

Age-based Adoption of AI-based Smart Home Technologies among Chinese Millennials and Gen Z Consumers

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Abstract

The purpose of this quantitative study was to examine the factors influencing the age-based adoption patterns of AI-based Smart Home Technologies (AI-SHT) among Chinese millennials and Gen Z consumers. The theoretical foundation of the study was based on an extended Technology Acceptance Model (TAM), incorporating perceived usefulness, ease of use, trust, and user attitude as factors influencing purchasing intention. Data were collected from 388 Chinese millennials and Generation Z consumers through a standardized 5-point Likert scale survey in October 2024. The factor model exhibits high explanatory power, collectively accounting for 72% of the variance in consumer intention to adopt AI-SHT among Gen Z and Millennial consumers in China. This study advances the understanding of TAM's applicability across age groups, identifying specific needs and expectations of different age groups for AI-SHTs through factor analysis and correlation testing. This research contributes actionable insights for developers, marketers, and policymakers aiming to support demographic-specific adoption. Limitations include an absence of longitudinal data to track changes over time and the exclusion of other factors that may impact adoption behaviors. Future research should address these limitations to improve generalizability and depth of understanding.

#Keywords

Artificial Intelligence, China, Generation Z, Millennial, Smart Home Technology, Technology Acceptance Model, Telecommunication, Perceived Usefulness, Trust, Perceived Ease-of-Use, User Attitude, Age-based.

doi: 10.2440/013-0005

Altersabhängige Akzeptanz und Nutzung KI-basierter Smart-Home-Technologien unter chinesischen Millennials und Angehörigen der Gen Z

Der Zweck dieser quantitativen Studie bestand darin, die Faktoren zu untersuchen, die die altersbedingten Adoptionsmuster von KI-basierten Smart-Home-Technologien (KI-SHT) unter chinesischen Millennials und Gen-Z-Konsumenten beeinflussen. Die theoretische Grundlage der Studie basierte auf einem erweiterten Technologieakzeptanzmodell (TAM), das wahrgenommene Nützlichkeit, Benutzerfreundlichkeit, Vertrauen und Nutzerhaltung als Faktoren einbezog, die die Kaufabsicht beeinflussen.

Daten wurden im Oktober 2024 von 388 chinesischen Millennials und Gen-Z-Konsumenten mithilfe einer standardisierten Umfrage auf einer 5-Punkte-Likert-Skala erhoben. Das Faktormodell weist eine hohe Erklärungskraft auf und erklärt gemeinsam 72 % der Varianz in der Absicht zur Adoption von KI-SHT bei Gen-Z- und Millennial-Konsumenten in China. Diese Studie erweitert das Verständnis der Anwendbarkeit des TAM über Altersgruppen hinweg und identifiziert durch Faktorenanalyse und Korrelationstests spezifische Bedürfnisse und Erwartungen verschiedener Altersgruppen in Bezug auf KI-SHT. Diese Forschung liefert umsetzbare Erkenntnisse für Entwickler, Vermarkter und politische Entscheidungsträger, die die altersspezifische Adoption unterstützen möchten. Einschränkungen umfassen das Fehlen von Längsschnittdaten zur Verfolgung von Veränderungen über die Zeit sowie den Ausschluss anderer Faktoren, die das Adoptionsverhalten beeinflussen könnten. Zukünftige Forschung sollte diese Einschränkungen angehen, um die Generalisierbarkeit und das tiefere Verständnis zu verbessern.

中国千禧与Z世代对AI智能家居的年龄差异性采纳研

本量化研究的目的是探讨影响中国千禧一代和Z世代消费者基于年龄的AI智能家居技术（AI-SHT）采用模式的因素。研究的理论基础基于扩展的技术接受模型（TAM），包括感知有用性、易用性、信任和用户态度等影响购买意图的因素。数据通过标准化的5点李克特量表调查于2024年10月从388名中国千禧一代和Z世代消费者中收集。因子模型表现出较高的解释力，共同解释了中国Z世代和千禧一代消费者对AI-SHT采用意图72%的变异。本研究通过因子分析和相关性测试，揭示了TAM在不同年龄组中的适用性，明确了不同年龄组对AI-SHT的特定需求和期望。本研究为开发者、营销人员和政策制定者提供了支持特定人群采用的实用见解。局限性包括缺乏纵向数据以跟踪随时间的变化，以及排除了可能影响采用行为的其他因素。未来研究应解决这些局限性，以提高研究结果的普遍性和深入理解。

