaging viewers by showcasing the specific features most relevant to their interests. These AI capabilities allow marketers to engage consumers on a deeper level, creating a more immersive and tailored experience that can significantly impact consumer attitudes and purchase intentions. According to Khan and Mishra (2024, 66), the effectiveness of AI-based live streaming stems from its ability to create a direct, personalized connection between the brand and the consumer, facilitating trust and increasing the likelihood of purchase.

3. Role of product knowledge, perceived value, and trust

Product knowledge refers to the understanding consumers have about a product's features, benefits, and how it fulfills their needs AI (Chen & Deng, 2016, 2; Al Idrus et al. 2021, 928). Product knowledge plays a significant role in shaping consumer purchase intentions, especially for high-involvement products like new energy electric vehicles (NEEVs). In the context of NEEVs, AI-based live streaming can enhance product knowledge by providing consumers with detailed and personalized information about the product's features, benefits,

ISSN: 3027-8414 (Online)

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and sustainability aspects (Babatunde et al., 2024, 936). Enhanced product knowledge, in turn, leads to greater confidence in purchase decisions, increasing the likelihood of conversion.

Perceived value, another critical factor, refers to the consumer's overall evaluation of the product based on the benefits they expect to receive compared to the cost (Sweeney & Soutar, 2001, 206). It involves a balance between what consumers perceive they will gain and what they need to sacrifice in terms of money, time, and effort (Boksberger & Melsen, 2011, 230). AI-based live streaming can increase perceived value by delivering personalized content that highlights the specific benefits of NEEVs tailored to consumer preferences. According to Hollebeek and Macky (2019, 27), consumers are more likely to perceive higher value when they feel the content is directly relevant to their needs, further boosting their purchase intentions.

Trust is also a crucial mediator between AI-based stimuli and consumer behavior. Trust refers to the consumer's confidence in the brand's reliability, integrity, and ability to meet their expectations (Hamid, 2013, 81). As AI-based live streaming allows for real-time, transparent interactions, it fosters trust between the brand and the consumer. Trust is particularly important in the NEEV market, where consumers may have concerns about new technologies, pricing, and long-term reliability (Lappeman et al., 2023, 337). By offering clear, transparent information and responding to consumer concerns in real time, AI-based live streaming helps build trust, which is essential for driving purchase intentions.

4. Integration of AI-based and traditional marketing approaches

While AI-based live streaming offers numerous advantages, research suggests that combining AI-driven strategies with traditional marketing elements can maximize impact. Traditional factors, such as brand reputation, quality assurance, and after-sales support, remain vital in influencing consumer behavior, especially for high-involvement purchases like NEEVs (Khan & Mishra, 2024). According to Wei et al. (2024, 1210), successful marketing strategies for NEEVs should integrate AI-based innovations with these foundational marketing principles to create a holistic consumer experience.

AI-based live streaming represents a transformative tool in modern marketing, offering real-time personalization and interactivity that significantly influences consumer purchase intentions (Peltier et al., 2024, 54; Vashishth et al., 2025, 7). By integrating AI-driven features such as high-quality content, audience interaction, and product displays with

traditional marketing factors like trust and perceived value, brands can effectively shape consumer behavior.

Conceptual Framework

The conceptual framework for investigating the impact of AI-based live streaming on consumers' purchase intentions for new energy electric vehicles (NEEVs) integrates critical elements from both AI-driven strategies and traditional marketing approaches. This framework employs the Stimulus-Organism-Response (SOR) model, which has been widely used in consumer behavior research to analyze how stimuli (external factors) affect an organism (consumer) and lead to specific responses (purchase intentions) (Donovan et al., 1994, 284; Peng & Kim, 2014, 162). In the context of NEEVs, the stimulus variables include high-quality AI content, AI audience interaction, and AI product displays. These factors are designed to engage and influence the consumer's perception, fostering a stronger emotional connection with the product (Sheth et al., 2022, 1248; Zhang et al., 2023, 1-32; Gao et al., 2024, 1-13).
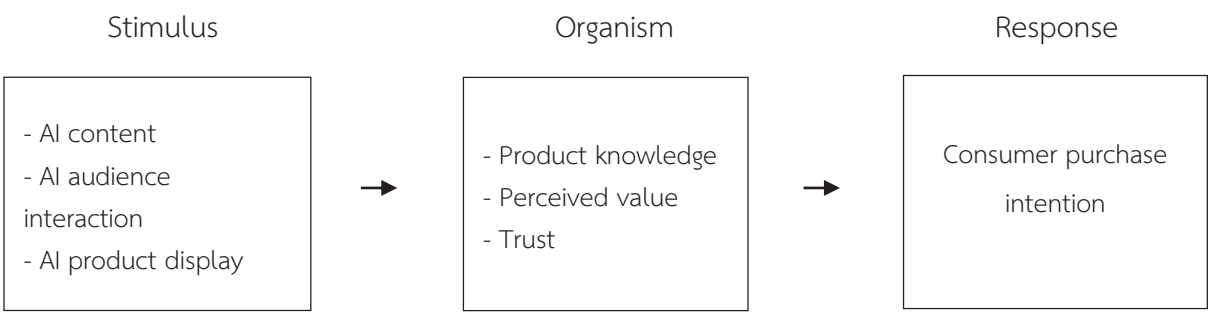
Stimulus	Organism	Response
- AI content - AI audience interaction - AI product display	- Product knowledge - Perceived value - Trust	Consumer purchase intention

