ENHANCING ONLINE FURNITURE SHOPPING FOR YOUNG ADULTS IN CHINA THROUGH AUGMENTED REALITY

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ABSTRACT

This study aims to develop an augmented reality App as an innovative branding method to improve the marketing of online furniture shopping among young Chinese adults. The study seeks to investigate the relationship between augmented reality design and three distinct design domains: interaction design, service design, and experience design. This study utilizes Jesse James Garrett's model to develop and validate the efficacy of a personalized online furniture buying App named 'IHome AR' to study the behavioral intentions of young adults, specifically their likelihood to participate in online shopping. The software was evaluated using Jesse James Garrett's User Experience paradigm, which was adapted to include and apply the Unified Theory (UTAUT) model. This study utilizes the UTAUT-LK model, which comprises five variables: performance expectancy, effort expectancy, facilitating condition, social influence, and hedonic motivation. The gathered data were analyzed using SPSS and AMOS software. The five hypotheses were assessed using non-parametric statistics and structural equation modeling (SEM). SEM tests revealed that performance expectancy (PE, b = 0.174, p = 0.013), effort expectancy (EE, b = 0.165, p = 0.017), social influence (SI, b = 0.145, p = 0.036), facilitating condition (FC, b = 0.142, p = 0.033), and hedonic motivation (HM, b = 0.191, p = 0.008) all had a statistically significant positive influence on behavioral intention. The researchers suggested six recommendations for creating augmented reality online furniture purchasing tailored for young adults. The study suggests that developing an online furniture purchasing App with augmented reality capabilities could enhance young adults' likelihood to use the developed App and improve their shopping experience. The developed app serves as cornerstone for future researchers to explore the role of augmented reality in e-commerce, and offers businesses a tested model to enhance customer interaction, improve marketing strategies, and drive long-term adoption of AR technology.

MENINGKATKAN PENGGUNAAN PEMBELIAN PERABOT SECARA DALAM TALIAN BAGI ORANG MUDA DI CHINA MELALUI REALITI BERMAMBAH

ABSTRAK

Kajian ini bertujuan mereka bentuk penjenamaan inovatif aplikasi realiti tambahan untuk memudahkan membeli-belah perabot dalam talian di kalangan orang muda di China. Pendekatan ini bertujuan untuk menyiasat hubungan antara reka bentuk realiti tambahan (AR) dan tiga domain reka bentuk yang berbeza: reka bentuk antara muka, reka bentuk perkhidmatan dan reka bentuk pengalaman. Kajian ini menggunakan model untuk membangunkan dan mengesahkan keberkesanan aplikasi pembelian perabot dalam talian yang diperibadikan bernama 'IHome AR' untuk mengkaji kecenderungan tingkah laku golongan dewasa muda, khususnya kemungkinan mereka untuk mengambil bahagian dalam membeli-belah dalam talian. Perisian ini dinilai menggunakan paradigma Pengalaman Pengguna Jesse James Garrett, yang disesuaikan untuk memasukkan dan menggunakan Unified Theory (UTAUT). Kajian ini menggunakan model UTAUT-LK, yang terdiri daripada lima pembolehubah: jangkaan pencapaian, jangkaan usaha, pemudahan, impak sosial dan motivasi hedonik. Data yang dikumpul dianalisis menggunakan perisian SPSS dan AMOS. Lima hipotesis telah dinilai menggunakan statistik bukan parametrik dan pemodelan persamaan struktur (SEM). Ujian SEM mendedahkan bahawa jangkaan prestasi (PE, b = 0.174, p = 0.013), jangkaan usaha (EE, b = 0.165, p = 0.017), pengaruh sosial (SI, b = 0.145, p = 0.036), keadaan pemudah (FC, b = 0.142, p = 0.033), dan motivasi hedonik (HM, b = 0.191, p = 0.008) semuanya mempunyai kesan positif yang signifikan secara statistik terhadap niat tingkah laku. Penyelidik mencadangkan enam cadangan untuk mencipta pembelian perabot dalam talian realiti tambahan yang disesuaikan untuk individu muda. Kajian itu mencadangkan bahawa melaksanakan Model Pengalaman Pengguna Jesse James Garrett dalam aplikasi pembelian perabot dalam talian dengan keupayaan realiti tambahan boleh meningkatkan kemungkinan orang dewasa muda untuk menggunakan aplikasi itu dan meningkatkan pengalaman membeli-belah mereka. Aplikasi ini berfungsi sebagai pelan induk untuk penyelidik masa hadapan meneroka peranan AR dalam e-dagang, dan menawarkan perniagaan model yang telah diuji untuk meningkatkan interaksi pelanggan, memperbaiki strategi pemasaran, dan memacu penerimaan teknologi AR.

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LIST OF ABBREVIATIONS

3D	Three Dimensional
AI	Artificial Intelligence
AMOS	Analysis of Moment Structure
ANOVA	Analysis of Variance
AV	Augmented Virtuality
App	Application
AR	Augment Reality
AVE	Average Variance Extracted
BI	Behavioural Intention
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CR	Composite Reliability
DDRI	Data-Driven Retrospective Interviewing
EBSCO	E.B.Stephens Company
EE	Effort Expectancy
FC	Facilitating Condition
HM	Hedonic Motivation
PE	Performance Expectancy
PRISMA	Pre-Recording Systematic Reviews and Meta-Analysis
RMSEA	Root Mean Square of Approximation
RV	Reality-Virtuality

SEM	Structural Equation Model
SI	Social Influence
SLR	Systematic Literature Review
SMC	Square Multiple Correlations
SPSS	Statistical Package for the Social Sciences
SDK	The Kudan Software Development Kit
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action UI User Interface
UTAUT	Unified Theory of Acceptance and Use of Technology
VR	Virtual Reality
VTO	Virtual Try-On

APPENDIX LIST

CHAPTER 1

INTRODUCTION

1.1 Overview

Consumers no longer need to browse through catalogs or visit physical stores to find the right purchase, whether it's software or furnishings. They now have the convenience of shopping online at any time. Over the past decade, there has been a significant shift in the retail sector from brick-and-mortar stores to e-commerce, driven by the widespread adoption of smart technology. Merchants are now striving to seamlessly integrate virtual and real-world shopping experiences (Y. Chen et al., 2018). According to Dacko (2017a), augmented reality (AR) is poised to be the next breakthrough technology that will realize this vision. AR technology has enhanced the shopping experience by enabling customers to virtually try on, preview, interact with, and customize items from the comfort of their homes, significantly reducing the inconvenience of shopping and the hassle of returning ill-fitting items.

Unlike traditional 'flat' Internet experiences, AR offers a more immersive and interactive shopping experience, revolutionizing and reshaping the landscape of purchasing on a large scale (Hilken et al., 2020). AR offers a higher level of engagement and customization compared to conventional online experiences.

The researchers in this study presented design recommendations tailored for young adults interested in using AR technology for furniture shopping. Young users utilize the App to blend conceptual understanding with technology, facilitating the rapid establishment of an effective design system. This study extensively examines the characteristics and features of experience design, interaction design, AR design, and service design within the AR furniture purchasing domain through meticulous research and analysis. Drivers and development models are analyzed using a systematic methodology. Detailed industry advice is provided for leveraging AR in furniture purchasing as an innovative marketing strategy targeting young consumers. The study aims to identify suitable design models and principles for developing AR technologies for furniture purchasing tailored to young adults.

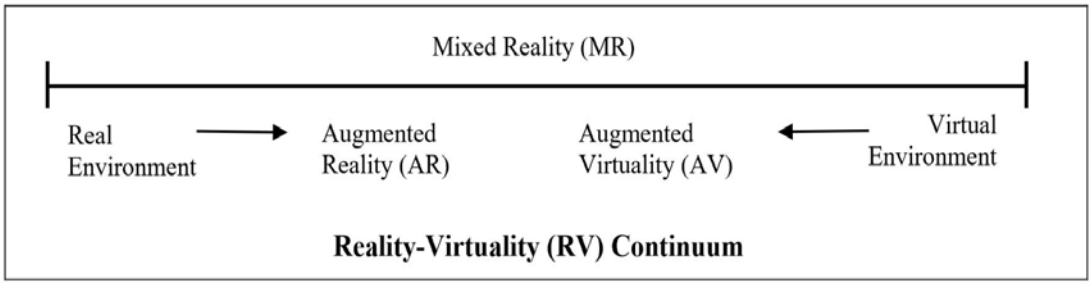
1.2 Background of the AR Research

Computer technology has advanced to the point where a wide range of human-computer interactions are now possible. The Reality-Virtuality (RV) continuum has been proposed by Milgram (1995) as a means to explain the different Apps for interacting with people, Figure 1.1 illustrates a continuum representing a scale from a fully real environment at one end to a fully virtual environment at the other.

Augmented Mixed Reality (MR) occupies the middle range of this spectrum, with Augmented Reality (AR) and Augmented Virtuality (AV) positioned between these two extremes (K. Kim et al., 2018).