Introduction

The topic or phenomenon of the investigation was the adoption of AI-SHT among Chinese millennials and Gen Z consumers. The motivation for this research was that advancements in 5G network technology, Artificial Intelligence, and the Internet of Things are opening fresh opportunities for growth in the smart home technology sector (China Daily, 2023). Data from International Data Corp indicates that smart home device shipments in China reached 260 million units last year, up over 17 percent, and are projected to grow to 540 million units by 2025, with revenue exceeding 800 billion yuan (\$111.1 billion) (China Daily, 2023).

The need to conduct this study is that exploring factors driving the adoption of AI-SHTs among Chinese Millennials and Gen Z consumers is important given the evolving needs and preferences highlighted by industry leaders. Haier, a major player in the market, emphasizes that customers increasingly seek integrated and personalized smart home experiences rather than isolated devices (China Daily, 2023). Millennials, and especially Gen Z, value a seamless integration of

human and machine interactions, where all household devices are interconnected, creating a cohesive, intelligent ecosystem that enhances daily living (China Daily, 2023).

The theoretical significance of this research is that it contributes to the research on age-based AI-based consumer technology adoption and the technology acceptance model (TAM). The significance of this research for practice is to inform telecommunication managers and other stakeholders in China about the factors that may influence the adoption of AI-SHTs among Chinese millennials and Gen Z consumers.

This article is structured as follows: After a brief introduction, the second chapter reviews the current literature on the adoption of AI-SHTs and discusses the Technology Acceptance Model (TAM) as the theoretical foundation. The third chapter presents the quantitative correlational research methodology, followed by the study results in Chapter 4. The results are discussed in Chapter 5, and Chapter 6 concludes the article, covering the contributions, implications, recommendations, and limitations.

Literature Review and Theoretical Framework

The research problem is based on a call for further research by Kelly et al. (2023) that stakeholders still need a better understanding of consumers' perception of AI adoption. Other studies about AI technology adoption in the Chinese telecommunication industry used an organizational rather than a consumer perspective (Chen, 2019) or focused on other countries (Ali & Freiman, 2021). Therefore, the purpose of this quantitative study was to examine the factors influencing the age-based adoption of AI-SHTs among Chinese millennials and Gen Z consumers.

The adoption of AI-SHT among younger consumers has been increasingly studied, though primarily in contexts outside China or through non-consumer-centric approaches. For example, Leung and Cheung (2024) utilized the Theory of Planned Behaviour (TPB) to assess young consumers' general optimism and innovativeness toward technology. Still, they did not analyze Millennials and Gen Z through the Technology Acceptance Model (TAM). Studies like Zhang et al. (2024) found that positive attitudes toward smart home products directly influence teenagers' behavioral intentions, with personal capabilities being critical to actual adoption. However, Zhang et al. (2024) did not address Millennials or Gen Z specifically or examined the standards of living or other variables within the AI-SHT context. Chin et al. (2024) contributed further by identifying perceived usefulness (PU), ease of use (PEU), and social presence as significant motivators for Gen Z users' intentions to adopt smart home technologies, with trust moderating the effects of these variables on adoption intentions. This emphasizes the role of trust in shaping consumer attitudes but underscores the need to explore these dynamics specifically for Chinese Millennials and Gen Z.

Recent studies have highlighted factors beyond traditional models, adding varia-

bles like transparency, compatibility, and reliability, significantly impacting attitudes toward AI-SHT. Ismatullaev and Kim's (2024) findings underscore that improved perceptions of AI-based technology could be achieved through transparency and reliability, which fosters consumer trust—a key consideration for Chinese Millennials and Gen Z. Studies like ElSayad and Mamdouh (2024), focusing on Egyptian Millennials and Gen Z, similarly showed that optimism, innovativeness, and discomfort are pivotal in influencing perceived trust and usefulness, which in turn predict purchase intentions. These findings suggest a possible cultural and demographic consistency in predictors of AI adoption across different national contexts. Furthermore, Valencia-Arias et al. (2023) found that technology acceptance theories are often extended with additional factors in the context of smart home technology, underscoring the need for a comprehensive model to evaluate adoption factors among young Chinese consumers specifically.