Figure 1: Conceptual framework
Source: Adapted from Peng and Kim (2014, 162)

The organism variables in the framework are product knowledge, perceived value, and trust, which are critical factors in shaping consumer decisions for high-involvement products like NEEVs (Zhang et al., 2024, 1-15; Zhao et al., 2024, 1-23). Product knowledge encompasses consumers' understanding of the product's features, benefits, and how it fulfills their needs (Joshi & Sharma, 2019, 47-59). Perceived value relates to the consumer's evaluation of the product's benefits relative to its cost, a key determinant in purchase decisions (De Medeiros et al., 2016, 158). Trust, particularly in the context of new technologies like NEEVs, is vital for

ISSN: 3027-8414 (Online)

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reducing uncertainty and fostering a sense of security in the purchase process (Huang & Shi, 2024, 217).

The integration of AI-driven strategies with traditional marketing elements, such as product knowledge and trust, forms a comprehensive framework that can more effectively drive consumer purchase intentions. This combined approach is particularly relevant in the context of NEEVs, where consumers may be cautious due to the novel technology and sustainability considerations. AI-based live streaming enables dynamic, interactive content that can address consumer concerns in real time, enhancing trust and providing personalized product knowledge (Babatunde et al., 2024, 936). Thus, the conceptual framework underscores the importance of blending innovative AI features with traditional marketing principles to optimize consumer engagement and influence purchase intentions for NEEVs.

Methodology

1. Population and Sample

This research utilized fuzzy-set qualitative comparative analysis (fsQCA) within the Stimulus-Organism-Response (SOR) framework to investigate consumer purchase intentions for new energy electric vehicles (NEEVs). The study involved a total of 301 respondents, a sample size selected to ensure both statistical power and practical feasibility (Geremew et al., 2024, 3). The selection of respondents was carried out through purposive sampling, specifically targeting individuals with experience in using new energy electric vehicles. This criterion was essential to ensure that the participants had sufficient knowledge and relevant experience with NEEVs, which was critical for assessing the impact of AI-based live streaming on their purchase intentions. Additionally, participants were chosen based on their regular use of live streaming platforms. To ensure that they were familiar with the interactive features of AI-based live streaming, respondents had to engage with these platforms at least weekly or daily. This criterion helped to ensure that the participants could accurately evaluate how AI-driven live streaming influenced their perceptions of NEEVs.

The purposive sampling technique is used when the researcher selects specific individuals based on a set of criteria, ensuring that the sample is well-suited to answering the research questions. This technique helps in identifying individuals who are most likely to have relevant experience or knowledge, which enhances the validity and reliability of the research findings (Campbell et al., 2000, 652). In this study, the purposive sampling method was

particularly relevant because the aim was to gather insights from a specific population—those with experience in both NEEVs and AI-driven live streaming platforms.

Regarding the sample characteristics, the gender distribution was nearly balanced, with 50.2% male and 49.8% female respondents. The majority of participants were aged between 26 and 35 years (52.2%), reflecting a demographic likely to be engaged with both new technologies and the NEEV market. Income levels varied, with 33.6% of participants earning between 10,001 and 15,000 CNY per month, and 3.7% earning above 30,000 CNY. A significant portion of the sample had used or owned a NEEV for 6 months to 1 year (55.1%), indicating familiarity with the product, which is crucial for the research. In terms of live streaming platform engagement, 52.5% of participants interacted with these platforms on a weekly basis, and 42.5% did so daily, ensuring that the sample had adequate exposure to AI-based live streaming content. The preferences for NEEV models were also notable, with 41.5% of respondents preferring SUVs and 37.9% preferring passenger cars, indicating the types of vehicles that were most relevant to the target market for this study.

