Adoption of AI-based Smart Home Technologies in China – Systematic Literature Review

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Abstract

The purpose of this systematic literature review was to explore the status of the literature about the factors influencing the adoption of AI-based Smart Home Technologies (AI-SHT) among Chinese consumers. The study synthesizes findings from 18 peer-reviewed articles published between 2019 and 2024, focusing on behavioral, social, and technological factors that impact AI-SHT adoption. Prominent theoretical models, including the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), were frequently used to explore perceived usefulness, ease of use, social influence, and trust. Key barriers, such as privacy concerns, data security issues, and economic considerations, are discussed within China's unique cultural and economic landscape. Methodologically, quantitative studies dominated the reviewed literature, relying heavily on survey-based approaches to assess consumer attitudes and behaviors. Findings highlight the complexity of Chinese consumers' adoption motivations, suggesting a need for further research into generational preferences, alternative adoption models, and cross-industry applications of AI-SHT. This review provides a foundation for future studies and industry strategies to enhance AI-SHT adoption in China.

#Keywords

Artificial Intelligence, China, Smart Home Technology. AI-based Smart Home Technologies, Adoption Factors, Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Chinese Consumers, Privacy Concerns, Data Security, Systematic Literature Review, PICO Framework, Consumer Behavior, Smart Home Technology Adoption.

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Nutzung und Akzeptanz KI-basierter Smart-Home-Technologien in China – Eine systematische Literaturanalyse

Der Zweck dieser systematischen Literaturübersicht war es, den Status der Literatur zu den Faktoren zu untersuchen, die die Akzeptanz von KI-basierten Smart-Home-Technologien (KI-SHT) unter chinesischen Verbrauchern beeinflussen. Die Studie fasst Erkenntnisse aus 18 begutachteten Artikeln zusammen, die zwischen 2019 und 2024 veröffentlicht wurden, und konzentriert sich auf Verhaltens-, soziale und technologische Faktoren, die die Akzeptanz von KI-SHT beeinflussen. Prominente theoretische Modelle, darunter das Technology Acceptance Model (TAM) und die Theorie des geplanten Verhaltens (TPB), wurden häufig verwendet, um die wahrgenommene Nützlichkeit, Benutzerfreundlichkeit, den sozialen Einfluss und das Vertrauen zu untersuchen. Wichtige Hindernisse wie Datenschutzbedenken, Datensicherheitsprobleme und wirtschaftliche Überlegungen werden im Kontext des einzigartigen kulturellen und wirtschaftlichen Umfelds Chinas diskutiert. Methodisch dominierten quantitative Studien die überprüfte Literatur, die stark auf Umfrageansätze zur Bewertung von Verbraucherhaltungen und -verhalten angewiesen waren. Die Ergebnisse heben die Komplexität der Adoptionsmotivationen chinesischer Verbraucher hervor und weisen auf einen Bedarf an weiterer Forschung zu generationsspezifischen Präferenzen, alternativen Adoptionsmodellen und branchenübergreifenden Anwendungen von KI-SHT hin. Diese Übersicht bietet eine Grundlage für zukünftige Studien und Branchenstrategien zur Förderung der Akzeptanz von KI-SHT in China.

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中国人工智能驱动的智能家居技术的使用与接受度：一项系统性文献综述

本系统性文献综述的目的是探讨关于影响中国消费者采纳基于人工智能的智能家居技术（AI-SHT）因素的文献现状。研究综合了2019年至2024年间发表的18篇同行评议文章的研究结果，重点分析了影响AI-SHT采纳的行为、社会和技术因素。包括技术接受模型（TAM）和计划行为理论（TPB）在内的主流理论模型被广泛用于探讨感知有用性、易用性、社会影响力和信任等方面的重要因素。文章还讨论了隐私担忧、数据安全问题和经济因素等主要障碍，并结合中国独特的文化和经济背景进行分析。从方法上看，定量研究在被审查的文献中占主导地位，并大量依赖基于问卷调查的方法评估消费者的态度和行为。研究结果揭示了中国消费者采纳动机的复杂性，表明需要进一步研究代际偏好、替代采纳模型以及AI-SHT的跨行业应用。本综述为未来研究和行业战略提供了基础，以促进AI-SHT在中国的采纳。

Introduction

The rapid growth of artificial intelligence (AI) is transforming smart home technologies (SHT), especially in urban markets like China. AI-based smart home technologies (AI-SHT) integrate intelligent automation for improved convenience, security, and energy efficiency, but technical benefits do not solely drive adoption. Factors like trust, privacy, and cultural values play significant roles in shaping consumer attitudes, especially in China's unique sociocultural environment (Ji & Chan, 2019; Li et al., 2021). Privacy concerns and data security are frequently cited as barriers to adoption, as consumers express high sensitivity to data protection and security risks (Xue & Gao, 2020; Liu et al., 2022).

This systematic literature review (SLR) explores determinants influencing the adoption of AI-SHT among Chinese consumers. Using the PICO (Population, Intervention, Comparison, Outcome) framework, the research question guiding this review is: *What are the factors influencing the adoption of AI-based smart home technologies among Chinese consumers?* Prominent behavioral models, such as the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), are frequently applied in this research. TAM often explores perceived usefulness and ease of use, while TPB provides insights into social influence and perceived behavioral control over adoption intentions (Yu et al., 2024; Zhang et al., 2024). Economic factors, like cost and perceived value, also shape adoption decisions (Chen et al., 2023).

Following PRISMA guidelines, studies from 2019 to 2024 were selected from Google Scholar, SciSpace, and Litmaps, focusing exclusively on research addressing China-specific adoption factors.