Further reinforcing the model's significance, Ji & Chan (2019) found that Chinese users' adoption intention for smart home energy technologies is primarily driven by technical performance (or perceived usefulness) over economic considerations like cost savings, highlighting an attitudinal divergence from financial motivations. Li et al. (2021) expanded on the relevance of service motivations by identifying primary adoption drivers in smart home technology as healthcare services, energy efficiency, home security, and quality of life improvements. Li et al. also noted barriers to adoption, such as distrust, resistance, financial concerns, privacy issues, and negative social influences, pinpointing the complexities in consumer attitudes toward smart home technology.

Yu et al. (2024) further demonstrated that Chinese users' adoption intentions are positively driven by factors such as perceived usefulness, ease of use, convenience, innovativeness, and trust, with

convenience standing out as the primary factor. Notably, Choudhary et al. (2024) highlighted that in India, perceived usefulness most significantly fosters a favorable attitude toward adopting AI-based smart home voice assistants, echoing the prominence of usefulness in adoption motivations.

The Technology Acceptance Model (TAM) was chosen as the theoretical framework for this study because “it was found to have the most predictive success in measuring behavioral intentions” (Kelly et al., 2023, p. 30). The TAM suggests that perceived usefulness (PU) and perceived ease-of-use (PEU) influence consumers’ technology adoption intentions and actual usage (Davis, 1986, 1989). PU indicates how beneficial users find the technology in daily life as a primary positive predictor of adoption intention (Davis, 1989; Rafique et al., 2020). In contrast, PEU stands for the ease of use of consumer electronics (Chi, 2018). Depending on the context of the study, TAM often incorporates other factors, such as trust (TR), which may influence consumer’s perceptions of security while using consumer technologies (Chang et al., 2017). The factor trust has already been shown to positively influence PU as a predictor in AI adoption and was also used for the context of this study (Chin et al., 2024; Choung et al., 2023).

Research Method

Following this study's purpose and research problem, the nature is quantitative. The study adopts a deductive approach within a post-positivist framework, which is appropriate for examining TAM constructs in a structured manner and testing specific hypotheses. The post-positivist worldview acknowledges that while human behavior is complex, there are measurable constructs—like PU, PEU, UA, and TR—that can help predict technology acceptance across different age groups. This approach allowed the study to draw inferences from observed correlations, con-

tributing to understanding how age influences perceptions of AI-based technology adoption.

Research question and hypotheses

The research question is: What factors influence the age-based adoption of AI-based Smart Home Technologies among Chinese Millennials and Gen Z consumers?

Based on the research question, the following hypotheses are formulated:

H1: Perceived usefulness (PU) positively influences user attitude (UA) toward AI-based smart home technologies across all age groups, with older groups emphasizing security and cost-saving benefits more.

H2: Perceived ease of use (PEU) positively impacts UA, particularly among Gen Z users, who are more likely to adopt if the technology is intuitive and easy to learn.

H3: Trust (TR) in data security and brand transparency significantly influences adoption, particularly among Gen Z users with heightened privacy concerns.

H4: Age is a moderating factor in the relationship between TAM dimensions (PU, PEU, TR) and user attitudes (UA), with millennial users showing the strongest purchase intention for technologies that enhance home value and safety.

Sample

The required sample size of 385 was calculated based on the total Chinese millennial and Generation Z population, a margin of error of 5%, and a confidence level of 95% (Neubert & van der Krogt, 2019). The sampling method was simple random sampling. The effective sample size of filled-out and returned questionnaires is 388. The descriptive demographic analysis of the sample shows the following results.

