

Exploring the Influence of AI on Purchase Intention of Electric Vehicle among Consumers in China

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ABSTRACT

As China swiftly recovers from the impacts of COVID-19, the nation grapples with complex development challenges, notably the promotion of green energy consumption. Despite environmental awareness among consumers in China growing but which not led to a parallel increase in the consumption of green products. Bridging this gap necessitates effective communication and communication tool, based on previous studies, AI was believed to be a pivotal tool for sustainable economy. Therefore, this study focuses on AI and China's electric vehicle (EV) industry which is a prominent sector in green energy. Employing the technology acceptance model to explore the influence of perceived usefulness (PU), perceived ease of use (PEU), perceived cyber risks (PCR), and perceived enjoyment (PE) of AI on consumers' purchase intention for EV in China.

Keywords: AI, Electric Vehicle, Purchase Intention, Green Marketing Communication, The Technology Acceptance Model.

INTRODUCTION

China's GDP growth is rebounding after COVID-19, driven by manufacturing and urbanization, but this success poses environmental challenges (O'Neill, 2023). Despite a rise in environmental consciousness among consumers, the adoption of green products hasn't surged (J. Liang et al., 2022). Therefore, green marketing communication becomes crucial in bridging this gap, necessitating a clear and effective communication channel.

Artificial Intelligence (AI) emerges as a significant tool in the realm of environment and helps companies doing the sustainably economy (Rathore, 2018). AI is a broad concept, compare the other AI technologies, AI chatbots are widely used in people's daily life, for example, Ernie Bot (Huang et al., 2022). This kind of AI known for their natural language interaction and versatility, it can provide consumers with personalized and unambiguous content, it perfectly can deal with the complexity of green products (Ghoreishi & Happonen, 2020; Huang et al., 2022; Ongkrutraksa, 2022). Therefore, this paper focuses on AI chatbots and utilizes the Technology Acceptance Model (TAM), extending it to include perceived cyber risks (PCR) and perceived enjoyment (PE) as additional factors. This ensures a holistic understanding of consumer behavior towards AI chatbots in the context of green marketing (Lee et al., 2019).

Because electric vehicle (EV) is seen as one of the most effective ways to mitigate global warming, so Chinese government spent over several billion dollars to support the purchase of EV, for example, exempt from a vehicle purchase tax. But the market sales in China have been slowing down, therefore this paper delved into this green product industry (Liu et al., 2023).

The research not only fills existing gaps in comprehending AI chatbots' role in green marketing and consumer behavior, particularly in the EV industry, but also sheds light on AI's potential to address climate crises, rather than being a threat.

LITERATURE REVIEW

This research gathers information from past studies; prevailing theories, current articles, and relevant documents to use them as a background source for conducting its study and propose the following topics.

AI plays a vital role in China, and it has a broad impact across different sectors, for example, medicine, and the education field. It has been developing Chinese' economy, and social development, improving human life (Abonizio et al., 2023; Chipman Koty, 2021; McKinsey, 2022). However, AI is a double-edged sword, not only bringing benefits to China but also taking challenges, such as job displacement (Danmeng & Jia, 2018; Shen, 2020). To address these challenges, maximize AI's benefits, and make people accept this technology. Letting people see AI as an important and effective way to help them improve their lives is essential. AI is a broad branch of computer science. This paper only focuses on AI chatbots, which is a software program that uses AI to understand consumers' questions and automatically respond, simulating human conversation, such as Chinese companies introduced Ernie Bot; Tongyi; Qianwen. Due to its natural language interaction, accessibility, personalization, and versatility, it is one of the most popular AI that consumers use in daily life to help them find more useful information (Huang et al., 2022). Especially in recent years, AI chatbots is making a wave in China, so this paper takes Chinese chatbots as examples to investigate (Brown, 2023a).

In the 21st century, addressing environmental challenges has become a paramount concern for humanity. Therefore, seizing the opportunity to use AI to assist in solving these challenges is imperative. Green marketing strategies can play a pivotal role to prove that AI can collaborate with humans to effectively address environmental issues and contribute to the betterment of society. The goal of green communication is to transmit detailed information to consumers about the company's green products, commitments, efforts, and results in the field of environmental protection and quality of life (Danciu, 2006; Mera, 2003; Ongkrutraksa, 2007). When green product companies communicate information about the performance of their products, they usually convey it in either ambiguous or precise presentation, how information on green products is presented to consumers has an impact on their decision to buy (S. Liang et al., 2022). Therefore, finding an effective communication tool is key, based on previous studies, Artificial intelligence has played a key role in revolutionizing eco-friendly marketing strategies, providing systems and tools to predict consumer behavior, and generating personalized marketing insights and opportunities (Brown, 2023b; Rathore, 2018).