2. Data Collection

The questionnaire used for data collection was distributed electronically through an online platform to ensure a broad and accessible reach to the target population. The distribution mechanism involved sharing the questionnaire link via email, WeChat, and specialized forums related to new energy vehicles (NEEVs) and AI-based live streaming, which ensured that the respondents had relevant experience with both platforms and products.

The questionnaire was divided into two main sections. The first section contained closed-ended questions aimed at gathering general demographic information about the respondents, such as gender, age, income level, and experience with new energy electric vehicles (NEEVs). The second section measured respondents' opinions on key variables using a Likert scale ranging from 1 to 5, where 1 indicated "strongly disagree" and 5 indicated "strongly agree." Sample items in this section included statements like: "The information presented during the live streaming was clear and easy to understand," "I have confidence in the authenticity of the new energy vehicle live streaming content," and "The live stream has influenced my likelihood of buying the new energy electric vehicle."

The second section consisted of more than three statements. It contained multiple items for each variable, ensuring a thorough measurement of each construct related to the

ISSN: 3027-8414 (Online)

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research. The constructs covered included clarity of information, trust in content accuracy, and the influence of live streaming on purchase intentions.

The measurement of these key variables was validated for content accuracy (content validity) by a panel of five experts in automotive marketing, AI technology, and consumer behavior. The Item-Objective Congruence (IOC) score was calculated, and it exceeded the threshold of 0.80, indicating high content validity (Li, 2023, 72). Additionally, the reliability of the questionnaire was evaluated through internal consistency, with a Cronbach's alpha target value of 0.70 or higher (Shrestha, 2021, 4). The study achieved an impressive Cronbach's alpha value of 0.968, confirming the high reliability of the instrument.

3. Calibration of Fuzzy Sets and Data Analysis

In this study, Fuzzy-set Qualitative Comparative Analysis (fsQCA) was employed to analyze the complex relationships between variables influencing consumer purchase intentions for new energy electric vehicles (NEEVs). fsQCA is an advanced methodology that offers a nuanced approach to studying complex, non-linear causal relationships. Unlike traditional methods, which often assume linear cause-and-effect scenarios, fsQCA allows researchers to explore configurations of conditions where different combinations of factors can lead to similar outcomes, known as equifinality (Kraus et al., 2018, 15). This method is particularly effective in contexts where various pathways could influence the same outcome, such as consumer behavior, organizational performance, or social phenomena. fsQCA is especially useful for understanding how different combinations of conditions (such as AI-driven features and traditional marketing elements) interact to influence consumer behavior.

The analysis began by defining the key variables and determining the conditions under which these variables could impact purchase intentions. The fsQCA process involved coding each condition and assigning binary scores (0 or 1) to represent the presence or absence of a condition. In fsQCA, the presence of a condition is indicated by a score of 1, meaning the condition is fully met (e.g., high-quality AI content), while the absence of a condition is indicated by a score of 0, meaning the condition is not met (e.g., low-quality AI content). This binary coding system is essential for identifying the conditions that are necessary and sufficient for a specific outcome (Fainshmidt et al., 2020, 455-466).

Before the analysis, raw scores from the questionnaire were pre-processed into fuzzy-set membership scores. This calibration process allows for a more nuanced categorization, enabling the recognition of varying degrees of membership—ranging from 0

(non-membership) to 1 (full membership). For example, a respondent who strongly agrees with a statement like "I trust the authenticity of the live streaming content" might receive a score close to 1, while someone who strongly disagrees might receive a score close to 0. The thresholds for converting raw scores into fuzzy-set scores were based on both theoretical foundations and empirical data (Fainshmidt et al., 2020, 455-466; Geremew, 2024, 3). By using fuzzy-set calibration, this study could capture the variations in consumer responses with greater precision. The fsQCA process ultimately revealed three distinct pathways—AI-driven, traditional, and synergistic—highlighting the importance of combining innovative AI technologies with traditional marketing strategies to maximize consumer purchase intentions.