Figure 1.1

The Boundary Between AR and VR



Various hardware components can be used to create AR. Recent advancements in hardware have enhanced the App of AR in several industries and sectors, making use of a variety of gadgets. Hamacher et al. (2019) studied the performance of AR user interfaces on several platforms. Recent advancements in portable mobile technology have enabled the development of AR-based mobile Apps. AR has been integrated into numerous Apps because of the widespread availability of mobile devices to the general population.

Among all of these different Apps, AR has consistently been shown to have a favorable influence on the overall quality of the consumer experience (Flavián et al., 2019; Xu et al., 2019). For instance, Han (2019) investigated how AR affects the overall experience that tourists enjoy in the tourism industry. As a result of this successful implementation, AR is now being utilized in a variety of storefronts, including retail shops (Bonetti et al., 2018a; Dacko, 2017a; Heller et al., 2019), e-

commerce stores (Martínez-Navarro et al., 2019), and stores (Bonetti et al., 2018a). For instance, Han (2019) investigated how AR affects the overall experience that tourists enjoy in the tourism industry. As a result of this successful implementation, AR is now being utilized in a variety of storefronts, including retail shops (Bonetti et al., 2018a; Dacko, 2017a; Heller et al., 2019), e-commerce stores (Martínez-Navarro et al., 2019), and stores (Bonetti et al., 2018a). Everyone utilized it with the primary intention of improving the overall experience for the users.

The AR technology market was valued at Approximately $17.67 billion in 2020 and is projected to exceed $340 billion by 2028. This rise was fueled by technical advancements and the widespread availability of high-performance mobile devices such as smartphones. A significant portion of this expansion may be ascribed to the experience advantages that the technology will bring to companies and consumers, as well as the capacity to address client expectancy more acceptably than is possible via websites (Yin et al., 2021). According to Javornik (2016a), AR technology allows customers to enhance their physical surroundings by including digital content that they can interact with. Research in AR has surged in recent years because of the growing need for enhanced self-service experiences resulting from the COVID-19 pandemic and the positive outlook on AR technology.

Table 1.1

Literature on AR, Personalization, and Co-creation

Reference	Context	Theory Base	Independent Variables	Dependent Variables	Sample	Analysis Method
Alimamy et al.(2018)	Retail	Value cocreation and SD-L	None	None	None	Conceptual Paper
Hilken et al.(2017)	Retail	Situated cognition and presence	Simulated physical control, environmental integration, spatial presence, utilitarian and hedonic value, decision confidence, cognitive processing style, and awareness of privacy practices	Purchase and WOM	Study 1: 156 university students Study 2: 173 university students Study 3: 321 university students Study 4: 100 university students	PROCESS Mediation
Tom Dieck and Jung (2018)	Heritage/ Tourism	Perceived value	None	None	24 interviews with stakeholders	Qualitative Paper

Reference	Context	Theory Base	Independent Variables	Dependent Variables	Sample	Analysis Method
Carrozzi et al.(2019)	AR holograms (online shopping)	Situated Cognition	Customization, assimilation, differentiation	Psychological ownership	Study 1: 120 university students Study 2: 90 university student Study 3: 120 university students	GLM (study 1) and PROCESS mediation (study 2)
Alimamy and Nadeem (2022)	Retail	Service-Dominant Logic/value Cocreation	Perceived authentic experiences, customer engagement, perceived ethics	Value co-creation intentions	266 online respondents	CB-SEM
Smink et al.(2020)	Online Shopping		Spatial presence, perceived personalization, perceived intrusiveness	App responses: App attitude and behavioral intention Brand responses: brand attitude and purchase intentions	Study 1: 113 university students Study 2: 81 university students	PROCESS Mediation

1.2.1 Young Adults

Young adults have consistently been the main support of the nation in modern times. Youth possess the benefits of being open-minded, creative, and full of vigor, serving as a continual source of vitality for national progress. Many countries have acknowledged the concept that a powerful youth leads to a powerful nation. As a result, they have implemented various policies and actions to boost the impact and position of young adults and to advance the stability and growth of their nations.

Various countries have different lower age limits for youth, ranging from 10 to 14 years. Some countries, like the United States of America, have specific age limits for female and male youth, with females being set at 10 years and males at 12 years. In some nations, the maximum age considered as young is 19 years, while in others it is 25 years, and in a few others, it is 40 years. The age range considered as young varies among countries due to differences in social policy, upbringing, and age at first marriage.

The 2017 Medium- and Long-Term Youth Development Plan (2016-2025) (Xinhua News Agency, 2017) by the Central Committee of the Communist Party of China (CPC) and the State Council specified that youth are individuals aged between 14 and 35 years old. The census of each country typically categorizes those aged 0 to 14 as juveniles and those 18 years and older as young adults who have acquired the age of majority. This study sets the minimum age for the youth population at 18 years old. As modernization progresses, the duration of education rises, the age of initial marriage is postponed, and the constancy of career selection and job security

diminishes. Therefore, the establishment of a maximum age limit of 35 for youth is essential as per the Medium- and Long-Term Youth Development Plan (2016-2025) (Xinhua News Agency, 2017).

'The global demographic structure' is shifting, with an aging population and a decreasing demographic dividend. Young adults, who are considered the 'native inhabitants' of the digital age, are increasingly influencing global digitalization and are becoming a dominant force in the new economy, consumption patterns, and culture. The strategic importance of young adults in the development of all countries is emphasized, and a decline in their absolute numbers and proportion in the total population will impact our country's strength in global competition.

Currently, in China, there are more than 400 million young adults between the ages of 18 and 35, with an average annual increase of 11% in spending power, twice the number of consumers over the age of 35, and by 2021, the spending of young consumers under the age of 35 will account for 69% of total consumption (National Bureau of Statistics, 2021). According to the data of the 7th National Census of Henan Province in 2021, the proportion of people aged 18-35 is 31.85%. In other words, in Henan Province, people aged 18-35 account for about one-third of the total population ratio (Henan Provincial Bureau of Statistics, 2022).

1.2.2 Use and Need of AR

According to Rau Schnabel (2019), recent technological developments have helped bring the virtual and actual worlds closer together. AR has grown more commonplace as a result of the proliferation of mobile devices such as smartphones and tablets (Rauschnabel et al., 2019； Hinsch, 2020).

According to Petit (2019), AR doesn't cut people off from reality; rather, it enhances it. Rauschnabel et al. (2019) users are now engaging with AR technology in a variety of ways, such as via stationary Apps (e.g., AR mirrors), Mobile Apps (e.g., Photoshop App), or wearable App (e.g., AR smart glasses).AR marketing has the potential to help impact behavior and support branding efforts, sales, and customer service initiatives (Hinsch, Felix,&Rauschnabel, 2020). This is accomplished by merging digital information and objects into users' views of the actual world. AR marketing technologies have the potential to effectively build a feeling of community, which may help campaigns stand out from the crowd (Hinsch et al., 2020). This is especially important during times of intense competition.

Customers have spent more than USD 7 billion as of 2020 and likely much more in the following years; moreover, the industries getting the biggest share of investments are gaming, followed by healthcare global AR market is expected to expand by more than USD 18 billion by 2025. Another study found that 32% of consumers use AR in a variety of ways and would want to purchase more if they had access to an AR facility, while 73% of customers use mobile AR Apps and had a favorable experience with AR technology (Triantafillopoulou, 2022).

Therefore, AR technology encourages consumer participation and offers solutions for online shopping, as well as for boosting customer satisfaction (CS), and brand loyalty, and impacting connections between customers and brands (Alha et al., 2019). According to Bell, Gallino, and Moreno (2018), the introduction of new technology contributes to the ongoing growth of retail business models and customer behavior.

The use of AR technology may be found in many different fields, including education (Alha et al., 2019), tourism (Buhalis, 2020), culture (Schnädelbach et al., 2002), and aviation (De Crescenzio et al., 2011). There is a significant body of research that demonstrates the acceptance and use of AR services in online environments (K.-E. Chang et al., 2014). There is room for enhancement in the utilization of AR, which could lead to unforeseen repercussions for BL. Multiple companies worldwide are currently implementing smartphone Apps based on AR.

1.2.3 Relevant Policy

China is leading the revolution in electronic or internet retailing. The precedent establishes various potential future developments that could become accessible on online shopping platforms. China's economy has experienced significant growth rates in recent decades, positioning it as one of the fastest-growing nations globally. It is currently the world's second-largest economy with the fastest-growing consumer market and the most substantial e-commerce sector.

On November 1, 2022, the Ministry of Industry and Information Technology, the Ministry of Education, the Ministry of Culture and Tourism, the State Administration of Radio and Television, and the State General Administration of Sports issued the 'Action Plan for the Integration and Development of Virtual Reality and Industry App (2022-2026)' (China Government Network, 2022), which puts forward that the overall scale of China's virtual reality industry will exceed 350 billion yuan by 2026, with the sales volume of virtual reality terminals exceeding 25 million, and that it will cultivate 100 backbone enterprises with strong innovation ability and industry influence, create 10 clusters with regional influence that lead the development of virtual reality ecology, and build 10 industrial public service platforms; it proposes to build experimental zones for virtual reality production for broadcasting, television and network auditioning, and to integrate the development of culture and tourism, convergent media, trade and creativity, and smart cities, etc.