While AI chatbots have proven to be valuable tools for marketing and customer service, their adoption can be influenced by various factors, especially when companies use it to promote green products. Therefore, it is necessary to use TAM to explore consumers' adoption towards AI chatbots. The Technology Acceptance Model (TAM) describes an individual's acceptance of information systems (Lucas Jr & Spitler, 1999). This model has been widely used to explain and predict what factors influence organizations and individual users to accept and use a specific technology (Rauschnabel & Ro, 2016). In the Technology Acceptance Model, there are two main dimensions, which include perceived ease of use (PEU) and perceived usefulness (PU) (Davis et al., 1989). Based on the criticisms of TAM and society development, this paper chooses perceived cyber risks (PCR) and perceived enjoyment (PE) as another two main factors to explore consumers' acceptance of AI and whether these factors (PU, PE, PEU, PCR) have impact on purchase intention (Abdullah & Ward, 2016; Kakabadse et al., 2008; Kim & Forsythe, 2008; Pantano & Di Pietro, 2012; Wang et al., 2018). With people's self-awareness increased and the widespread use of technology in daily life, they are more care about their psychology, thus using perceived enjoyment is essential, it can measure how much a certain system's use is seen as pleasant in and of itself, without regard to any negative effects on performance. For perceived cyber risks, this factor is often seen as the major barrier to user adoption of innovative technologies (Wang et al., 2018). Perceived cyber risks refer to an individual's subjective assessment of potential cyber security threats and vulnerabilities. These perceptions are shaped by numerous factors and can influence decision-making, behavior, and cyber security practices.

Consumer purchase intention is a key driver of a company's green marketing success, but it is influenced by a complex interplay of factors (Gogoi, 2013). So, the Technology Acceptance Model (TAM) provides a framework that lets marketers

analyze consumers' purchase behavior. Businesses and marketers can use this model to design and market products, thereby increasing purchase intention among potential customers. A marketer must comprehend the purchasing intention to determine whether a consumer's attitude toward environmental communications is related to their desire to buy the promoted goods because of the relationship between attitude and behavior.

In this paper, researchers chose the EV industry as an example to explore. Based on previous studies, the adoption of EV is crucial in mitigating air pollution and reducing carbon emissions. China as the world's biggest national market for EV, there has a bright future, especially the Chinese government committed to achieve carbon neutrality by 2060. Therefore, EV is currently being introduced as one of the most efficient solutions to help people protect the world. The Chinese government has been introducing a lot of policies to help EV industry, for example, price subsidies for electricity, oil, and purchase subsidies, purchase tax exemptions (Yan & Crookes, 2007). However, there is one big problem China has been facing, even if the number of electric car (EV) on the road has been increasing but their market shares are still lower than traditional ICEVs (Lin & Wu, 2018). Not only because the COVID-19 damages but also public awareness, willingness to buy, and technology diffusion is still at a low (Liu et al., 2023). Therefore, finding an effective new communication tool for this industry is urgent.

In summary, this paper's literature review underscores Artificial Intelligence (AI) is a double-edged sword, but AI especially AI chatbots can help green marketing to maximize their benefits to help humans. Leveraging the Technology Acceptance Model (TAM), the research delves into consumers' acceptance of AI chatbots, incorporating factors like perceived cyber risks and perceived enjoyment. The examination of China's electric vehicle (EV) industry underscores its potential for environmental mitigation, backed by governmental support. Despite the growing popularity of EV, challenges persist in capturing market shares, underscoring the necessity for holistic approaches in green marketing and AI integration.

HYPOTHESIS

H1: Perceived usefulness (PU) of AI affects consumers' purchase intention towards EV.

H2: Perceived ease of use (PEU) of AI affects consumers' purchase intention towards EV.

H3: Perceived enjoyment (PE) of AI affects consumers' purchase intention towards EV.

H4: Perceived cyber risks (PCR) of AI affects consumers' purchase intention towards EV.