Results

1. Descriptive statistics

Descriptive statistics for all variables are shown in Table 1.

Table 1

Descriptive statistics for all variables

	AI content	AI audience interaction	AI product display	Product knowledge	Perceived value	Trust	Consumer purchase intention
Mean	4.28	4.27	4.30	4.21	4.29	4.25	4.24
S.D.	0.480	0.491	0.454	0.513	0.446	0.492	0.493
Min	2.25	1.50	2.40	2.20	2.67	1.80	2.20
Max	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Skewness	-1.17	-1.51	-1.01	-0.943	-0.958	-1.34	-1.11
Kurtosis	1.76	3.87	1.48	0.733	0.928	3.13	1.65

The descriptive statistics in Table 1 reveals that the variables related to AI features and traditional factors influencing consumer purchase intention (CPI) are generally rated positively. The mean values for all variables exceed 4, indicating favorable responses from participants. Standard deviations are relatively low, suggesting a degree of consistency in perceptions, although some variables show more variation, particularly AI audience interaction and trust. The skewness values are negative, indicating a tendency towards higher ratings, especially in AI-related factors and CPI, with most respondents providing favorable feedback.

ISSN: 3027-8414 (Online)

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The kurtosis values suggest that the responses are somewhat concentrated around the mean, with a higher concentration for some factors, like AI audience interaction.

2. Calibration of Fuzzy Sets

The calibration of fuzzy sets in fsQCA converts raw data into fuzzy membership scores, allowing for a more detailed analysis of conditions. The raw scores are mapped to fuzzy scores ranging from 0 to 1, reflecting a spectrum of membership rather than binary classifications. For instance, a raw score of 5.0 corresponds to a fuzzy score of 0.95, indicating strong membership in the condition, while a raw score of 2.0 corresponds to a fuzzy score of 0.05, reflecting minimal membership. This calibration process enables a finer distinction between different levels of a condition's presence and its relationship to the outcome, offering a more nuanced understanding of the factors influencing consumer purchase intentions.

This approach captures the complexity of consumer attitudes, especially in the context of NEEVs and AI live streaming, where perceptions are nuanced. Fuzzy set calibration in fsQCA provides deeper insights into the factors influencing consumer behavior and decision-making by recognizing varying degrees of membership.

3. Necessity Analysis

The necessity analysis reveals which conditions are prerequisites for the outcome of high CPI. With consistency scores above 0.9, both AI content (AIC) and Trust (T)emerge as necessary conditions (Table 2).

Table 2

Analysis of necessity of each variable of consumer purchase intention

Variable	Consistency	Coverage
AI content (AIC)	0.92	0.85
AI audience interaction (AIA)	0.88	0.83
AI product display (AIP)	0.90	0.86
Product knowledge (PK)	0.87	0.84
Perceived value PV	0.89	0.85
Trust (T)	0.91	0.87

Note: Consistency reflects the degree to which a condition is consistently associated with the outcome, while coverage indicates the proportion of cases where the condition is present and contributes to the outcome

This finding underscores the importance of high-quality AI content and consumer trust in driving high purchase intentions. High-quality AI content (AIC) was identified as a necessary condition with a consistency score of 0.92, indicating its crucial role in generating consumer interest and purchase intent. It highlights that compelling AI-generated content is fundamental for marketing NEEVs effectively. Additionally, trust remains essential, showing that despite technological advances, core consumer psychology principles—such as trust in the product and marketing channel—are critical for achieving high purchase intentions.

4. Sufficiency Analysis

In the sufficiency analysis presented in Table 3, the column labeled "Number" indicates the frequency of cases that match a specific configuration of conditions. Each row in the table represents a unique combination of the conditions being studied (AI content, audience interaction, product display, product knowledge, perceived value, and trust). The Number column tells us how many instances, or observations, from the data set correspond to that combination. For example, the configuration where all conditions are high (1, 1, 1, 1, 1, 1) occurs 50 times, resulting in a high consistency score of 0.95. In contrast, a combination with one missing condition, such as (1, 1, 1, 1, 1, 0), appears 10 times, still yielding a strong consistency score of 0.88. This information is important because it helps assess the sufficiency of different configurations in predicting high consumer purchase intentions (CPI), based on how often they occur in the data and the consistency of their outcomes.