Over the last 2 years, numerous regions have introduced virtual reality-related regulations to promote the growth of associated sectors, with the expectation that these policies will expedite industrial development. On January 15, 2022, the State Council released the '14th Five-Year Plan' for the digital economy, which includes plans to enhance the adoption of ultra-high-definition television, interactive video, immersive video, cloud games, and other new business forms. It also focuses on innovating 'cloud life' services and promoting the establishment of smart communities and service life circles. The State Council issued a circular on January 20, 2022, outlining the '14th Five-Year Plan for Tourism Development' (State Council, 2022). The circular emphasized the need to expedite the integration of big data,

virtual reality, AR, and other new technologies in the tourism sector. It also highlighted the importance of improving the quality and interactivity of tourism products and advancing the utilization of technologies like interactive immersive tourism performances. Tourism, performing arts, technological research, development, and App demonstration. The 'virtual reality +' sector is believed to have a wide development space, with promising prospects for hardware, software, and content. The development speed of the virtual reality industrial chain is predicted to increase with regulatory assistance.

Extended reality, often known as XR, is an umbrella word that encompasses both AR and virtual reality (VR). While virtual reality (VR) refers to the process of replacing the perceived reality (Xi & Hamari, 2021), AR refers to the process of adding to the perceived reality (Carmigniani et al., 2011; Rauschnabel, 2021). AR enables the incorporation of digital sensory information into the user experience in real-time using a variety of media (visual displays, such as smartphones, tablets, and glasses; sound, smell, and touch displays). This may be accomplished through AR. Modern AR wearables on the market enhance the shopping experience by allowing hands-free operation, quick response, and deep user interaction. Major global retailers such as IKEA, Walmart, and Amazon have developed their own AR (AR) systems to enhance the retail store experience. These services consist of IKEA Place for showcasing products in 3D, the Walmart AR scanning tool for product comparison, and the Amazon AR View for product testing. Customer desire for AR furniture shopping has increased due to the COVID-19 pandemic. AR has the potential to be very disruptive in the field of marketing (Rauschnabel, 2021).

1.2.4 Design Trends

Technological advancements in information technology have ignited a revolution in business and marketing, particularly in the field of commerce. Since Approximately 1990, E-commerce, involving electronic business transactions, has been a vital practice for firms. Online shopping is widely recognized for offering numerous advantages over purchasing from physical stores, notably in terms of convenience, cost-effectiveness, time-saving, and reduced physical strain. Consequently, consumers are gradually adapting to and relying more on online shopping services (Perea Y Monsuwé et al., 2004). Currently, intelligent technology is continuously evolving, profoundly changing people's lifestyle patterns. The emergence of swift payment methods simplifies people's travel; the expansion of online ticketing has eradicated the necessity for lengthy ' queues and physical tickets; the 'Internet + government' platform also facilitates the establishment of a communication bridge between the government and the public.

Retailers have begun to leverage mobile AR furniture shopping Apps not only to support innovative visual merchandising but also, perhaps more importantly, to mirror real-world retail experience and reinforce purchase experience and engagement in an online environment (Roggeveen et al., 2021; Smink et al., 2020). In doing so, retailers are effectively bridging the gap between online and offline shopping experiences. In this regard, AR furniture shopping Apps for mobile devices are becoming more popular among customers since they are both convenient and inexpensive. Mobile AR furniture shopping Apps take advantage of consumers' cell

phones to superimpose digital material onto the real world around them (Qin et al., 2021). Available data indicates that mobile AR Apps currently have 0.81 billion active users worldwide, with Statista forecasting this number to triple by 2024. Research results from Google and BRP Consulting show that 66% of adults are interested in using AR for purchasing, and 48% of customers prefer buying from a business that offers AR technology.

The surge in popularity of AR furniture purchasing Apps can be attributed to a profound comprehension of the shopping habits of young adults. The study conducted by Scholz and Smith (2016a) discovered that AR technology provides young adults with an unparalleled customized purchasing experience by virtually showcasing furniture. This not only facilitates the display of products but also creates a profound connection between shopping and living by providing an immersive digital experience.

Shopping for young adults has evolved from a mere act of acquiring goods to a significant social ritual. The study conducted by Saha et al. (2020) demonstrates that AR furniture shopping Apps have altered the nature of shopping, shifting it from an individual activity to a communal activity involving group participation and sharing on social media platforms. Within the virtual shopping realm, adults can engage with acquaintances and exchange purchasing advice, leading to a more engaging and collaborative digital shopping community.

AR technology improves users' shopping experience and assists in their decision-making process thoroughly. Scholz and Smith's (2016a) research

demonstrates that using AR technology improves the accuracy of purchase decisions by incorporating real-time information overlay. Consumers can easily get comprehensive product information while making a purchase. The real-time, enhanced overlay of information offers users a more streamlined shopping experience and deepens their comprehension of the products, resulting in a more methodical and purposeful purchasing process.

Chinese government initiatives have been crucial in advancing significant progress in the creation and advancement of AR technology. The government's backing of AR technology extends beyond financial aid to encompass incentives and promotion, fostering a conducive environment for technological advancement. This assistance has enabled enterprises to have more opportunities for investment and research and development, resulting in the widespread integration of AR technology in several sectors, including enhancing the shopping experience. This policy also presents undisclosed difficulties. AR technology's widespread use and deployment are crucial for technological dissemination. The government needs to promote and ensure the widespread adoption and use of AR technology. Users may need further training and education to improve their comprehension and skill in AR technology.

Government and industry collaboration is essential to promote the widespread use of technology and encourage full user participation. Additionally, there are worries regarding the privacy and security of consumers' data. AR technology being widely used in the retail industry could result in the gathering and utilization of consumers' data. The government needs to enhance data privacy oversight to provide sufficient protection of users' rights and interests. It is crucial to encourage

organizations to adopt clear and open rules regarding data usage simultaneously. To address these challenges more effectively, governments and enterprises must closely collaborate. The government may offer increased regulatory support and incentives to promote companies' involvement in technology research and development, user training, and data protection. Companies must enhance their internal innovation and social responsibility to guarantee the ongoing advancement of AR technology and the continuing enhancement of user experience. AR technology is anticipated to enhance the digital economy's success by creating a new, intelligent, convenient, and personalized purchase experience for young adults through this collaborative effort.

1.2.5 AR App for Young Adults

With the emergence of AR technology in the retail sector, young Chinese consumers have become significant participants in this digital shopping experience. International research has demonstrated the global success of AR shopping, offering users a more interactive and personalized shopping experience (Scholz & Smith, 2016b). However, China still encounters challenges in the development of AR shopping compared to other countries.

AR shopping has emerged as a significant driver of retail innovation in international markets. Foreign merchants use AR technology to offer consumers virtual fitting, product demonstration, and other interactive activities to enhance the shopping experience (Lanier, 2017). Scholars commonly agree that this customized

and engaging purchasing Approach can significantly enhance users' shopping happiness and brand loyalty (Scholz & Smith, 2016b).

Young adults represent a generation that is highly tech-savvy and more open to adopting emerging technologies such as AR. Scholz and Smith (2016a) argue that younger consumers are often the early adopters of technological innovations, making them a relevant target group for the implementation of AR in retail. This generation has grown up in a digital era, where interaction with online platforms and mobile applications is a daily occurrence. As a result, they are more likely to engage with AR-enhanced experiences compared to older age groups, who may be less familiar with such technologies.

However, there are still flaws in the progress of AR purchasing in China. The uneven popularity of the technology has led to restricted awareness and utilization of AR purchases among specific young adults. Government policies support AR technology, however there is a necessity to improve its overall adoption among different populations. Moreover, there are extensive concerns about user privacy and weaknesses in data security. Stricter restrictions and norms are required for the collection and utilization of personal information in AR commerce (Scholz & Smith, 2016b). The connection between AR purchasing and Chinese youth is an intricate and comprehensive occurrence that encompasses technology, social interaction, and cultural elements. Academic research enhances comprehension, and collaboration between the government and companies is crucial to tackling technical and privacy

concerns to offer a smart, convenient, and secure purchasing experience for young adults.

This study outlines the selection and App of a suitable design model for creating an AR technology App tailored for the youthful demographic interested in furniture shopping. An AR furniture purchasing App was created by integrating the shopping requirements of young adults in metropolitan China with research and development endeavors. The target demographic was invited to take part in the App trial, and many questionnaires were gathered. The study outcomes are given via data analysis. This study examines the features and fundamental principles related to the utilization of AR furniture shopping Apps by young adults. The article examines many aspects that affect young adults and studies the developmental trends in their utilization of AR furniture shopping Apps.