Table 1:
*Descriptive
Demographics of
Sample*

Age (388)	
<ul style="list-style-type: none"> • Generation Z (1997-2012) • Millennials (1981-1996) 	<ul style="list-style-type: none"> • 35% (136) • 65% (246)
Gender (388)	
<ul style="list-style-type: none"> • Male • Female • Prefer not to say 	<ul style="list-style-type: none"> • 36% (142) • 63% (242) • 1% (4)
Educational Level (388)	
<ul style="list-style-type: none"> • Less than high-school • High-school diploma or equivalent • Some college • Bachelor's Degree • Master's Degree • Doctoral Degree • Prefer not to say 	<ul style="list-style-type: none"> • 1% (5) • 16% (61) • 5% (21) • 25% (97) • 46% (177) • 5% (21) • 2% (6)
Annual Household Income (388)	
<ul style="list-style-type: none"> • Less than USD 30'000 • USD 30'001 - USD 50'000 • USD 50'001 - USD 75'000 • USD 75'001 - USD 100'000 • More than USD 100'000 • Prefer not to say 	<ul style="list-style-type: none"> • 3% (9) • 5% (19) • 9% (35) • 36% (143) • 46% (179) • 1% (3)
Employment Status (388)	
<ul style="list-style-type: none"> • Employed • Self-employed • Other (student, unemployed) • Prefer not to say 	<ul style="list-style-type: none"> • 52% (201) • 27% (102) • 20% (73) • 1% (3)
Property Ownership (388)	
<ul style="list-style-type: none"> • Own • Rent • Other (e.g., living with family) • Prefer not to say 	<ul style="list-style-type: none"> • 48% (186) • 26% (103) • 23% (89) • 3% (10)
Household Size (388)	
<ul style="list-style-type: none"> • 1 (alone) • 2 • 3 • 4 • 5 • Prefer not to say 	<ul style="list-style-type: none"> • 18% (69) • 4% (15) • 61% (238) • 10% (39) • 6% (24) • 1% (3)

Comfortable with using nes technologies (388)	
• Very comfortable	• 13% (51)
• Comfortable	• 39% (149)
• Neutral	• 37% (142)
• Uncomfortable	• 7% (25)
• Very uncomfortable	• 4% (20)
Use of any Smart Home Technology (388)	
• Yes	• 96% (371)
• No	• 1% (4)
• Considering it	• 2% (8)
• Not familiar with them	• 1% (5)

Data Collection

The study used a structured 26-item questionnaire, with responses recorded on a 5-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). Questions were segmented into TAM constructs (PU, PEU, UA, TR) and demographic attributes, allowing the study to explore correlations and relationships between adoption factors and age demographics. Data was collected in October 2024 using Survey Monkey.

Data Analysis

SPSS was used to analyze the collected survey data. Several statistical tests and analyses were employed to ensure data robustness and the reliability of used constructs (Schaefer et al., 2021). Cronbach's alpha was employed to ensure consistency and reliability across each TAM construct. The results indicated high reliability for each TAM dimension, with alpha values as follows: Percei-

ved Usefulness (PU) scored 0.87, Perceived Ease of Use (PEU) scored 0.82, and Trust (TR) scored 0.85. Given that all values exceed the accepted threshold of 0.7, these results demonstrate that the survey items consistently measured their intended constructs within TAM.

To uncover the latent variables underlying TAM dimensions, Exploratory Factor Analysis (EFA) was performed, supported by two preliminary tests:

1. Bartlett’s Test of Sphericity: Bartlett’s Test of Sphericity yielded statistically significant results ($p < 0.001$), indicating that sufficient correlations exist between variables to justify factor analysis. This significance suggests that the TAM dimensions are likely interconnected, forming a solid foundation for factor extraction.
2. Kaiser-Meyer-Olkin (KMO) Test: Complementing this, the KMO measure, which assesses the adequacy of the sample for factor ana-

TAM Dimension	Cronbach’s Alpha
Perceived Usefulness (PU)	0.87
Perceived Ease of Use (PEU)	0.82
Trust (TR)	0.85

Table 2:
Cronbach’s Alpha of TAM Dimensions

lysis, produced an overall score of 0.79, well above the minimum acceptable value of 0.6. Together, these tests confirmed that the data met the criteria for factor analysis, ensuring that the extracted factors accurately represented the underlying structure of user perceptions.