The article is structured as follows: the materials and methods section outlines the search strategy and data management; the results section presents major adoption factors identified; and the findings synthesize the peer-reviewed academic articles selected for this review, highlighting results, research gaps, and suggesting directions for future research.

Materials and Methods

To achieve the purpose of this study and address the research question, this systematic literature review (SLR) employs an exploratory and descriptive methodology (Neubert, 2022). A SLR is a qualitative research method (Halkias et al.,

2020; 2023). This approach allows for a comprehensive understanding of the current state of research on factors influencing the adoption of AI-based smart home technologies among Chinese consumers, highlighting both existing study limitations and potential directions for future research. The review follows the 2020 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, ensuring thorough reporting of materials and methods, inclusion and exclusion criteria, information sources, search strategies, data management, and adherence to the PRISMA flow chart for transparency and rigor in the methodological process (Neubert, 2022).

Inclusion and exclusion criteria

The inclusion criteria for this systematic literature review focused on studies that address the adoption of AI-based smart home technologies among Chinese consumers. Eligible studies are those that were published not later than five years ago (2020-2024) and include relevant keywords (and their synonyms) in the titles and metadata, such as "smart home," "intelligent home," "AI-based home automation," "adoption," and "acceptance." To align with the research question, studies must specifically explore factors influencing the adoption of AI-based smart home technologies (AI-SHT). Exclusion criteria, aligned with PRISMA 2020, include studies that do not address the adoption of smart home technologies within China, do not provide access to the full text, or lack detailed exploration of adoption factors relevant to AI in smart homes. Additionally, any studies failing to present identifiable models or factors related to consumer adoption will be excluded, ensuring that only research contributing to the study's objectives remains for analysis.

Information sources

Following the PRISMA guidelines for systematic literature reviews, once the inclusion and exclusion criteria are established, it is essential to identify and specify the information sources that will provide the data for in-depth analysis. For this SLR on the adoption of AI-based smart home technologies (AI-SHT) among Chinese consumers, Google Scholar, Scispace, and Litmaps were chosen as primary sources of information. These databases are recognized for their comprehensive and high-quality bibliographic metadata and robust bibliometric indicators, supporting a thorough and consistent evaluation of scientific literature. Given their extensive technology and social sciences research coverage, Google Scholar, Scispace, and Litmaps are particularly suitable for this review. They enable a detailed exploration of factors influencing consumer adoption of AI-based smart home technologies. This selection ensures that the review draws on a well-rounded and authoritative body of literature.

Search Strategy

The search strategy for this systematic literature review was designed to ensure the retrieval of studies directly relevant to the research question on factors influencing the adoption of AI-based smart home technologies among Chinese consumers. Google Scholar, SciSpace, and Litmaps were selected as primary databases for their broad accessibility, comprehensive coverage, and research discovery capabilities. Search equations were tailored to each platform, considering their unique search interfaces and using terms directly related to smart home technologies and adoption factors. For Google Scholar, the search was structured to include terms like "smart house," "smart home," "intelligent home," "intelligent house," and "home automation," combined with terms such as "adoption" and "acceptance." A similar approach was applied in SciSpace and Litmaps, targeting relevant keywords and phrases that capture both the adoption and acceptance of smart home technologies. These targeted search equations were crafted to identify stu-

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dies addressing user perceptions, attitudes, and various factors influencing adoption. This strategic approach ensures that the studies identified align closely with the review's objectives, enabling a focused analysis of factors affecting the adoption of AI-based smart home technologies in the Chinese context.

Risk of Bias Assessment

In this systematic literature review, a careful and structured risk of bias assessment was conducted to ensure the reliability of findings on factors influencing the adoption of AI-based smart home technologies among Chinese consumers. Both authors participated in an independent full-text analysis and evaluation of each article, using a Literature Review Matrix and the CRAAP test in Microsoft Excel to standardize assessments and maintain objectivity. Discrepancies were collaboratively discussed and resolved, ensuring consistency throughout the review. While Google Scholar, SciSpace, and Litmaps were selected as primary sources for their comprehensive coverage, this choice may have limited the inclusion of relevant studies in other specialized smart home technology databases. We applied strict inclusion and exclusion criteria and thoroughly searched the selected sources to counterbalance this. Nonetheless, potential limitations remain, as relevant studies outside these databases might affect the comprehensiveness and generalizability of the review's conclusions.

Data Management and Synthesis Methods

Data management for this review involved an organized approach to handle and analyze studies related to the adoption of AI-based smart home technologies among Chinese consumers. Following the application of search strategies across Google Scholar, SciSpace, and Litmaps, all identified studies were exported and stored in a folder and in SciSpace and Litmaps. Then, each article was analyzed individually using the Literature Review Matrix and the CRAAP test in Microsoft Excel. This included a data homogenization process to ensure consistency across study formats, addressing typological differences in data presentation from the various sources. Ultimately, we had a database of all articles meeting the inclusion criteria.