1.3 Problem Statement

The adoption of AR technology in the furniture industry in China faces several obstacles. Younger users, in particular, are hesitant to use AR due to unfamiliarity with the technology, and many consumers experience limitations with visual stability and precision, impacting the overall user experience. Additionally, AR hardware remains costly and less accessible, further limiting the widespread use of AR technology. Moreover, the furniture industry struggles with delivering high-quality and diverse 3D models within AR Apps, leading to reduced user engagement. Users

also face challenges with adapting to evolving interaction settings required by advancing technologies.

According to Scholz and Smith (2016a), AR significantly enhances decision-making by allowing consumers to visualize products in real-time, a particularly crucial factor in the furniture sector, where decisions rely on spatial compatibility. Unlike industries like clothing or electronics, furniture shopping requires users to see how a piece fits within their home environment, making AR technology especially valuable. This sector lags behind in adopting these innovative solutions, resulting in difficulties for customers to accurately visualize furniture in their space, leading to uncertainty and higher return rates.

Furthermore, research like Poushneh (2018a) emphasizes AR's competitive advantage in enhancing user experiences in sectors where aesthetic decisions are key. Despite this potential, the use of AR in furniture shopping Apps—particularly those targeted at young adults—remains limited, and empirical studies exploring its use are lacking. Young adults expect a seamless and highly interactive shopping experience, but current AR solutions fail to fully meet their expectations. There is a significant gap in understanding how AR can be optimized for this demographic, particularly in the context of youth-friendly digital design.

Although efforts have been made to address these challenges, further research is required to fully explore the relationship between an AR furniture-purchasing App and user responses. Smink et al. (2019) suggested that AR Apps can elicit more persuasive responses than non-AR Apps, yet they primarily focus on general attitudes

and behavioral intentions. This study aims to build on their work by diving deeper into how AR can shape user engagement and behavioral outcomes, specifically within the context of online furniture shopping for young adults.

1.3.1 Design Perspectives

AR technology can help visualize the best home decorating option by examining the spatial relationship of objects. AR can improve human perception and realism by overlaying virtual elements in real-world situations instantly. Previous studies have shown promising results for using AR in residential environments (Bellucci et al., 2022, 2022). Several Apps have been developed or studied to improve the overall quality of home life. A recent study showed that AR visualization technology can enhance adults' comprehension and awareness of home technologies by providing a way for intuitive interaction with objects (Bellucci et al., 2022; Bhatt, 2021). An upgraded kitchen with projections layered on objects could improve the culinary experience, making it more fun, safe, and convenient. An improved house window could offer information and facilitate personal and family communication (Bonanni et al., 2005; Ventä-Olkkonen et al., 2014). Further studies on AR houses have explored users' capacity to customize their interior design using augmented picture modification of their home settings. This involves functionalities like adding, relocating, or deleting 3D virtual furniture (Perusquía-Hernández et al., 2014; Phan & Choo, 2010). Another study focused on enabling couples to collaboratively explore furniture design options for their living room (Shin et al., 2020). AR App at the 'IKEA

Plaza' enables clients to assess the compatibility and visual Appeal of virtual furniture in a real-world setting, aiding their decision-making process (Siltanen et al., 2013). Additional styling tools enable the dynamic adjustment and presentation of objects in real time to facilitate customization (Sandu & Scarlat, 2018). While there is an extensive empirical study on AR, the majority of the aforementioned tools are seldom examined from a design standpoint.

1.3.2 AR Atmosphere

AR is a developing technology that enables the addition of virtual objects to the real world in real time while users are experiencing it (Cipresso et al., 2018). The integration of AR technology allows for the merging of people's views of the physical environment with computer-generated digital content (Farshid et al., 2018). AR technology enables the integration of virtual aspects into the actual world (Verhagen et al., 2014). According to the International Data Corporation (IDC), global expenditure on AR is projected to increase significantly as a result of the COVID-19 pandemic. It is expected to rise from US$12 billion in 2020 to US$72.8 billion by 2024. Furthermore, IDC reports that the consumer sector constituted 53% of the overall market expenditure on AR in 2020. This suggests that AR is likely to have a significant impact on consumers' way of life, including their social interactions, work habits, and leisure activities (Hsu et al., 2021). This also suggests that AR is becoming integrated into consumers' lives and is considered a need. It also signifies that the rapidly advancing AR market still holds significant potential for further growth and study.

Recently, the App scenarios of AR have greatly expanded. These include surgical simulation (Ayoub & Pulijala, 2019; Vávra et al., 2017), education(J.-J. Chen et al., 2021) Khan et al., 2019), games (Paavilainen et al., 2017; Rauschnabel et al., 2017), military training (Amaguaña et al., 2018; Livingston et al., 2019), architecture construction (Zaher et al., 2018; Zhou et al., 2017), psychological and cognitive therapy (L. N. Lee et al., 2019; Tsao et al., 2019), tourism (Serravalle et al., 2019; Yung & Khoo-Lattimore, 2019), and more. AR technology can frequently offer trial-and-error training methods and increased accessibility in such situations, hence enhancing labor efficiency. AR, when properly utilized, can have a beneficial impact on marketing. It is considered one of the most potent tools for marketing professionals. AR enables customers to simulate the experience of trying out products before making a purchase online, thereby compensating for the drawbacks of traditional online purchasing (Baek et al., 2018; Scholz & Smith, 2016b). Research conducted by Smink (2019) has demonstrated that AR can have a beneficial impact on the user experience while buying items like cosmetics or furnishings through online platforms. A drawback of prior studies was that participants simulated makeup effects by uploading pre-existing images of their faces, resulting in a non-real-time AR trial experience. There is a distinction between a cosmetics trial and trying on shoes.

Furthermore, several research have assessed the AR try-on experience in online purchasing, specifically examining customers' perception of trying on garments (Plotkin & Saurel, 2019; Shaw et al., 2020; Yim & Park, 2019; Zhang, 2018). These studies demonstrate that AR can assist customers in selecting clothing items that are the right size and color when purchasing online. However, there has been no research conducted on the perception and preference of using AR for trying

on shoes. AR virtual trials can compensate for the absence of experience in e-commerce when compared to traditional fittings (Beck & Crié, 2018). However, buyers may also have concerns about shoe size, color, and fitness in addition to clothes. Emphasizing the impact of AR shoe-try-on software design enhances the overall user experience by leveraging advanced technologies. To enhance the design effect, it is crucial to carry out focused iterative research on the technology acceptance model (TAM). Marketers are now investigating the potential App of AR in business. However, the limited understanding of how AR might benefit customers is a challenge in designing effective strategies (Smink et al., 2020). AR technology has been in existence for a considerable period. However, its practical App was limited due to the high hardware requirements, until it became supported by mobile phones (McLean & Wilson, 2019). Hence, the utilization of AR technology in marketing is exemplified by the implementation of AR shoe-try-on software on mobile devices. The utilization of AR technology in digital marketing by businesses has led to increased interest from academic and practical communities in understanding customer behavior towards AR technology (Fan et al., 2020). Expanding and modifying the model of consumers' perception and desire when using AR is both theoretically and practically significant.

1.3.3 Empirical Studies

There have been prior investigations into the possibility of creating an AR mobile App for shopping for furniture (Ahmed T. et al., 2018; V. C. Huang & Tedjojuwono, 2020; Ozturkcan, 2021; Young & Smith, 2016a). Yen Prima Mebel is the name of the

furniture store that the writers (V. C. Huang & Tedjojuwono, 2020) have designed and built a system, which they have designed and developed. There are two primary advantages that the program offers to improve the shopping experience that customers have at that particular location. One of the features is the provision of the entire catalog within the App, and the other is the use of AR to determine whether or not a certain piece of furniture is suitable for the location of the consumer. The writers of this study declared that they were successful in accomplishing the objectives of their project by utilizing a qualitative methodology to evaluate the usability of the App that they had built. In a manner that is comparable to that of Huang and Tedjojuwono (2020), Ozturkcan (2021) investigated an AR mobile App that was conceived and produced by the IKEA fashion retailer. An App that is comparable to this one was developed and put into operation by Ahmed (2020). When it came to developing the Android App, the authors relied on Kudan SDK. Comparable to the findings of Huang and Tedjojuwono's (2020) study, the authors evaluated the usability of the proposed App and stated that the user experience was adequate. A description of the Approach was the primary emphasis of the study; the evaluation of the suggested system was not included in the report. In conclusion, the work that was done by Young and Smith (2016b) established a calibration algorithm to enhance the quality of the photographs. During this task, the usability of the App that was produced was evaluated, and the results showed that the client experience was satisfactory.

Conversely, another App focused on providing precise measurements of furniture, as shown by Huang and Tedjojuwono (2020). The previous section discussed the App of AR technology in shopping, specifically in furniture shopping. These studies often investigate the impact of AR technology on consumers' shopping

decisions, experiences, and engagement. Empirical research on the utilization of AR furniture among young adults is few. Empirical research approaches such as designing surveys, collecting data, and analyzing data are seldom utilized in studies of young adults' AR furniture App. There is a scarcity of quantitative approaches for studying AR furniture Apps designed for young adults, especially those actively engaging with AR furniture Apps tailored for this demographic.