RESEARCH METHODOLOGY

The research is based on a quantitative approach aiming to explore the effects of PU, PEU, and PE, PCR of AI on the purchase intention of Electric Vehicle among consumers in China. This chapter describes the details of the research sample and sampling method, research tool, variable measurement, and data collection and data analysis. The study utilizes an online questionnaire survey to collect information and plan to use multiple regression analysis. Based on the literature review and previous studies, the questionnaire was categorized into 8 sections: screening questions, 5-point Likert scale charts about PU, PEU, PE, PCR, and purchase intention (PI) towards EV. A purposive sampling method involved 300 participants for data collection. The sample of this study is people who live in Shanghai city, aged between 31-40 years old because they are the main buyers of EV and have high education level and income, and they must meet the requirements that they have intention to use AI chatbots and EV or have experience using any AI chatbots and EV.

DATA ANALYSIS AND RESULTS

The Statistical Package for the Social Sciences (SPSS) is employed to analyze the primary data collected from research questionnaire in this study.

Reliability Analysis

The SPSS test concluded that: The overall reliability coefficient value of the scale is $\alpha=0.906$, indicating good internal consistency and stability of this questionnaire in general. At the same time, the coefficient of reliability value α of each subscale is greater than 0.8, indicating that each subscale had good stability. The conclusion is that the reliability of the data

reliability of this scale is good.

Table 1: Reliability

Construct	Cronbach α	Items
Perceived usefulness (PU)	.873	5
Perceived ease of use (PEU)	.851	4
Perceived enjoyment (PE)	.852	4
Perceived cyber risks (PCR)	.877	4
Purchase intention (PI)	.825	3

The Cronbach's alpha value for PU, PEU, PE, PCR scales are all over 0.8, ensuring high reliability of the scale. Moreover, these values are in concurrence with the original scale which all had reliability over 0.7 (Holdack et al., 2022; Liu, 2022; Vafaei-Zadeh et al., 2022; Woo & Kim, 2019).

Validity Analysis

The structural validity of the scale was tested by exploratory factor analysis, and the test results are shown in table 2. The KOM value is 0.887, and the Bartlett's sphericity test showed $P < 0.01$. This indicates that the overall validity of the questionnaire is good.

Table 2: KMO and Bartlett

KMO and Bartlett		
KMO		0.887
	Approx. Chi-square	3056.465
Bartlett	df	190
	P	<0.01

Descriptive Statistics

The SPSS test concluded that: The gender distribution among respondents is nearly equal, with 49.7% males and 50.3% females, while none fall into the "others" category. In terms of monthly income, the largest group comprises 49.0% of respondents earning between 7,001-9,000 RMB, followed by 40.3% earning more than 9,000 RMB. Regarding education, the majority (73.3%) hold a bachelor's degree, followed by 18.0% with education beyond a bachelor's, 6.7% with a secondary school level, and 2.0% with education below secondary school.

Multiple Regression Analysis

The study uses data to test the influence of independent variables on dependent variables through multiple regression analysis. The results are shown in Table 3.

Table 3: Results of Multiple Regression Analysis

Variable	B	SE	95% CI	β	t	P
(constant)	0.669	0.238	0.201		2.816*	0.005
PU	0.235	0.062	0.113	0.216	3.786*	0.01
PEU	0.096	0.059	-0.19	0.092	1.641	0.102
PE	0.235	0.057	0.122	0.222	4.095*	0.01
PCR	0.232	0.056	0.121	0.228	4.113*	0.01

Note: $F = 33.543$, $R^2 = 0.313$, $R^2_{adj} = 0.303$, $*p < 0.01^b$

There are four independent variables that positively affect the dependent variables: (1) the perceived cyber risks (PCR) got highest Beta score = 0.228; (2) the perceived enjoyment (PE) variable with Beta = 0.222, followed by (3) the perceived usefulness with Beta = 0.216 (4) the last variable (PEU) with Beta = 0.092, meaning that when the samples perceived the usefulness, ease of use, enjoyment, and cyber risks of AI Chatbots, their intention to purchase EV would be positively affected. Four independent variables (PU, PEU, PCR, and PE) can explain the relationship between dependent variables (PI) for 30.30 percent. However only three variables (PU, PE, PCR) are statistically significant less than 0.05. Therefore H1, H3, H4 are supported.

Results

The hypotheses testing was conducted by using SPSS, to produce coefficients, statistical significance of influence (As shown in Figure 1).