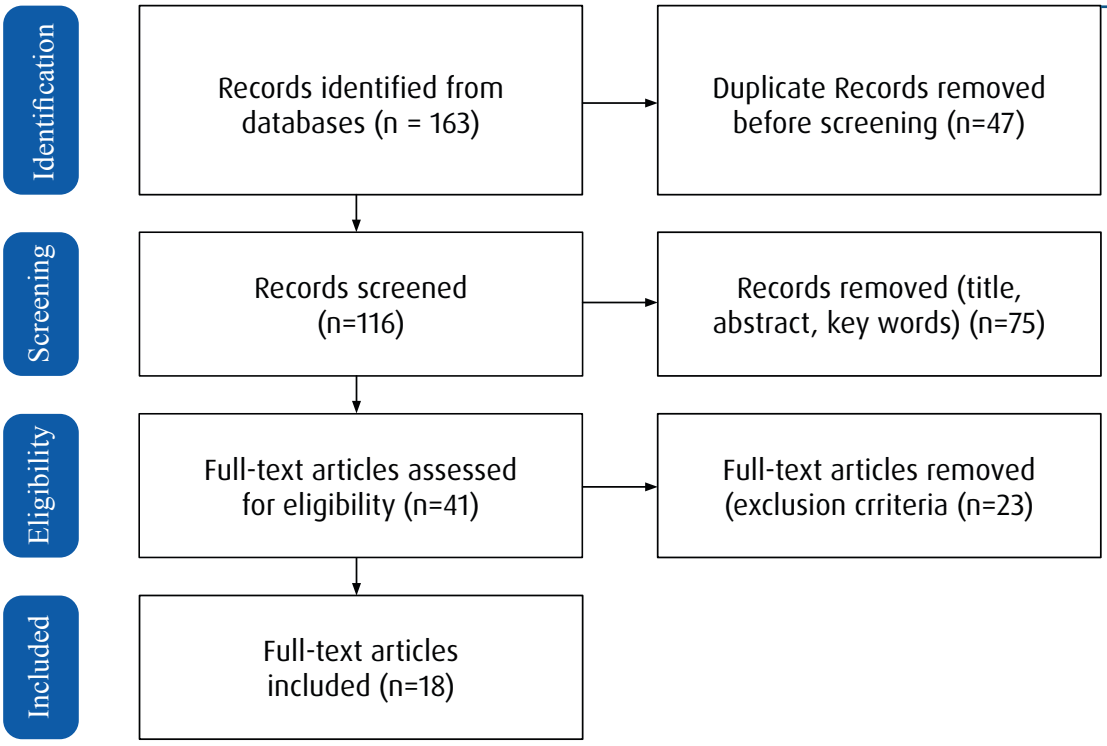

Fig. 1: *Flowchart for PRISMA systematic literature reviews*

Study Selection Process

Following the PRISMA 2020 guidelines, the study selection process involved both authors independently executing the search and exclusion steps using Microsoft Excel to minimize bias. Any discrepancies were collaboratively reviewed and resolved to ensure consistency and accuracy.

Effect Measures

This systematic literature review on factors influencing the adoption of AI-based smart home technologies among Chinese consumers focuses on synthesizing key explanatory factors and psychometric theories rather than on specific effect measures standard in primary research. Microsoft Excel and ChatGPT supported data organization and analysis, with both authors carefully verifying all findings to ensure accuracy. This approach provides a detailed, contextually relevant view of adoption factors specific to Chinese consumers without using specific effect measures.

Methodological Design

Figure 1 presents the PRISMA 2020 flow chart used to detail the stages of inclusion, exclusion, and final selection of studies for this systematic literature review. Initially, 163 documents were identified. After removing 47 duplicates, 116 remained. The abstracts and titles of the articles were screened, which led to the removal of 75 more articles. From the remaining 41 articles, 23 were excluded for not meeting the inclusion criteria, resulting in 18 peer-reviewed scientific articles for final analysis. Table 1 provides an overview of these selected articles, including crucial details such as title, authors, year, country, sample size, and theories used.

Table 1:
Articles used in this systematic literature review with title, authors, year of publication, country, sample size, and theory

Article Title	Authors	Year	Country	Sample Size	Theory
Why Do Users Switch to Smart Homes? A Push-Pull-Mooring Framework.	Xiaofan Yu, Yichen Ye, Bilu Chen, Shaomin Yan, and Shan Wu	2024	China	412	Push-Pull-Mooring (PPM) framework
Critical Factors Influencing the Adoption of Smart Home Energy Technology in China: A Guangdong Province Case Study.	Weiyu Ji and Edwin Chan	2019	China	1913	- Theory of Planned Behavior (TPB) - Norm Activation Model (NAM)
Motivations, Barriers and Risks of Smart Home Adoption: From Systematic Literature Review to Conceptual Framework.	Wenda Li, Tan Yigitcanlar, Isil Erol, and Aaron Liu	2021	Multiple countries, including China	72 articles	- The paper develops a conceptual framework for smart home adoption. - It outlines motivations, barriers, and risks influencing adoption.
Causal Factors of Acceptance Smart Home Technology System among Adolescentes in Zhengzhou, Henan.	Yilin Zhang, Somchai Seviset, and Thanate Piromgarn	2024	China	390	Technology Acceptance Model (TAM)

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Article Title	Authors	Year	Country	Sample Size	Theory
Review of the Factors Affecting Acceptance of AI-Infused Systems.	Ulugbek Vahobjon Ugli Ismatullaev, and Sang-Ho Kim	2022	Multiple countries, including China	85 articles	- Theory of reasoned action - Technology acceptance model (TAM) - Unified Theory of Acceptance and Use of Technology (UTAUT)
Impact of COVID-19 on IoT Adoption in Healthcare, Smart Homes, Smart Buildings, Smart Cities, Transportation and Industrial IoT.	Muhammad Umair, Muhammad Aamir Cheema, Omer Cheema, Huan Li, and Hua Lu	2021	Multiple countries, including China	no sample	IoT adoption due to COVID-19 impacts
Smart home for elderly care: development and challenges in China.	Quan Zhang, Meiyu Li, and Yijin Wu	2020	China	no sample	no theoretical model
A study on smart home use intention of elderly consumers based on technology acceptance models.	Chengmin Zhou, Yawen Qian, and Jake Kaner	2024	China	236	(Extended) Technology Acceptance Model (TAM)
Smart homes: pioneering age-friendly environments in China for enhanced health and quality of life.	Ingy Shafei, Jyoti Khadka, and Madhan Balasubramanian	2024	China	no sample	Smart home model
Artificial Intelligence for Creating a Digitized Lifestyle and Multifaceted Applications: A Case Study in the Realm of Smart Home Technology.	Chuan Ju	2024	China	no sample	no theoretical model
Long-Term Adoption or Abandonment of Smart Technology in the Chinese Elderly Home Care Environment: A Qualitative Research Study.	Jiahao Yu, Jianyuan Huang, and Qi Yang.	2023	China	26	Golant's theory of technology adoption behaviors
Integrating Technology Acceptance Model With Maslow's Hierarchy Needs Theory to Investigate Smart Homes Adoption.	Yi Yang, Xiaofan Yu, Zongdeng Zhang, and Li Gan	2023	China	405	- Technology Acceptance Model (TAM) - Maslow's Hierarchy Needs Theory - Innovation Diffusion Theory (IDT) - Value-based Adoption Model (VAM)