1.4 Research Objectives

Based on a review of the background of AR furniture shopping, we can see the need for further research into AR. As design continues to evolve, many new concepts are being added. There is a need to include more current design factors in the field of AR. For example, popular design concepts such as interaction design, experience design, service design, AR design, and branding design will continue to influence AR design. Furthermore, existing systematic review articles fail to provide detailed information about the review process. This includes keyword identification, article screening, and article qualification. Furthermore, due to this, future researchers are unable to reconstruct the survey, authorize interpretations, or assess the breadth of the data. Additionally, this study is important because it provides researchers with an understanding of the peer literature review and helps researchers to better understand the design issues of AR furniture shopping platforms that may require academic attention. This systematic analysis aims to answer the main research question: do AR furniture shopping Apps embody another model in the field of design? The primary focus of the investigation was on perceptions of AR furniture shopping Apps.

RO1: To identify a suitable model to develop an AR online furniture shopping App for Chinese young adults.

RO2: To develop an AR online shopping App for young adults using the suitable identified model.

RO3: To test the effectiveness of the development of AR online furniture shopping among Chinese young adults using the UTAUT2 theory.

RO4: To propose design guiding principles for innovative branding AR online shopping based on the findings of the measurement of five constructs as a creative branding strategy to influence the behavioral intention of Chinese young adults.

Describe the behavioral tendencies of young adults while utilizing AR for online purchasing with a focus on design aesthetics. To perform a comprehensive, three-dimensional, and multi-level professional analysis and theoretical research on online purchasing using AR.

1.5 Research Questions

With the research objectives of this study serving as a foundation, the research questions for this study were formulated without any significant difficulties. As a

result of the fact that they are correspondences between adults, the study questions are presented as follows:

RQ1: How to identify a suitable model to develop an AR online furniture shopping App for Chinese young adults?

RQ2: How to develop an AR online shopping App for young adults using the suitable identified model?

RQ3: How to test the effectiveness of the developed AR online furniture shopping among Chinese young adults using the UTAUT2 theory?

RQ3.1: Is there a significant positive effect of performance expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?

RQ3.2: Is there a significant positive effect of effort expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?

RQ3.3: Is there a significant positive effect of social influence on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?

RQ3.4: Is there a significant positive effect of facilitating condition on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?

RQ3.5: Is there a significant positive effect of hedonic motivation on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?

RQ4: What are the proposed design guiding principles for innovative branding AR online shopping based on the findings of the measurement of five constructs as a creative branding strategy to influence the behavioral intention of Chinese young adults?

1.6 Research Hypotheses

This study employs the methodology of quantitative research. Formulating research hypotheses is a common activity in quantitative research. A hypothesis is a statement or a set of assertions created to explain the occurrence of a certain phenomenon. It might be proposed as a preliminary speculative assumption to direct the study independently, or it can be acknowledged as something that is quite likely based on the evidence. The researcher formulated the research hypothesis for this study based on research objectives and corresponding research question 3. In order to provide a comprehensive analysis of the relationships examined, both the null hypothesis and

the alternative hypothesis were included in this study to ensure that we either confirm or refute the existence of significant impacts

Firstly, mature facts do not necessitate hypothesis testing and can be denoted as the null hypothesis (H_0). In this scenario, the null hypothesis can be regarded as the baseline condition of a statement when there is any novel statement that lacks solid establishment in the empirical reality. Hence, based on Research Question 3, the null hypothesis posits that there is no construct capable of exerting a positive influence on the behavioral intention of young adults following their use of the AR online furniture shopping App. Furthermore, the Appropriate sub-null hypotheses are presented below:

$H_0$1: There is no significant positive effect of performance expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design.

$H_0$2: There is no significant positive effect of effort expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design.

$H_0$3: There is no significant positive effect of social influence on the behavioral intention of young adults after having used an AR online shopping App with a good experience design.

$H_0$4: There is no significant positive effect of facilitating condition on the behavioral intention of young adults after having used an AR online shopping App with a good experience design.

$H_0$5: There is no significant positive effect of hedonic motivation on the behavioral intention of young adults after having used an AR online shopping App with a good experience design.

Furthermore, to tackle the third research objective and research question, this study necessitated a sequence of tests and hypothesized that the utilization of an AR online furniture shopping App developed within a design framework would substantially improve the behavioral intentions of young adults. By conducting many tests and proposing different ideas, this study automatically resulted in an alternative hypothesis (Ha). This hypothesis was then further broken into five sub-hypotheses:

Ha: The behavioral intention of young adults shows a significant difference after using an online shopping App about AR.

This hypothesis aligns with Research Objective 1, which seeks to understand the key factors driving AR adoption. It directly answers Research Question 1, which explores how specific design elements like performance expectancy impact user behavior.

Ha1: There is a significant positive effect of performance expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?

This hypothesis aligns with RO3 and RQ3.1, as it specifically tests the influence of performance expectancy on user behavior. By confirming this hypothesis, the study helps determine whether the effectiveness of the AR app, in terms of improving performance expectations, leads to higher adoption rates among young adults.

This hypothesis is tied to RO3 and RQ3.2, focusing on the ease of use of the AR app. Testing effort expectancy helps assess whether the user-friendly design encourages young adults to adopt the app, contributing to the objective of measuring the AR app's effectiveness.

Ha3: There is a significant positive effect of social influence on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?

This hypothesis supports RO3 and RQ3.3 by investigating how social factors, such as peer recommendations or social norms, impact the behavioral intention to use the AR app. Understanding the role of social influence helps validate the app's effectiveness in encouraging user adoption.

Ha4: There is a significant positive effect of facilitating condition on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?

This hypothesis connects to RO3 and RQ3.4 by examining how external support—like access to the right resources or technology—affects the intention to use the app. Verifying this hypothesis helps measure whether the app's design and infrastructure support successful adoption.

Ha5: There is a significant positive effect of hedonic motivation on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?

This hypothesis is aligned with RO3 and RQ3.5, as it tests whether enjoyment and fun in using the AR app play a significant role in influencing young adults' behavioral intention. This hypothesis supports the goal of understanding the role of emotional factors in the app’s effectiveness.

Last, the researcher summarizes a table that shows how problem statements, research objectives, research questions, and research hypotheses all relate to each other. This table made understanding and comparing their relationships easier (see Table 1.2). It is a core of this study that complete, accurate, and comprehensive representation of essentials for subsequent research. At this point, the above elaboration demonstrates the fundamental elements of this research direction clearly and logically.

Table 1.2
A research summary of the relationship between problem statements, research objectives, research questions, and research hypotheses.

Problem Statements	Research Objectives	Research Questions	Research Hypotheses	
			Null Hypotheses	Alternative Hypotheses
1. There are many empirical studies on AR but most of them rarely look from the perspective of design.	RO1: To identify a suitable model to develop an AR online furniture shopping App for Chinese young adults.	RQ1: How to identify a suitable model to develop an AR online furniture shopping App for Chinese young adults?		
2. Although the volume of the consumer industry is large, there is a lack of pervasive examples of AR shopping, especially shopping Apps for young adults.	RO2: To develop an AR online shopping App for young adults using the suitable identified model.	RQ2: How to develop an AR online shopping App for young adults using the suitable identified model?		
3. As of today, few empirical studies have been conducted about AR online shopping for young adults.	RO3: To test the effectiveness of the development of AR online furniture shopping among Chinese young adults using the UTAUT2 theory.	RQ3: How to test the effectiveness of the development of AR online furniture shopping among Chinese young adults using the UTAUT2 theory?		

Problem Statements	Research Objectives	Research Questions	Research Hypotheses	
			Null Hypotheses	**Alternative Hypotheses**
		RQ3.1: Is there a significant positive effect of performance expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?	$H_0$1: There is no significant positive effect of performance expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design.	Ha1: There is a significant positive effect of performance expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?
		RQ3.2: Is there a significant positive effect of effort expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?	$H_0$2: There is no significant positive effect of effort expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design.	Ha2: There is a significant positive effect of effort expectancy on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?
		RQ3.3: Is there a significant positive effect of social influence on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?	$H_0$3: There is no significant positive effect of social influence on the behavioral intention of young adults after having used an AR online shopping App with a good experience design.	Ha3: There is a significant positive effect of social influence on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?