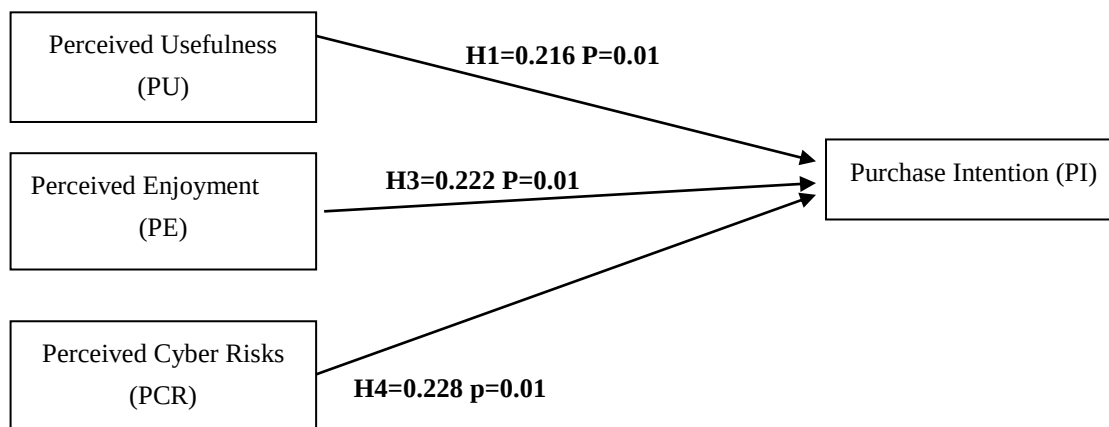


Figure 1. Hypothesis tests using SPSS

DISCUSSION

1. Perceived cyber risks (PCR) received the highest Beta score, highlighting the pervasive influence of personal information security concerns in an increasingly technology-driven world. In the contemporary landscape, individuals are increasingly wary of potential risks to their personal information. These results align consistently with prior research, which states that cyber risks is a very important factor to influence them use a specific technology and then influence their behavior (Al-Adwan et al., 2023).
2. Perceived enjoyment (PE), there is a notable connection between respondents' PE of AI chatbots and their subsequent purchase intention toward electric vehicles (EVs). These results align consistently with prior research, particularly the

work of Venkatesh (2000) and Liu (2022). Notably, there has been a noteworthy shift in people's self-awareness, with an increasing recognition of the importance of personal happiness. In recent years, the evaluation of technology has extended beyond mere functionality; individuals now consider whether a particular technology can contribute to their happiness, which has become a crucial benchmark in deciding whether they will continue to engage with that technology.

3. Perceived usefulness (PU) is one of the influential variables on PI, but only can rank third among all variables. Respondents believe that using AI chatbots can be a good assistant to help them to do the shopping. Previous studies have reached consistent conclusions in most contexts, including the paper (Mensah, 2020), The convenience of obtaining real-time information, coupled with the ability to navigate through various options effortlessly, strengthens the belief that AI chatbots are instrumental in shaping a high-quality consumption experience for consumers interested in electric vehicles.
4. Perceived Ease of Use (PEU) positive impact on purchase Intention (PI); however, the absence of strong evidence indicates that consumers' perceptions may be influenced by the complexity of electric vehicle information and the limited popularity and functionality of domestic AI chatbots compared to global counterparts. This outcome does not align with the results reported by Liu (2022).

Research Implications

This research contributes significantly to the understanding of Technology Acceptance Model (TAM), AI chatbots, purchase intention toward electric vehicle (EV), and green marketing strategy. While previous studies focused on factors like subsidy policies, business models, and challenges in EV purchase intention, the study innovatively explores AI chatbots as a new marketing communication tool in the context of green marketing. The findings emphasize the positive impacts of AI chatbots on perceived usefulness, ease of use, enjoyment, and cyber risks on purchase intention, providing valuable insights for academic research and practical implications for businesses. Marketers are advised to leverage AI chatbots as effective and efficient tools, emphasizing their positive influences and addressing concerns to enhance consumer engagement and purchase intentions.

Additionally, the study highlights the business implications of the findings, based on this paper results, marketers are advised to accentuate the enhanced personal information security offered by AI chatbots compared to other communication tools, and promote the experience use AI chatbots to get information is fun, not boring, so it can attractive consumers attention. Besides marketers should be aware of that usefulness in AI chatbot also will be a point to let consumers use this technology to get products information, therefore should highlight AI chatbots can help their life more productivity, save money and time. In order let consumer aware of the ease of use of AI chatbots, marketers should offer clear instructions on how to effectively engage with AI chatbots, highlighting their user-friendly features, and demonstrating the simplicity of incorporating these tools into daily information-seeking routines. When consumers see AI chatbots advantages and use it, this technology will influence their purchase decision. Overall, the research offers a comprehensive understanding of the intersection between AI chatbots, green marketing, and consumer behavior, paving the way for strategic advancements in technology-driven marketing approaches.

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