Table 1 (continued): *Articles used in this systematic literature review with title, authors, year of publication, country, sample size, and theory*

Article Title	Authors	Year	Country	Sample Size	Theory
Smart home adoption factors: A systematic literature review and research agenda.	Alejandro Valencia-Arias, Sebastian Cardona-Acevedo, Sergio Gómez-Molina, Juan David Gonzalez-Ruiz, and Jackeline Valencia	2023	Multiple countries, including China	12 articles	- (Extended) Technology Acceptance Model (TAM) - Diffusion of Innovations (DOI) - (Extended) Theory of Planned Behavior (TPB)
Psychosocial Factors Affecting Artificial Intelligence Adoption in Health Care in China: Cross-Sectional Study	Tiantian Ye, Jiaolong Xue, Mingguang He, Jing Gu, Haotian Lin, Bin Xu, and Yu Cheng	2019	China	474	- Technology Acceptance Model (TAM) - Theory of Planned Behavior (TPB)
The Influence of User Experience on Consumption Intention: A Study of Smart Home Appliances in China.	Ting Cui and Siti Hassan	2022	China	378	A theoretical model to examine the impact of user experience on consumption intention.
What Influences the Perceived Trust of a Voice-Enabled Smart Home System: An Empirical Study.	Yuqi Liu, Yan Gan, Yao Song, and Jing Liu	2021	China	475	- Innovation Diffusion Theory (IDT) - Social Cognitive Theory (SCT) - Theory of Planned Behavior (TPB) - Technology Acceptance Model (TAM)
The Investigation of Adoption of Voice-User Interface (VUI) in Smart Home Systems among Chinese Older Adults.	Yao Song, Yanpu Yang, and Peiyao Cheng	2022	China	420	- Technology Adoption Model (TAM) - Senior Technology Adoption Model (STAM)
The effects of technology readiness, risks, and benefits on smart home technology adoption: extending the Theory of Planned Behavior model	Louis Leung and Marsena Cheung	2024	China	501	(Extended) Theory of Planned Behavior (TPB)

Results

This results section presents an in-depth analysis of the findings from the systematic review of the 18 articles (see Table 1). It covers critical aspects, including the characteristics of the Chinese consumer population in the adoption of AI-based smart home technologies, the theoretical and conceptual frameworks supporting these studies, the research methodologies employed, and the main findings related to adoption factors. Additionally, this section discusses identified research gaps, offering a well-rounded perspective on the topic and highlighting potential areas for future investigation to advance understanding in this field.

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Descriptive quantitative analysis of the sample

Based on the data provided in Table 1, this systematic literature review's 18 peer-reviewed academic articles were published between 2019 and 2024 to understand current research results better and demonstrate the recent interest in adopting AI-based smart home technologies in China. Most studies employed quantitative research methods, particularly survey-based studies, to gather insights from Chinese consumers, with sample sizes varying between 263 and 1913. The qualitative studies, especially the three systematic literature review articles, have smaller sample sizes (26-85). They were included in this systematic literature review to explore adoption factors in broader contexts, such as from other countries besides China. Each study centered around China, either directly or as part of a comparative analysis, ensuring that the findings are relevant to understanding consumer behavior within the Chinese market for AI-based smart home technologies.

Theories used

The main theories applied across the reviewed studies include the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA), Unified Theory of Acceptance and Use of Technology (UTAUT), Push-Pull-Mooring (PPM) framework, and the use of general conceptual frameworks.

1. The Technology Acceptance Model (TAM) appears most frequently, referenced in 9 instances across studies, including its variations and extensions.
2. The theory of Planned Behavior (TPB) is closely followed by ten mentions, often integrated to explore behavioral intentions related to technology adoption.
3. Push-pull-mooring (PPM) is used twice, indicating interest in push-pull dynamics tailored to adoption motivations and barriers.
4. Other theories, like the Theory of Reasoned Action (TRA), Value-based Adoption Model (VAM), Social Cognitive Theory (SCT), Senior Technology Adoption Model (STAM), Maslow's Hierarchy of Needs, Diffusion of Innovations (DOI), Unified Theory of Acceptance and Use of Technology (UTAUT), and general Conceptual Frameworks, each appear once.

The dominance of TAM and TPB suggests a strong preference for established behavioral models to understand adoption patterns in AI-based smart home technology among Chinese consumers. Additionally, some articles developed unique theoretical models or needed to apply a specific theoretical framework. This range of theories reflects the multidisciplinary approach to exploring factors influencing AI-based smart home technology adoption among Chinese consumers.