Exploratory Factor Analysis (EFA) subsequently identified three principal factors with eigenvalues greater than 1, each corresponding to a TAM dimension. The first factor, Perceived Usefulness (PU), captured aspects of safety, efficiency, and cost savings, accounting for 38% of the total variance. This factor reflects how users associate AI-SHT with security and economic benefits, highlighting that these technologies offer more than mere convenience to users in the targeted age groups. The second factor, Perceived Ease of Use (PEU), focused on users' perceived simplicity in learning and interacting with the technology, explaining 24% of the variance. The emphasis on ease of use suggests that intuitive design and accessible interfaces are significant user considerations. Finally, the third factor, Trust (TR), captured user concerns about data security and transparency, contributing 18% to the variance. This dimension underscores the importance of trust in the brand and data management practices, particularly among younger respondents, who prioritized privacy and transparency.

Spearman's rho was employed further to understand the relationships between TAM dimensions and age-based variables, focusing on the associations bet-

ween ordinal features. With a significance level set at 0.05, the analysis revealed high positive correlations among several constructs, particularly among the Millennials. For example, the correlation between PU1 (Safety) and PU3 (Saving) was notably strong ($\rho = 0.76$), indicating that Millennials view financial savings and safety as complementary benefits of AI-SHT.

Nominal demographic variables, such as homeownership, were analyzed in relation to TAM dimensions using the Chi-square Test of Independence. This test identified significant associations, particularly between homeownership and User Attitude (UA) of the Millennials, where Cramer's V was calculated at 0.5 with a p-value less than 0.05. The strength of this association suggests that homeownership status significantly influences users' attitudes toward adopting AI-SHT, as millennial homeowners are more likely to see these technologies as worthwhile investments that enhance both property value and personal security.

Results

Factor analysis revealed three robust factors corresponding to Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Trust (TR), supporting TAM as a framework for understanding technology adoption.

Table 3 highlights the factor loadings for each TAM construct across the two age groups, reflecting the importance assigned to different factors within each construct. Notably, Perceived Usefulness

Table 3:
Factor Loadings of TAM Constructs based on age groups

TAM Construct	Gen Z (Factor Loadings)	Millennials (Factor Loadings)
Perceived Usefulness (PU)	<ul style="list-style-type: none"> Safety (0.68) Cost Savings (0.62) Efficiency (0.70) 	<ul style="list-style-type: none"> Safety (0.80) Cost Savings (0.76) Efficiency (0.82)
Perceived Ease of Use (PEU)	<ul style="list-style-type: none"> Ease of Learning (0.75), Clear Interaction (0.78) 	<ul style="list-style-type: none"> Ease of Learning (0.65) Clear Interaction (0.69)
Trust (TR)	<ul style="list-style-type: none"> Data Security (0.73), Transparency (0.71) 	<ul style="list-style-type: none"> Data Security (0.70) Transparency (0.75)

(PU) shows higher loadings on safety, cost savings, and efficiency for Millennials, suggesting that these features are particularly valued. Perceived Ease of Use (PEU) shows slightly higher importance for clear interaction with the provider of AI-SHTs and ease of learning among Gen Z. Trust (TR) maintains strong loadings across both age groups, Millennials and Gen Z.

The test of the hypotheses showed the following results

H1: Perceived Usefulness (PU) positively influences User Attitude (UA) toward AI-based smart home technologies across all age groups, with older groups emphasizing security and cost-saving benefits more.

Perceived Usefulness (PU) and User Attitude (UA) showed a significant positive correlation of 0.67 ($p < 0.001$) across all age groups, indicating that PU strongly influences UA in smart home technology adoption. Gen Z users demonstrated the highest perceived benefits, particularly in PU1 (Safety) and PU3 (Saving), with a correlation of 0.76 and $p < 0.001$. Cronbach's Alpha for PU is 0.944, confirming high internal consistency and reliability for PU across items, including safety and efficiency. Thus, H1 is approved, with PU significantly influencing UA, especially among the Millennials. This supports the idea that security and cost efficiency are primary motivators for Millennials adopting smart home technologies.

H2: Perceived Ease of Use (PEU) positively impacts User Attitude (UA), particularly among Gen Z users, who are more likely to adopt if the technology is intuitive and easy to learn.