Problem Statements	Research Objectives	Research Questions	Research Hypotheses	
			Null Hypotheses	**Alternative Hypotheses**
		RQ3.4: Is there a significant positive effect of facilitating conditionon the behavioral intention of young adults after having used an AR online shopping App with a good experience design?	$H_0$4: There is no significant positive effect of facilitating conditionon on the behavioral intention of young adults after having used an AR online shopping App with a good experience design.	Ha4: There is a significant positive effect of facilitating conditionon on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?
		RQ3.5: Is there a significant positive effect of hedonic motivation on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?	$H_0$5: There is no significant positive effect of hedonic motivation on the behavioral intention of young adults after having used an AR online shopping App with a good experience design.	Ha5: There is a significant positive effect of hedonic motivation on the behavioral intention of young adults after having used an AR online shopping App with a good experience design?
4. These studies were inadequate for examining youth-friendly digital design, especially in AR online shopping.	RO4:To propose design guiding principles for innovative branding AR online shopping based on the findings of the measurement of five constructs as a creative branding strategy to influence the behavioral intention of Chinese young adults.	RQ4: What are the proposed design guiding principles for innovative branding AR online shopping based on the findings of the measurement of five constructs as a creative branding strategy to influence the behavioral intention of Chinese young adults?		

1.7 Conceptual Framework

Miles and Huberman (1984) describe a conceptual framework as 'the researcher's present map of the area under investigation'. They suggest that conceptual frameworks may change as research progresses. Their concept integrates boundaries and evolution to maintain consistency in research, all derived from conceptual frameworks. Robson suggests that integrating various viewpoints involves articulating your intentions through the development of a conceptual framework. It assists in making selective decisions regarding significant features, relationships, and data collection and analysis (Robson, 2024).

This research focuses on creating a novel AR furniture App to enhance the online purchasing experience for young Chinese consumers. Young Chinese individuals are showing a growing preference for online purchasing, particularly for major furniture goods, and they desire a more user-friendly and lifelike shopping experience on the Internet. The researchers aim to create furniture shopping software that utilizes AR technology to allow users to visualize furniture placement and appearance in a virtual setting, aiding in making precise purchasing choices.

The selection of a design model is crucial as it will direct the entire development process, spanning from requirements research to App design to the ultimate App delivery. I will evaluate the applicability, adaptability, and compatibility with AR technology when selecting a design model.

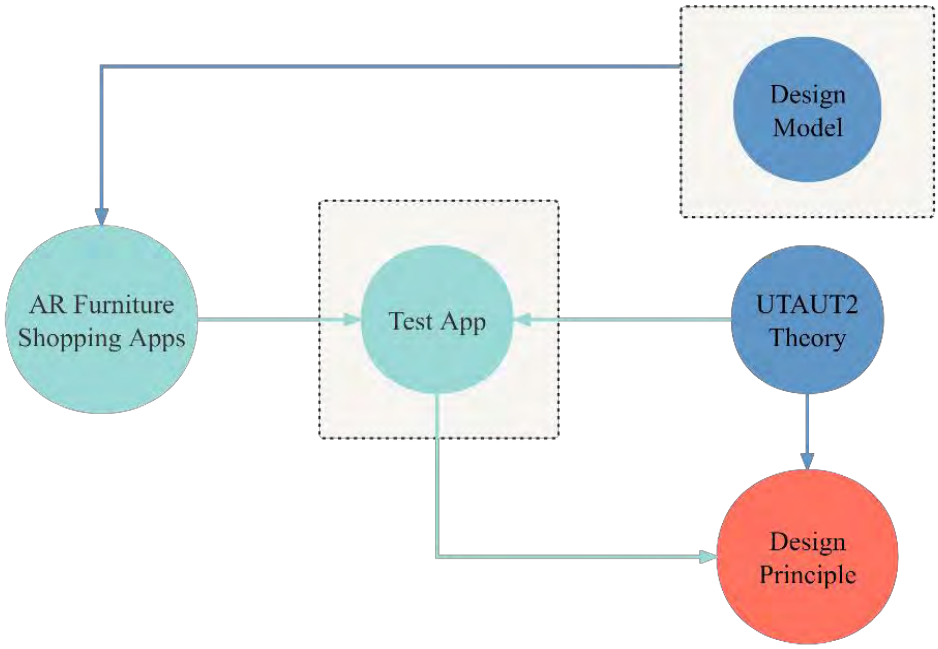
Upon completion of App construction, this study will utilize UTAUT2 as a validation framework to gather users' feedback and App experience via a questionnaire survey. UTAUT2 is a prevalent theoretical framework in technology adoption research that encompasses aspects like as perceived usefulness, ease of use, social impact, and trust in technology. This study will utilize the UTAUT2 theory to thoroughly evaluate consumers' acceptability and willingness to use AR furniture Apps, and subsequently analyze their strengths and limitations.

Analyzing the questionnaire data will lead to the development of guidelines for App design, focusing on enhancing user experience, optimizing functional design, and improving market competitiveness. The rules will serve as valuable references and lessons for creating comparable Apps in the future, as well as promoting the implementation and development of AR technology in the furniture purchasing industry.

To better study this topic, based on the combination of the above theoretical research and practice, the researchers constructed a conceptual framework for this study (see Figure 1.2).

Figure 1.2

Conceptual Framework of the Study



As depicted in Figure 1.2, to propose the design of the AR Furniture Shopping App, it is imperative to adhere to the relevant design model. Given that the App falls within the realm of common digital media and technology, validating its overall design can be achieved by aligning it with the UTAUT2 technology model. This approach serves as a guiding principle for designing AR Online Shopping.

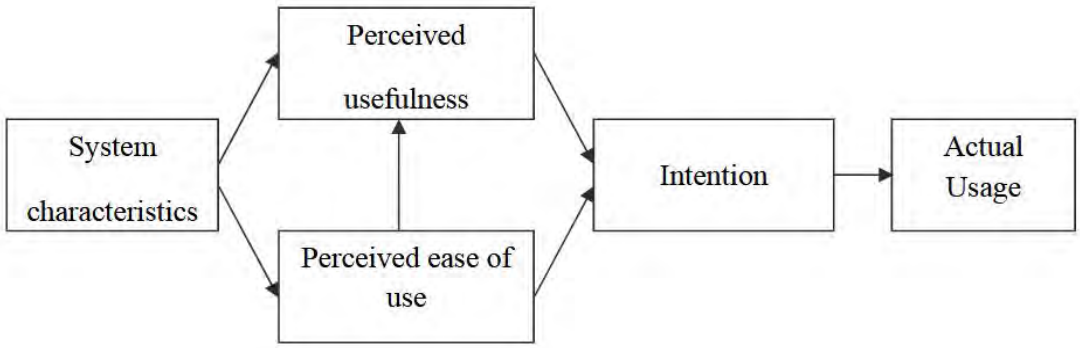
1.8 Theoretical Framework

Over the past several years, there has been a significant increase in the global popularity of online shopping (S. Wu, 2003). The prevalence of internet users engaging in online shopping and the income generated by online retail businesses are consistently growing over time (Ozen & Engizek, 2014). Companies aiming to

expand their online retail operations require accurate projections of online shopping growth and a comprehensive understanding of the elements that influence customers' decision to purchase online (Lohse & Spiller, 1998). Various models, such as the technology acceptance model (TAM) and the theory of planned behavior (TPB), have been extensively employed in research to investigate the elements that influence the intention to engage in online purchasing behavior. TAM has been effectively utilized as a theoretical framework to predict online buying intention and behavior within the specified range (Gefen et al., 2003b, 2003a; In Shim & Lee, 2011; Pavlou & Fygenson, 2006). The Technology Acceptance Model (TAM) was initially proposed by Davis (1989) as a modified version of the Theory of Reasoned Action (TRA) developed by Fishbein and Ajzen (1977). According to the Technology Acceptance Model (TAM), the aspect that directly affects 'intention' is the combination of 'perceived usefulness' and 'perceived ease of use' (Davis, 1989) (see Figure 1.3).

Figure 1.3

Technology Acceptance Model

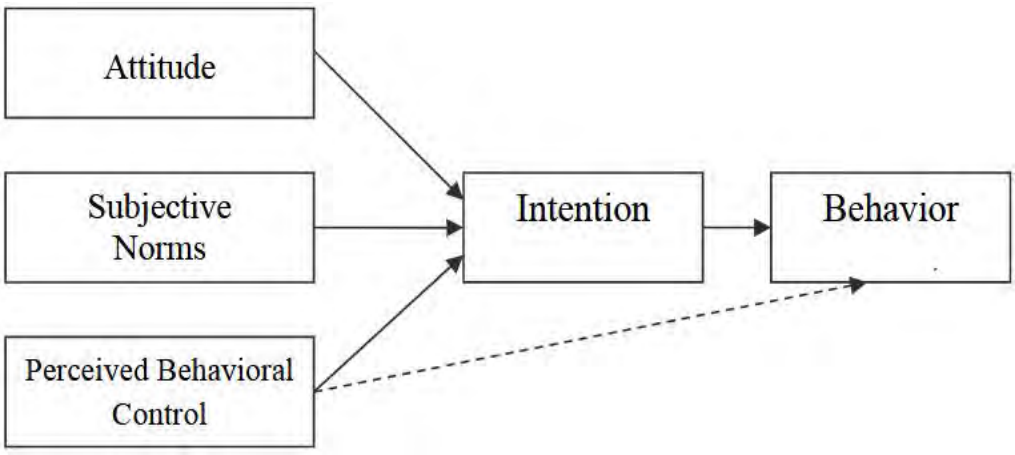


TPB, established by Ajzen (1985), is an extension of the Theory of Reasoned Action (TRA) (Hill et al., 1977). It incorporates the additional aspect of "Perceived Behavioural Control" into TRA. Perceived Behavioural Control is a measure of how

easy or difficult it is to do a behavior, which is influenced by the resources and opportunities available to carry out that behavior (Ajzen, 1991). TPB states that the consumer's 'Behavioural Intention' is impacted by their 'Attitude,' 'Subjective Norms,'and 'Perceived Behavioural Control.' The Technology Acceptance Model (TPB) has gained widespread acceptance and usage in research for predicting persons' intention to use and their specific behaviors. Furthermore, empirical research has demonstrated the suitability of this model for analyzing consumer behavior in the context of online buying (George, 2004; Hansen et al., 2004). In a study conducted by Hansen et al. (2004), both the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) models were examined. The findings indicated that the TPB model provided a more accurate explanation of consumer behavior compared to the TRA model (see Figure 1.4).