Methods used

The diversity in methodological approaches across these peer-reviewed academic articles underscores the evolving nature of this research domain. Quantitative studies with large, representative samples are predominant, offering statistically robust insights into consumer attitudes and behaviors (Leung & Cheung, 2024; Zhang et al., 2024; Liu et al., 2022; Ji & Chan, 2020). The preferred data analysis method is Partial Least Squares Structural Equation Modeling (PLS-SEM), suitable for complex models, small sample sizes, and a focus on predicting consumer behavior. Qualitative studies are rare, which is surprising for a relatively new research field. Among them are systematic literature reviews, like those by Li et al. (2021) and Ismatullaev and Kim (2022), which provide synthesized insights from multiple contexts and geographies, highlighting commonalities and specificities in Chinese consumers' responses to AI-based smart home technologies (AI-SHT).

Motivating factors for adoption

A prominent motivation among Chinese consumers is the perceived convenience and enjoyment of smart home technologies, which are transformative for routine household management (Yu et al., 2024). This convenience is coupled with the appeal of unique and engaging user experiences, which enhance user satisfaction and drive adoption (Ju, 2024). In addition, technical performance is crucial in attracting users, especially affluent individuals who prioritize reliable, efficient systems for their homes. This demographic values both the technological and economic benefits, notably energy savings and cost-efficiency, which are compelling reasons for adoption (Ji & Chan, 2019).

Another driver is the potential for these technologies to improve health and quality of life, especially among elderly users. Smart home applications in healthcare and elderly care promote safety and support daily living activities, alleviating pressures on traditional care systems (Shafei et al., 2024). This feature has increased adoption interest, mainly as smart homes provide elderly individuals with enhanced independence, a critical factor in an aging society (Zhou et al., 2024). Social influences, including subjective norms and family support, positively impact adoption intentions, particularly among older users who benefit from intergenerational technology support (Song et al., 2022).

Barriers to adoption

Despite the appealing aspects of smart home technologies, several barriers hinder widespread adoption. Financial constraints are a significant concern, particularly among less affluent users who might not see immediate economic returns on investment in smart home systems (Umair et al., 2021). Privacy and security issues further complicate adoption, as users remain wary of data protection and potential unauthorized access, raising concerns about trust in these systems (Leung & Cheung, 2024; Li et al., 2021). Trust in technology plays a significant role, with low trust levels among some consumers slowing adoption. Enhancing transparency, compatibility, and reliability is crucial to address these concerns (Ismatullaev & Kim, 2022).

Technology anxiety and distrust also serve as significant psychological barriers, with many consumers hesitant to fully embrace AI-driven home systems due to unfamiliarity and concerns about reliability (Cui & Hassan, 2022). These anxieties mainly affect older users, who are likelier to abandon technology that does not align with their lifestyle habits and preferences (Yang et al., 2023).

Demographic influences on adoption

Demographic factors, particularly age and economic status, shape adoption trends. Affluent and younger consumers are likelier to adopt smart home technologies, focusing on technical and economic benefits, while juveniles prioritize performance over cost concerns (Ji & Chan, 2019). Among elderly users, adoption is facilitated by intergenerational support and user-friendly design, highlighting the importance of a supportive social environment in encouraging technology use (Zhou et al., 2024). However, these same users are more likely to abandon technology if it fails to meet their long-term needs, showing a preference for systems that align closely with their routines (Yang et al., 2023).

Future Research

Research on adopting AI-based smart home technologies among Chinese consumers calls for deeper investigation into theories, methods, demographic impacts, hardware innovations, and industry-specific applications. Many studies highlight the need to explore the Unified Theory of Acceptance and Use of Technology (UTAUT) model in the context of smart home technologies to understand

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better the cultural and demographic differences influencing adoption. For instance, Yu et al. (2024) suggest examining cultural variations and age impacts on post-adoption behaviors. Ji and Chan (2019) recommend assessing the influence of education and social norms in diverse Chinese populations. Valencia-Arias et al. (2023) further emphasize the importance of UTAUT in addressing gaps in understanding adoption in emerging markets and among lower-income groups, as existing studies predominantly focus on middle- and high-income users.

Methodologically, calls for more longitudinal and mixed-methods research are prevalent, as many studies have relied on cross-sectional data, which limits insights into long-term adoption trends and technology retention. Zhou et al.(2024) propose improving assessment subjectivity by including longitudinal studies to capture evolving user perceptions, especially in aging populations. Li et al. (2021) argue that mixed-method approaches better analyze consumer privacy and security concerns perspectives. Ye et al. (2019) suggest longitudinal studies on AI trust development, particularly in healthcare applications. Cui and Hassan (2022) support field experiments focusing on the usability of voice-user interfaces for older adults to validate current findings and investigate sustained usage.

Demographically, age and socio-economic status are recurring areas for further exploration. Zhang et al. (2024) emphasize studying the unique needs of adolescents in smart home contexts, including privacy and data security, while Shafei et al. (2024) urge addressing the digital divide that often marginalizes elderly users. Zhou et al. (2024) also highlight the importance of intergenerational technology support for elderly users, suggesting this may improve acceptance among older demographics. Valencia-Arias et al. (2023) underscore the need to investigate how smart home technologies impact people with disabilities, a group often overlooked in the literature but potentially benefitting significantly from such technologies.

Regarding hardware, scholars call for research into integrating AI and IoT to optimize smart home efficiency, especially in high-demand areas like healthcare and telecommunications. Zhang et al. (2024) propose studies on IoT-enabled deep learning models that enhance automation and sustainability. Yu et al. (2023) recommend predictive maintenance applications to improve device longevity and user experience. Additionally, Umair et al. (2021) note that IoT adoption in smart buildings could benefit from semantic-aware models to support advanced automation and remote control.