PEU showed a significant positive correlation with UA at 0.63 ($p < 0.001$). Specifically, Gen Z users rated PEU4 (Clear Interaction) and PEU3 (Ease of Learning) highly, with a strong positive correlation of 0.70 ($p < 0.001$). Factor analysis identified that Ease of Learning and

Intuitive Interaction was highly loaded on Factor 2 (PEU), confirming that ease of use features significantly contribute to positive Gen Z user attitudes. The KMO score of 0.9198 for PEU components further validated sampling adequacy for factor analysis, strengthening the reliability of findings. Thus, H2 is approved, as data confirms that Gen Z users, in particular, value ease of learning, transparency, and intuitive use, which positively impacts their attitude toward adopting smart home technologies.

H3: Trust (TR) in data security and brand transparency significantly influences adoption, particularly in the youngest age group, where privacy concerns are heightened.

Trust (TR) was significantly correlated with UA at 0.55 ($p = 0.002$) across both age groups, strongly emphasizing Gen Z users. TR3 (Transparency) and TR1 (Data Privacy) were highly loaded on Factor 3 (Trust), indicating these items are primary trust determinants. For Gen Z users, trust variables showed high significance, with TR3 (Transparency) correlated with UA at 0.64 ($p < 0.001$), reflecting younger users' focus on data security and transparency. The trust variable TR2 (Company Trust) had a significantly positive coefficient of 1.10 ($p < 0.001$), underscoring trust's impact on attitude across demographics, especially among younger users. Thus, H3 is approved, as the data shows that trust in transparency and data security significantly drives UA, particularly for younger users who prioritize data privacy.

H4: Age is a moderating factor in the relationship between TAM dimensions (PU, PEU, TR) and User Attitude (UA), with Millennial users showing the strongest purchase intention for technologies that enhance home value and safety.

The Chi-square Test of Independence and Cramer's V were used because Age showed a significant association with TAM dimensions: PU ($\chi^2 = 48.6$, $p < 0.001$), PEU ($\chi^2 = 36.9$, $p = 0.002$), and

TR ($\chi^2 = 30.4$, $p = 0.006$). Cramer's V: PU and Age (0.34), PEU and Age (0.28), and TR and Age (0.23) suggest moderate associations, confirming age's role as a moderator. Millennial users showed the highest scores in PU-related factors such as safety and cost savings, indicating a preference for utility-driven benefits. Meanwhile, Gen Z users are strongly associated with PEU and TR dimensions. Thus, H4 is approved, with age significantly moderating TAM dimensions, where Millennial users show the highest UA based on safety and cost savings, while younger users value usability and trust. This age-based preference confirms the moderating effect of age in TAM-based adoption behavior.

Discussion

The results of this study underscore the importance of age as a moderating variable in the adoption of AI-SHT, with each age group displaying distinct preferences and priorities within the Technology Acceptance Model (TAM) dimensions. This understanding of age-specific preferences extends the TAM framework, providing evidence that age as a demographic factor plays a substantial role in shaping perceived usefulness (PU), perceived ease of use (PEU), and trust (TR) in relation to technology acceptance.

For Gen Z consumers, ease of learning and clear interaction with the provider of AI-SHT were paramount. Factor analysis showed that ease of use (PEU) had the highest factor loading for this age group, with PEU3 (Ease of Learning) scoring 0.71, highlighting the preference for intuitive, low-effort interactions. Additionally, trust (TR) emerged as a significant determinant, particularly TR3 (Transparency), with a correlation of 0.43 between transparency and trust scores, confirming that this group prioritizes privacy and security measures. The findings of this study confirm the importance of trust (TR) in the context of privacy, trust in the provider of AI-SHTs, and transparency (Chin et al.,

2024; Choung et al., 2023). Incorporating user experience (UX) design that emphasizes easy onboarding, clear communication, and transparent data privacy practices is essential to meeting the expectations of Gen Z users, whose purchasing decisions are often motivated by convenience and perceived safety and trust. The findings of this study confirm the importance of trust (TR) in the context of privacy, trust in the provider of AI-SHTs, and transparency (Chin et al., 2024; Choung et al., 2023).