Table 3

Hypothetical truth table (partial)

AIC	AIA	AIP	PK	PV	T	Number	CPI	Raw Consist.	PRI Consist.
1	1	1	1	1	1	50	1	0.95	0.93
1	1	1	1	1	0	10	1	0.88	0.85
1	1	1	0	0	0	5	0	0.75	0.70
0	0	0	1	1	1	8	1	0.85	0.82

This indicates that strong AI features and other traditional elements can still achieve high CPI even without factors like trust. The analysis shows that high AI content, audience interaction, and product display alone can drive high CPI, underscoring the significant

role of AI. However, AI effectiveness is enhanced when combined with strong traditional factors, suggesting a balanced approach may be most effective.

5. Pathways

The analysis of hypothetical pathways to high consumer purchase intentions (CPI), as shown in Table 4, reveals several key configurations that predict high CPI for new energy electric vehicles (NEEVs).

The complex solution highlights three primary pathways. The first pathway involves a combination of high AI content, AI audience interaction, AI product display, and traditional marketing elements such as product knowledge, perceived value, and trust. This configuration demonstrates the effectiveness of integrating advanced AI features with core marketing principles to drive high CPI, achieving a consistency score of 0.92 and a coverage of 0.85. The second pathway suggests that even without a strong trust factor, robust AI elements like content, interaction, and display can still lead to high CPI, indicating that AI-driven strategies can influence consumer purchase intentions despite lower traditional trust. The third pathway focuses on the importance of strong traditional factors—product knowledge, perceived value, and trust—demonstrating that these elements alone can drive high CPI without the need for advanced AI features.

Table 4

Hypothetical pathways to high consumer purchase intentions (CPI)

Solution	Hypothetical pathways	consistency	coverage
Complex solution	1) AICAIAAIPPKPV*T + 2) AICAIAAIPPKPV + 3) ~AIC~AIA~AIPPKPV*T -> high CPI	0.92	0.85
Parsimonious solution	1) AIC*AIA + 2) PK*T -> high CPI	0.88	0.80
Intermediate solution	1) AICAIAAIP + 2) PKPVT -> high CPI	0.90	0.83

Note: * means AND, + means OR, and ~ means NOT

The parsimonious solution simplifies this by identifying high AI content and audience interaction (AICAIA) and strong traditional elements (PKT) as the core pathways to high CPI. While these pathways cover 80% of high CPI cases, they have a slightly lower

ISSN: 3027-8414 (Online)

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consistency score of 0.88 compared to the complex solution, suggesting that this model, while useful, may overlook some subtler interactions that could also influence purchase intentions.

The intermediate solution identifies two distinct pathways: one focusing on high AI-driven features (AI content, interaction, and product display), and another centered around traditional marketing factors (product knowledge, perceived value, and trust). This solution achieves a consistency score of 0.90 and a coverage of 0.83, indicating its strong predictive power and its ability to account for most instances of high CPI.

This analysis emphasizes the significance of both advanced AI features and traditional marketing elements in shaping consumer purchase intentions, while offering different pathways depending on the balance of these factors.

6. Robustness Checks

Robustness checks in fuzzy-set qualitative comparative analysis (fsQCA) are crucial for validating the stability and reliability of the results. They involve examining how changes in calibration thresholds and consistency cutoffs affect the findings (see Table 5).

Table 5

Robustness checks

Adjustment	Scenario	Solution Consistency	Solution Coverage
Crossover point	Increased from 3.5 to 4.0	0.89	0.81
Consistency threshold	Increased from 0.80 to 0.85	Varies (Fewer paths, higher precision)	Varies (Fewer paths, higher precision)

The research findings demonstrate how adjusting the crossover point and consistency threshold affects the robustness and reliability of fuzzy-set qualitative comparative analysis (fsQCA) results. Increasing the crossover point from 3.5 to 4.0 reduced both consistency and coverage, showing that stricter criteria for full membership limited the number of sufficient pathways for high consumer purchase intention but improved the precision of the remaining pathways. Similarly, raising the consistency threshold from 0.80 to 0.85 decreased the number of pathways while enhancing their reliability. These adjustments highlight fsQCA's sensitivity to calibration changes and the need for careful calibration to balance pathway precision and generalizability.