Finally, the healthcare industry represents a significant application of AI-based smart home technologies with calls for targeted research. Zhang et al. (2020) emphasize the development of technical standards for elderly care to support safe and effective integration with public and private healthcare systems. Further research on AI-driven healthcare devices for elderly users, particularly concerning trust and practical utility, is recommended by Ye et al. (2019). These studies indicate that healthcare and telecommunications may offer valuable contexts for understanding smart home adoption as they address critical issues of safety, privacy, and emotional well-being across different age groups and professional applications.

Conclusion

This systematic literature review aimed to identify the factors influencing the adoption of AI-based Smart Home Technologies among Chinese consumers.

This systematic literature review aimed to identify and analyze factors influencing the adoption of AI-based smart home technologies among Chinese consumers. The findings reveal that adoption is shaped by a combination of individual, social, and technological factors, with models like the Technology Acceptance Model

Table 2: *Articles used in this systematic literature review with research methods used, results, calls for future research*

Article Title	Research Question	Methods Used	
Why Do Users Switch to Smart Homes? A Push-Pull-Mooring Framework.	The research question investigates factors impacting switching to smart homes.	Quantitative Study	
Critical Factors Influencing the Adoption of Smart Home Energy Technology in China: A Guangdong Province Case Study.	The research examines factors influencing the adoption of smart home technology and focuses on urban residents in Guangdong Province, China.	Quantitative Study with a data analysis using PLS-SEM methodology.	
Motivations, Barriers and Risks of Smart Home Adoption: From Systematic Literature Review to Conceptual Framework.	The research question addresses motivations for smart home adoption, barriers, and risks.	A systematic literature review using the PRISMA model.	
Causal Factors of Acceptance Smart Home Technology System among Adolescentes in Zhengzhou, Henan.	The study investigates factors influencing adolescent acceptance of smart homes.	Quantitative Study with a data analysis using PLS-SEM methodology and confirmatory factor analysis.	
Impact of COVID-19 on IoT Adoption in Healthcare, Smart Homes, Smart Buildings, Smart Cities, Transportation and Industrial IoT.	The research question focuses on COVID-19's impact on IoT adoption.	- Qualitative Literature review of existing research on IoT adoption. - Examine reports from leading consulting firms. - Interactions with industry experts for insights.	

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	Results	Future Research
	- The study identified significant push, pull, and mooring factors. - Dissatisfaction significantly influences users' switching intentions. - Perceived convenience is the main pull factor. - Variety-seeking is the primary mooring factor. - Users are motivated by unique smart home experiences.	- Investigate the moderating effects of different types of smart homes. - Explore age's impact on behavioral intentions towards smart homes. - Examine cultural variations in post-adoption behaviors. - Analyze unique smart home experiences influencing user switching behavior. - Study push, pull, and mooring factors in diverse contexts.
	- Residents' attitude towards technical performance positively influences adoption intention. - Social norms impact the intention to adopt smart home technology. - Perceived behavioral control affects adoption intention positively. - Personal norms also positively influence adoption intention. - Attitude towards economic performance does not lead to intention to adopt. - Older adults show no factors driving SHET adoption. - Juveniles only support adoption based on technical performance. - Affluent individuals consider economic performance when deciding on adoption intention.	- Investigate factors influencing elderly adoption of smart home technology. - Explore regional cultural impacts on adoption intentions. - Assess the long-term effects of government policies on technology adoption. - Examine demographic variations in adoption across different education levels. - Analyze social norms' influence on adoption in diverse populations.
	- Prominent services include healthcare, energy efficiency, and home security. - Primary motivations are energy management and enhanced quality of life. - Main barriers include distrust, financial issues, and privacy concerns. - Key risks involve privacy threats and technology domestication challenges. - The study proposes solutions to improve smart home acceptance.	- Address significant research gaps in smart home adoption. - Explore solutions for smart home technology domestication. - Investigate consumer perceptions of smart home technology. - Analyze the impact of privacy and security concerns. - Study the effectiveness of smart home services in various demographics.
	- A positive relationship exists between product attitudes and behavioral intentions. - User personal capabilities predict the adoption of smart home technology. - Individual ability influences perceived ease of use and usefulness. - Findings guide smart home product design for adolescents.	- Explore deep learning and IoT for smart home efficiency. - Investigate integration with smart cities for sustainable development. - Assess user-centered design in smart home technology. - Study impact on daily life and user convenience. - Examine privacy and data security concerns in smart homes.
	- COVID-19 catalyzed IoT adoption across various sectors. - Smart homes revenue is expected to reach $317 billion by 2026. - Financial strain hinders immediate IoT investment in industries. - Long-term work-from-home policies drive IoT device adoption. - Challenges identified for accelerated IoT adoption in multiple sectors.	- Digital maintenance of equipment for future pandemics. - End-to-end automation in various industries. - Advanced remote collaboration and asset control. - Development of virtual reality for remote equipment operation. - Creation of semantic-aware models for smart buildings. - Analytics for indoor mobility data in smart buildings. - Solutions for emerging problems in IoT sectors.