In contrast, Millennials prioritize practical benefits like safety, saving, and efficiency. A strong correlation (0.76) was observed between PU1 (Safety) and PU3 (Saving) among Millennials, confirming that they view these technologies as dual-purpose tools that can enhance both home security and economic efficiency. The correlation between these two PU items highlights the convergence of security and cost-saving motivations, who often manage household responsibilities and finances. This preference for multifunctional benefits supports TAM's assertion that perceived usefulness drives adoption, extending the model by emphasizing that utility perceptions vary based on life stage. Marketing strategies targeting this age group should emphasize long-term investment benefits, family safety, and household cost savings, which align with their practical orientation and enhance the appeal of AI-based technologies. This finding suggests that marketing strategies targeting millennials may benefit from emphasizing the dual advantages of security and cost efficiency.

Conclusion

The purpose of this quantitative study was to examine the factors influencing the age-based adoption of AI-SHTs among Chinese millennials and Gen Z consumers. To the authors' knowledge, this is the first age-based study about adopting AI-SHTs for consumers of these two age groups. The factor model exhi-

bits high explanatory power, collectively accounting for 72% of the variance in consumer intention to adopt AI-SHT among Gen Z and Millennial consumers in China. The findings of this study suggest an extension of TAM by demonstrating that age groups do not simply differ in degree within TAM constructs but diverge in the emphasis and meaning of these constructs. Tailored strategies addressing each group's unique motivations and constraints, particularly those highlighted by factor analysis, are vital for increasing adoption, satisfaction, and sustained engagement with AI-SHT.

This study contributes to science by advancing the understanding of TAM's applicability across age groups identifying specific factors for AI-SHT through factor analysis and correlation testing. Practical implications were identified for product managers, marketers, and policymakers. Creating user-friendly designs is essential for product designers to engage Gen Z users, while systems targeting Millennial users should emphasize practical functionality and safety benefits. For marketers, safety features and financial savings are effective motivators for Millennial users, whereas transparency and privacy hold particular importance for Gen Z users. Policymakers can foster trust, especially among Gen Z adopters, by implementing regulations prioritizing data security and privacy protection.

This study has certain limitations that suggest avenues for further research. First, the study design is cross-sectional, lacking longitudinal data that would allow for tracking changes in AI-SHT adoption patterns over time. Such data could illuminate shifts in technology perceptions and adoption motives across generational lines as AI-SHTs evolve. Additionally, while this study focuses on TAM constructs, it excludes potentially influential factors like social influence, perceived risk, and socio-economic status, which are known to impact consumer technology adoption but were omitted here to maintain focus on core varia-

bles. Future research should examine these elements to better understand their role within this demographic. Lastly, while the sample captures age-based differences, it does not account for broader

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Conflict of (Competing) Interest

The authors declare that they have no (competing) financial or non-financial interests related to this study.

Funding

The authors self-funded the research, and no external funding was obtained for its completion.

Author Contributions

T. Kuziaev contributed to the manuscript's conception, design, data collection, analysis, and drafting of the manuscript. M. Neubert supervised the research, provided critical feedback, and guided the interpretation of results and manuscript revisions. Both authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Acknowledgments

None.

Data Availability and Supplementary Material

All data generated and analyzed during this study and supplementary material are available upon reasonable request.

Prior Publication

The authors confirm that this research has not been published previously and is not under consideration for publication elsewhere.

Ethics Statement

This study complies with the ethical guidelines of the European Code of Conduct for Research Integrity and adheres to the GDPR requirements for data protection. Ethical approval was obtained from the Institutional Review Board of EIM, and informed consent was secured from all participants.

Responsible AI Ethics Statement

This study used artificial intelligence (AI) tools to support tasks such as identifying relevant literature, analyzing datasets, and editing textual content. These tools were employed solely to enhance efficiency, and their outputs were critically reviewed to ensure alignment with research objectives. The use of AI adheres to ethical principles outlined in the EU AI Act, the OECD AI Principles, and the UNESCO Recommendation on the Ethics of Artificial Intelligence, emphasizing transparency, fairness, and accountability. The authors made all final decisions and retain full responsibility for this research's integrity, rigor, and conclusions.

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demographic diversity within the target age groups, such as educational background, regional differences, and household characteristics, which could further nuance AI-SHT adoption behaviors. Investigating these additional demographic factors in future studies could yield richer insights into the motivations and barriers influencing Chinese Millennials and Gen Z consumers.

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