ISSN: 3027-8414 (Online)

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7. Model for High Consumer Purchase Intention

Based on the fsQCA analysis provided, the model for achieving high levels of consumer purchase intention (CPI) for new energy electric vehicles (NEEVs) is shown in Table 6. The model identifies several key configurations for achieving high CPI, with a comprehensive approach involving all conditions—high AI content (AIC), high AI audience interaction (AIA), high AI product display (AIP), high product knowledge (PK), high perceived value (PV), and high trust (T)—yielding the strongest likelihood of high CPI, reflected by a consistency score of 0.95 and a coverage score of 0.93. This configuration underscores the importance of integrating both advanced AI features and traditional marketing elements to maximize consumer interest.

As shown in Table 6, other models with missing conditions show reduced consistency and coverage scores. For example, models featuring high AI features combined with traditional marketing factors (except trust) still result in high CPI, achieving a consistency score of 0.88 and a coverage score of 0.85. However, models with low AI features, even with high traditional factors, show lower consistency and coverage scores (0.85 and 0.82, respectively).

Table 6

Model of AI-based live streaming to enhance consumer purchase intentions for new energy electric vehicles

Configurations	Conditional variable						Consistency Score	Coverage Score
	AIC	AIA	AIP	PK	PV	T		
All Conditions High	●	●	●	●	●	●	0.95	0.93
High AI Features, Most Traditional Factors (Except Trust)	●	●	●	●	●	○	0.88	0.85
High Traditional Factors, Low AI Features	○	○	○	●	●	●	0.85	0.82
High AI Content and Interaction	●	●					0.88	0.80
High Product Knowledge and Trust				●		●	0.88	0.80
Intermediate Solution 1	●	●	●				0.90	0.83
Intermediate Solution 2				●	●	●	0.90	0.83

Note: ● indicates high, ○ indicates low/moderate

The intermediate solutions indicate that high levels of AI content and interaction alone are sufficient to drive high CPI, as are high levels of traditional factors like product knowledge, perceived value, and trust. These results suggest flexibility in achieving high

ISSN: 3027-8414 (Online)

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consumer interest, where either AI-driven innovations or strong traditional marketing can play a significant role in influencing purchase intentions.

These findings illustrate that the combination of AI-based features with traditional marketing elements creates a powerful model for driving high CPI, while also demonstrating that consumer behavior can be influenced by a range of configurations. The results emphasize the need to integrate both innovative AI strategies and traditional marketing practices to maximize the effectiveness of marketing campaigns for NEEVs. This analysis highlights the complexity of consumer decision-making, emphasizing that both technological innovations and foundational marketing strategies are crucial for shaping purchase intentions.

Discussion

This study provides valuable insights into the role of AI-driven live streaming features in shaping consumer purchase intentions for new energy electric vehicles (NEEVs). The findings underscore the crucial role of high-quality AI-generated content, which significantly influences consumer interest (Pataranutaporn et al., 2021, 1013). However, the study further reveals that the impact of AI content is amplified when integrated with other AI-driven elements such as audience interaction and product display, forming a sufficient condition for high consumer purchase intentions. This aligns with the first research objective, showing that AI-based live streaming features directly contribute to shaping purchase intentions for NEEVs.

Importantly, the research underscores the continued significance of traditional marketing factors, particularly trust, which emerges as a necessary condition for high purchase intentions (Bhattacharya et al., 2023, 248). Despite advancements in AI technology, building consumer trust remains fundamental, especially for high-involvement products like NEEVs. The study also reinforces that traditional factors, such as product knowledge and perceived value, continue to influence consumer decisions, as evidenced by the various pathways leading to high purchase intentions. These findings support the second research objective by providing a comprehensive model of AI-based live streaming to enhance consumer purchase intentions for new energy electric vehicles. The synergistic effects of combining both AI and traditional marketing elements, as proposed by Du and Kim (2021, 272) and Moriuchi and Takahashi (2022, 76), offer marketers a comprehensive strategy to boost purchase intentions.

The application of the fsQCA method in this research offers a unique approach within the Stimulus-Organism-Response (SOR) perspective. fsQCA allows for an analysis of multiple

ISSN: 3027-8414 (Online)

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causal pathways leading to high consumer purchase intentions, demonstrating its capability to account for complex interactions between AI and traditional marketing factors. This methodological approach addresses the research objectives by revealing how AI features, alongside traditional factors, form distinct pathways to influence consumer behavior. Moreover, fsQCA's ability to identify and validate these pathways enhances its role in understanding consumer decision-making, offering a nuanced analysis that would not be possible with traditional regression models.