Table 2 (continued): *Articles used in this systematic literature review with research methods used, results, calls for future research*

Article Title	Research Question	Methods Used	
Review of the Factors Affecting Acceptance of AI-Infused Systems.	The study investigates factors affecting AI-infused systems' adoption.	A systematic literature review using the PRISMA model.	
Smart home for elderly care: development and challenges in China.	The status quo and development of smart homes for elderly care in China are reviewed, and suggestions are provided on further developing China's smart homes for elderly care.	Qualitative literature review articles, including a historical analysis	
A study on smart home use intention of elderly consumers based on technology acceptance models.	The study investigates elderly consumers' intentions to use smart home technology and explores factors influencing acceptance of this technology.	A quantitative study with SEM evaluates the reliability of items and constructs, and confirmatory factor analysis assesses the model's path effects and validity.	
Smart homes: pioneering age-friendly environments in China for enhanced health and quality of life.	The research question is about the adoption of a 'smart home' model in aged care in China.	Opinion piece to elaborate the perspectives of the smart home model in aged care in China.	
Long-Term Adoption or Abandonment of Smart Technology in the Chinese Elderly Home Care Environment: A Qualitative Research Study.	The research question focuses on AI's impact on smart homes.	Qualitative study	

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	Results	***Future Research***
	- User Attitudes and Trust: Enhancing transparency, compatibility, and reliability of AI devices can improve users' attitudes, trust, and perceptions of the technology. - Task Simplification: Simplifying tasks performed by AI devices can make the technology more accessible and appealing to users. - Technological Factors: Addressing technological aspects can help mitigate issues stemming from human factors like distrust, skepticism, and inexperience with AI. - Support for Low-Trust Users: Technological improvements can encourage adoption among users with lower intentions to use and trust AI systems.	- Findings suggest extending the TAM to incorporate these factors to better understand and accept AI across various applications. Further research is needed to gather more data and validate these insights. - Conduct large-scale reviews across more application areas. - Perform experiment-based research in specific fields. - Validate findings through experiments or surveys.
	- China's smart home for elderly care has progressed significantly. - Development stages include seed, start-up, development, and popularization. - Unique characteristics create challenges for further development. - Insufficient demand leads to waste of public resources. - Technical standards for services need urgent formulation. - Combination of public and private platforms is essential. - Increasing demand for home-based care presents opportunities. - Cost-benefit ratio and service compatibility require improvement.	- Development of technical standards for elderly care services. - Integration of public and private smart home care platforms. - Encouragement for enterprises to innovate new technologies. - Exploration of industry technical standards by local associations.
	- Perceived usefulness positively affects the intention to use smart homes. - Perceived ease of use positively affects the intention to use smart homes. - Perceived ease of use enhances the perceived usefulness of smart homes. - Intergenerational technology support influences older users' acceptance of smart home technology.	- Improve the subjectivity of assessment methods in research. - Explore factors influencing smart home acceptance among diverse age groups. - Analyze challenges in the aging smart home market. - Investigate intergenerational technology support for elderly users. - Study ethical issues related to smart home technology.
	- The paper advocates for a smart home model in aged care. - It emphasizes the need for technology in-home care. - Adoption of digital technologies can enhance healthy aging. - Co-creation with end-users is crucial for effective implementation. - The traditional family care model is increasingly unsustainable. - Smart homes can alleviate pressure on healthcare systems.	- Addressing the digital divide in smart home solutions. - Exploring ethics and regulatory issues in smart home technologies. - Investigating the successful implementation of smart home solutions for older adults. - Enhancing training for better adoption of gerontechnologies.
	- AI significantly impacts the development of smart home technology. - Digital homes enhance convenience, comfort, and security. - Smart homes integrate IoT for efficient appliance interconnection. - Large-scale model technology optimizes equipment operation and maintenance. - Personalized experiences improve user interaction and satisfaction.	- Integration of AI with human learning for knowledge sharing. - Enhancing emotional intelligence in machine-human interactions. - Addressing technological and application challenges in smart homes. - Exploring personalized services in digital home environments. - Investigating predictive maintenance for digital home devices.

Table 2 (continued): *Articles used in this systematic literature review with research methods used, results, calls for future research*

Article Title	Research Question	Methods Used	
Artificial Intelligence for Creating a Digitized Lifestyle and Multifaceted Applications: A Case Study in the Realm of Smart Home Technology.	This article aims to analyze the impact of artificial intelligence on smart homes.	Qualitative study with an applied case study design based on a literature review.	
Integrating Technology Acceptance Model with Maslow's Hierarchy Needs Theory to Investigate Smart Homes Adoption.	The study explores technology adoption or abandonment by elderly users.	Qualitative study based on semi-structured interviews and thematic analysis	
Smart home adoption factors: A systematic literature review and research agenda.	The research investigates factors influencing smart home adoption intentions.	Qualitative, systematic literature review using the PRISMA model.	
Psychosocial Factors Affecting Artificial Intelligence Adoption in Health Care in China: Cross-Sectional Study	The study examines the acceptance of ophthalmic AI devices and the factors influencing the intention to use these devices.	A quantitative study with SEM and confirmatory factor analysis assesses the model's path effects and validity.	
The Investigation of Adoption of Voice-User Interface (VUI) in Smart Home Systems among Chinese Older Adults.	The study explores factors influencing perceived trust in smart home systems.	Quantitative Study with a data analysis using PLS-SEM methodology.	