Figure 1.4

Theory of Planned Behavior (TPB)



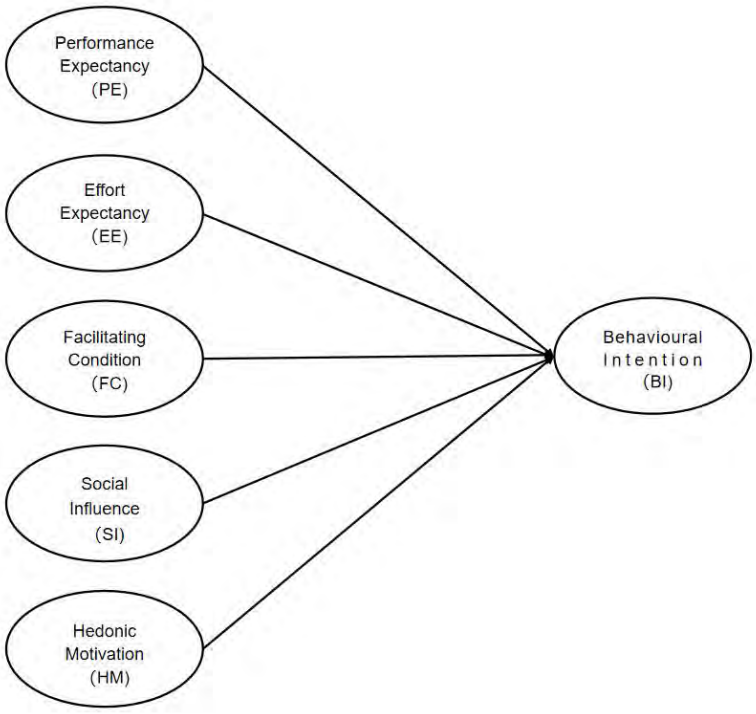
Due to their shared foundation in TRA, TPB, and TAM exhibit some level of mutual influence. Perceived Behavioural Control refers to an individual's subjective assessment of the level of ease or difficulty associated with performing a specific

behavior (Ajzen, 1991). Perceived usefulness refers to the extent to which an individual feels that utilizing a certain system will improve their work performance (Davis, 1989). This indicates that Perceived Behavioural Control in the Theory of Planned Behavior (TPB) is comparable to Perceived Ease of Use in the Technology Acceptance Model (TAM). In addition to the variables described above, trust is one of the most influential aspects that significantly affect consumers' inclination to purchase online. The absence of trust has been demonstrated to be a primary factor that impedes consumer online purchases (Järvenpää et al., 2000; M. K. O. Lee & Turban, 2001). Without the establishment of trust, it is impossible to carry out any online transaction (Winch & Joyce, 2006). Consumer trust in online sellers is crucial for engaging in virtual purchasing over the Internet (Y. Chen & Chou, 2012). Several academics have examined the influence of trust on consumers' propensity to purchase online. Nevertheless, findings from these studies continue to vary. Hahn and Kim (2009) found that trust had little effect on consumers' propensity to purchase online. Simultaneously, other studies have contended that trust plays a pivotal role in exchange-based interactions McKnight et al. (2002) and has a substantial influence on customer behavior in both online and traditional retail settings (Winch & Joyce, 2006). In the realm of online buying, trust is crucial since consumers perceive a greater risk when doing transactions in a virtual environment where they do not have direct contact with the vendor or the items being sold (Järvenpää et al., 2000; Pavlou & Fygenson, 2006). Hence, the utilization of TAM and TPB models can provide a more comprehensive examination of the online buying inclination towards AR among young Chinese customers.

The study uses UTAUT2 to investigate the relationship between independent variables (performance expectancy, effort expectancy, social influence, enabling conditions, and hedonic motivation) and dependent variables, notably behavior intention, in the context of AR design. The study focuses on analyzing the relationship between performance expectancy, effort expectancy, social influence, facilitating condition, and hedonic motivation on behavioral intention. This study will integrate the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Theory of Planned Behavior (TPB) to examine the intention of young Chinese customers to shop online using AR (see Figure 1.5).

Figure 1.5

The Six Constructs from UTAUT2 Theory



This study utilized the UTAUT2 theory, incorporating certain adaptations, as indicated by the aforementioned studies. Three primary reductions were implemented.

Initially, the two autonomous variables, price value, and habitual conduct, were eliminated. Given that the AR online furniture purchasing App developed in this study is an independent App with a cheap price and has not been commercially distributed or advertised, the intended audience will not recognize its monetary worth and will not develop regular usage patterns specific to this App. Hence, the inclusion of the price value and habitual behavior as dependent variables is unnecessary for assessing the target audience. Furthermore, user behavior is eliminated as a variable that is influenced by other factors. This study just focuses on the behavioral intention of the target group, disregarding their actual usage. This can also be attributed to the inherent characteristics of low-priced independent Apps. Furthermore, experience was excluded as a moderating influence. The App should be novel and predominantly unutilized by the intended user base, within the confines of the test area. Thus, it is possible that they lacked previous familiarity with utilizing AR for online furniture shopping. Hence, the inclusion of experience as a moderating element lacks logical coherence in this context.

1.9 Research Scope and Limitations

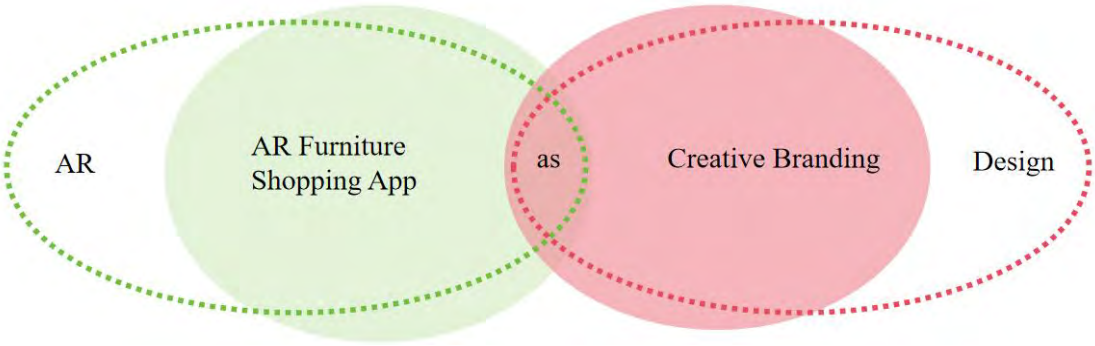
As far as the scope of the study is concerned, this study is an academic study in the field of Applied arts. Specifically, it is an empirical study on branding that involves the use of AR as a creative branding strategy (Shangguan, Dayan, 2017). It is worth emphasizing that this is not a social research study, although human beings were recruited as participants in the study, and that it is not an Applied science research

study, although a scientific research methodology was applied to collect and analyze the data to answer the specific research questions.

Developers should take into consideration the AR furniture shopping itself in addition to the innovative branding when they are building an AR App. It is necessary for there to be areas of overlap between the AR furniture shopping App and the creative brand, as demonstrated in Figure 1.6. If AR is developed as a standalone App, it is quite probable that it will become myopic and fail to accomplish its long-term development objectives. One example of a strategic development tactic is the creation of AR as an innovative branding and the design of products and services with this strategy in mind from the beginning. AR furniture shopping Apps for AR must be built and designed as innovative branding from the very beginning. This encompasses every facet of the App, from the App's logo to the production framework of the App, from the user-friendly interface to the overall visual style, and from the idea of virtual design to the derivative items that are linked with it. In the second place, when utilizing an AR furniture shopping App as a brand, it is essential to take into consideration the use of AR in terms of design, technology, the internet, and personal computers.