While these findings provide important insights, the study does have some limitations. The sample was drawn from individuals familiar with AI-driven live streaming and NEEVs, potentially limiting the generalizability of the results (Guarte & Barrios, 2006, 277). The reliance on purposive sampling may introduce biases, as participants were selected based on prior exposure to AI technologies. Additionally, the study focused on specific AI-driven features such as content, audience interaction, and product display, leaving other potential factors like recommendation algorithms and personalized marketing unexplored. Moreover, the self-reported nature of the data may have introduced response bias, where participants provided socially desirable answers (Clifford & Jerit, 2015, 790), which could affect the reliability of the findings.

The robustness checks confirm the stability of the fsQCA results, highlighting its sensitivity to calibration adjustments. Increasing the crossover point from 3.5 to 4.0 slightly reduced both consistency and coverage, but the identified pathways remained valid, underscoring the reliability of the analysis. Similarly, raising the consistency threshold enhanced the strength of the causal paths, with fewer but more robust pathways identified. These adjustments demonstrate the balance fsQCA strikes between precision and generalizability, making it a powerful tool for capturing complex causal relationships while maintaining result robustness (Fainshmidt et al., 2020, 455; Geremew et al., 2024, 3-26).

The proposed model based on the study's findings integrates both AI-driven and traditional marketing pathways. The AI-driven pathway focuses on high-quality content, engaging audience interaction, and compelling product displays, while the traditional pathway emphasizes building product knowledge, perceived value, and trust. A combined strategy, leveraging both AI innovations and traditional marketing, offers a comprehensive framework for enhancing consumer purchase intentions (Stone et al., 2020, 183). This research provides actionable insights for marketers in the electric vehicle sector, suggesting that the optimal

ISSN: 3027-8414 (Online)

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approach involves a balanced integration of AI features with traditional elements, ultimately enhancing consumer confidence and purchase intentions for NEEVs.

Conclusion

The findings of this study highlight the significant influence of AI-based live streaming features on consumer purchase intentions for new energy electric vehicles (NEEVs). Key elements such as high-quality AI-generated content (AIC), AI audience interaction (AIA), and AI product display (AIP) foster consumer engagement and understanding, leading to higher purchase intentions. However, the effectiveness of AI features is amplified when combined with traditional marketing elements like product knowledge (PK), perceived value (PV), and trust (T), especially for high-involvement products such as NEEVs. Trust remains a critical factor even as AI advances, underscoring the need for marketers to balance technological innovation with traditional approaches.

The comprehensive model developed in this research emphasizes the integration of both AI-driven and traditional marketing strategies to maximize consumer purchase intentions. The optimal configuration for encouraging high purchase intentions includes all six key factors: AIC, AIA, AIP, PK, PV, and T, which together achieve a consistency score of 0.95. Even in cases where trust is lower, strong AI features combined with traditional marketing strategies can still lead to positive consumer outcomes. This flexibility in consumer behavior indicates that marketers can adapt their strategies based on the strength of each factor, enhancing their ability to drive consumer decisions across different contexts.

The research offers actionable insights for practitioners, particularly within the electric vehicle (EV) and digital marketing sectors. Marketers in the NEEV industry can utilize AI-driven technologies to enhance consumer engagement and boost purchase intentions. By focusing on high-quality AI content, they can communicate the benefits of NEEVs more effectively. Moreover, incorporating AI audience interaction and product display into the marketing mix can create a more immersive and personalized shopping experience, which in turn influences consumer decisions. However, the importance of traditional factors like trust and product knowledge should not be overlooked. A balanced approach combining AI innovations with traditional marketing strategies is key to improving consumer purchase intentions.

In the digital marketing field, this study underscores the role of AI in shaping consumer behavior and the need for marketers to integrate AI-based solutions—such as live streaming

and interactive product displays—while adhering to core marketing principles. The synergistic effect of AI and traditional marketing can be leveraged to enhance customer engagement and drive conversion rates.

Future research should focus on exploring the impact of AI live streaming not only on initial purchase intentions but also on long-term brand loyalty. Future studies could also investigate how various AI content and interaction strategies influence consumer purchase intentions across different market segments and product categories. Additionally, further research could examine the interaction between traditional factors like trust and product knowledge with AI-driven strategies, providing deeper insights into consumer behavior in the context of evolving digital marketing technologies.

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ISSN: 3027-8414 (Online)

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