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	Results	***Future Research***
	- Improve human-machine interaction for a more comfortable and personalized digital home experience. - Integrate machine and human learning for shared knowledge, advancing from "intelligence" to "wisdom" in digital home systems. - Develop advanced data processing to offer richer, more precise services in human-machine integration. - Enhance emotional intelligence in machines for better response to human emotions, adding warmth to digital home interactions. - Support the creation of a smart society by embedding digital homes into social systems, improving the overall quality of life.	There are no calls for further research
	- Elders' adoption depends on user experience with smart technology. - Lack of clear advantages leads to abandonment of smart technology. - Key reasons for abandonment include low effectiveness and usability. - Continuous application requires meeting elders' long-term needs. - Ignoring living habits contributes to technology abandonment.	- Explore reasons for the long-term use of smart technologies among elders. - Investigate the abandonment of smart technology from diverse subject perspectives. - Assess the effectiveness of smart technology in meeting elderly needs.
	- The existing research has focused predominantly on the leading models of adoption, such as the TAM, DOI, and TPB, with limited attention given to one of the leading models of adoption and use of technology, i.e., the UTAUT. - Although perceived reliability is currently positioned as the most important variable of the adoption of smart homes, the main theories that allow understanding of the variables that determine perceived reliability in the adoption of smart homes is unknown. - Among the variables identified in the scientific literature, attitude toward use has received little attention from researchers.	- Studies on the adoption of smart homes address the context of more developed countries, omitting the variables that affect the adoption of this technology in homes in emerging countries. - There is a lack of research on the adoption of smart home technologies by people with disabilities, despite the potential impact on their quality of life. - Research tends to focus on urban environments, leaving a gap in understanding smart home adoption in rural communities where needs and challenges may be different. -Most studies have examined smart home adoption among middle- and high-income groups, leaving a gap in understanding how low-income people perceive and use these technologies.
	- Intention to use was significantly affected by subjective norms and perceived behavior control. - Trust moderated the effect of perceived usefulness on intention.	- Investigate age as a moderator in AI adoption. - Explore medical staff's views on ophthalmic AI devices. - Assess practical utility for older generations in AI devices. - Examine trust's role in the acceptance of AI technology.
	- System quality significantly influences perceived trust in smart home systems. - Perceived enjoyment directly affects perceived trust. - Subjective norms are crucial for Chinese users' trust. - Familiarity and technology optimism indirectly impact perceived trust.	- Influence of personality traits on perceived trust. - Analysis of user types affecting perceived trust. - Mediation role of perceived enjoyment between familiarity and trust. - Exploration of technology optimism's impact on perceived trust. - Examination of individual characteristics like gender and income.

Table 2 (continued): *Articles used in this systematic literature review with research methods used, results, calls for future research*

Article Title	Research Question	Methods Used	
The Influence of User Experience on Consumption Intention: A Study of Smart Home Appliances in China.	The study investigates older adults' adoption of VUI in China. It explores factors influencing adoption, including trust and aging characteristics.	Quantitative Study with a data analysis using PLS-SEM methodology.	
What Influences the Perceived Trust of a Voice-Enabled Smart Home System: An Empirical Study.	The study investigates user experience's influence on consumption intention.	Quantitative Study with a data analysis using AMOS-SEM methodology.	
The effects of technology readiness, risks, and benefits on smart home technology adoption: extending the Theory of Planned Behavior model	This study investigated generational differences in the roles of technology readiness (TR), risks, and benefits on the behavioral intention of smart home technology.	Quantitative Study	

(TAM) and Theory of Planned Behavior (TPB) frequently employed to examine critical determinants, including perceived usefulness, ease of use, social influence, and trust in technology. Privacy concerns, data security, and the cost of smart home devices also emerged as critical considerations, especially within the Chinese cultural and economic context (Yu et al., 2024; Ji & Chan, 2019; Chen et al., 2024). Methodologically, quantitative approaches dominated the research, often utilizing large samples to explore behavioral patterns, while a smaller number of studies employed systematic literature reviews or conceptual frameworks to provide broader insights (Li et al., 2021; Ismatullaev & Kim, 2022). Focusing on Chinese consumers underscores unique adoption dynamics tied to cultural

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	Results	Future Research
	- Older adults' adoption of VUI is influenced by perceived usefulness. - Perceived ease of use also affects the adoption of VUI. - Trust is a key factor in adopting VUI. - Aging-related characteristics mediate the adoption factors. - Mobile self-efficacy positively influences trust and ease of use. - Self-actualization positively impacts perceived usefulness and ease of use. - Technology anxiety has a marginal influence on perceived ease of use. - No significant influence from perceived physical conditions was found.	- Validate results for older adults who are not frequent online users. - Conduct user studies on VUI usability issues. - Focus on older adults aged 65 and above. - Explore actual usage and continuous usage of VUI. - Use field experiments to validate current findings.
	- User experience positively impacts the intention to consume smart appliances. - Sensory, performance, emotional, interactive, and associative experiences influence consumption intention. - No significant gender differences in user experience and consumption intention. - Emotional experience significantly enhances consumers' consumption intention. - Four marketing strategies proposed for smart home appliances in China.	- Investigate the impact of user experience on smart appliance sales. - Explore gender differences in user experience perceptions. - Study emotional experience in diverse usage scenarios. - Analyze marketing strategies for enhancing user experience. - Examine environmental factors influencing the intention to consume smart appliances.
	- Low Adoption Rate: Smart home technologies had limited adoption in Hong Kong at the time of the survey. - Drivers of Adoption Intentions: - Theory of Planned Behavior (TPB) Components: Higher adoption intentions were associated with attitudes, subjective norms, and perceived behavioral control. - Technology Readiness (TR): Optimism and innovativeness also motivated adoption intentions. - Tangible Benefits: Perceived benefits, such as energy, cost, and time savings, encouraged adoption. - Trendiness: The appeal of staying up-to-date with trends further supported adoption intentions. - Inhibiting Factors: Psychological risks, such as concerns about privacy and security, hindered intentions to adopt smart home technologies. - Interaction Effect: The study found that attitudes toward IoT and tangible benefits shape behavioral intentions, offering a nuanced understanding of factors influencing smart home adoption.	

norms, social expectations, and increasing urbanization, highlighting both the potential and challenges of integrating AI in smart home environments within this market.

This review synthesizes current knowledge on adoption factors. It underscores gaps that future research should address, such as applying alternative models like UTAUT, exploring age-based adoption patterns, and studying applications in various industries like healthcare and telecommunications. These insights offer a foundation for researchers and industry practitioners to better understand and foster the adoption of AI-based smart home technology among Chinese consumers.

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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.

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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.

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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

In this study, artificial intelligence (AI) tools were used 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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