Figure 1.6

Creative Brands and AR Furniture Shopping Apps



After this thesis, the attributes of AR online shopping Apps are compared in three domains of design, namely the correlation between experience design and AR online shopping Apps, interaction design and AR online shopping Apps, and service design and AR online shopping Apps. Comprehending these connections is crucial for implementing AR online shopping Apps as innovative branding.

1.9.1 The Participants

This study specifically targeted young adults aged 18-35 in China, excluding other age demographics. Participants were recruited from students at Henan Engineering of Engineering and local youths residing in the adjacent town of Longhu. Henan Engineering of Engineering, renowned for its scenic and human-centric setting, stands as one of the esteemed universities in Henan Province, China. Its surroundings, facilities, and resources reflect those typical of public universities across China. Furthermore, Longhu Town ranks among the top 100 towns in China and serves as a

significant transportation nexus nationwide, renowned for its robust economy, rich cultural heritage, and pristine environment. For this study, the youth population residing within a 10-kilometer radius centered around Henan University of Engineering was chosen as the focus group for drawing conclusions and findings.

1.9.2 App Test Equipment

The mobile device used in the first pre-test experimental study was a 6.06-inch mobile phone from an iPhone. In the second mobile phone experimental study, the same mobile phone was also used to collect data with the participants.

1.9.3 Research Design

The survey utilized a validation study as its method of investigation. The research technique for this study was implemented in four phases from December 2022 to December 2023. The first stage of this research study utilized an AR online shopping App as a design prototype to find the right framework for innovative branding for young adults. This step consisted of selecting an appropriate building framework for the AR furniture shopping App and validating it through a comprehensive literature review of three representative user experience design models and UTAUT2 theory. This section of the inquiry focused on analyzing survey question 1, with the findings to be elaborated on in Chapter 2. The second phase was to construct an AR online shopping App for young adults using an appropriate model architecture. Phase 2 of

the project will dissect and analyze the development and design process of the AR online shopping App into its components. Beginning the second phase of the project includes validating the App through internal and external expert assessments. The researcher use the UTAUT-LK model including components from the App architecture. Research hypotheses were created based on the research model and questionnaires were developed based on these hypotheses. A data-gathering mechanism was constructed and data analysis procedures were developed. This section of the investigation yielded a solution to Problem 2, as discussed in Chapter 3.

The third and final phase of this study concentrated on quantitative research analyses. This phase of the study was primarily carried out after the data collection phase was over. The data was first analyzed using rudimentary methods of data collection. Simple descriptive and non-parametric statistical analyses were conducted using the SPSS software. Statistical structural equation analyses were conducted on multiple parameters using the AMOS software to achieve the intended outcomes and assess the hypotheses. Question 3 will be addressed during this research phase, and the findings will be outlined in Chapter 4. The fourth section of the study project discusses the prior findings and confirms the practicality of the design framework to harmonize it with the brand design strategy for creating an AR online shopping App aimed at young adults. The concepts were based on our successful experience in designing shopping Apps, along with related theoretical studies and literature reviews. The response to the fourth research inquiry is now accessible and the initial research query has been modified. The answer to research question 4 will be addressed in Chapter 5 (see Table 1.3).

Table 1.3

The Four Phases of This Study

PHASE	Research Design Content	Methodology	QR & Chapter
PHASE 1	Identify developing a design model for an AR online App as innovative branding for young adults.	1.Literature review 2.Choosing the suitable design model	QR1 & Chapter 2
PHASE 2	Design and development of an AR online shopping App for young adults to enhance their shopping behavioral intentions.	1.AR online shopping App design 2.Questionnaire development 3. Data collection	QR2 & Chapter 3
PHASE 3	Validating some constructs of behavioral intentions of young adults when using an AR furniture shopping App.	1. Descriptive statistics 2. Nonparametric test 3. SEM analysis	QR3 & Chapter 4
PHASE 4	Propose a set of principles to guide young adults' use of AR Apps.	1. Interpret results 2. Set guiding principles	QR4 & Chapter 5

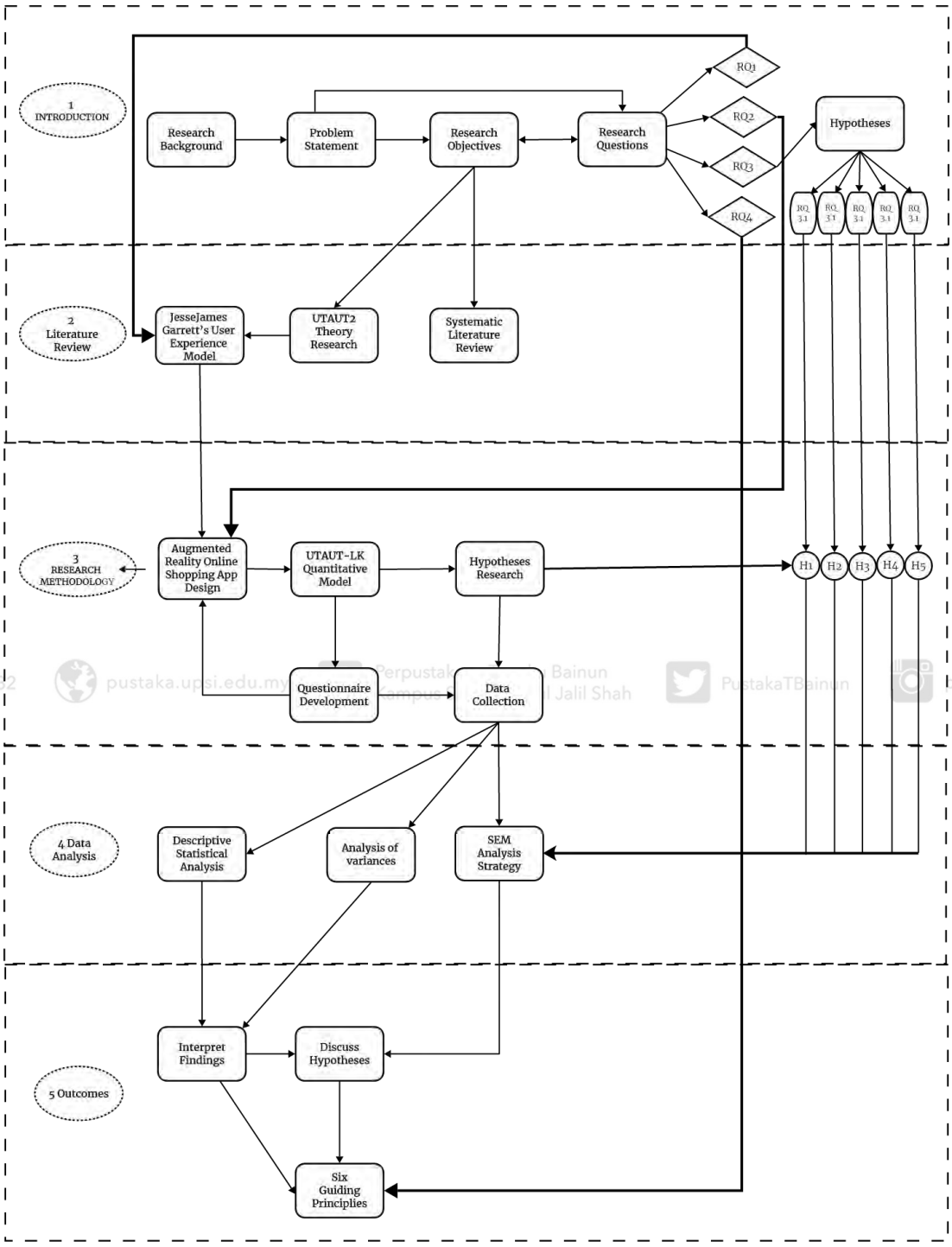
The researcher obtained a fundamental comprehension of the thesis's structure and content at the first conceptualization stage of the study. The researcher's comprehension of the research framework improved as the inquiry advanced. The researcher refined and improved the research framework during the inquiry to build its structure. The researcher used an integrated graphical representation to enhance the presentation of the research framework.

Figure 1.7 effectively illustrates the research concept in the research framework. The problem statement outlines four primary research inquiries for this study. The first research question aims to find a viable design model solution. The

framework was identified after conducting a systematic literature review and scoping literature review in Chapter 2. The answer to the second research question is located in the AR App developed by the researcher in Chapter 3. Chapter 4 will delve into the third research issue and its five sub-problems in the data analysis results section. Chapter 5 of this book addresses the fourth research question. Each square in the diagram represents a distinct research element, with the arrows showing the sequential connection between each element and others that come before or after it. The research framework demonstrates the logical linkages and interactions between the components and delineates the sequence in which the complete investigation will be carried out.

Figure 1.7

Research Framework Proposed for This Study



1.10 Importance of the Research

This study effectively combines young adults with AR online shopping Apps and presents a focused research field on designing new brands for young adults through AR online shopping Apps. This study offers an analysis of the usage of AR by young adults in online shopping Apps. The goal was to investigate several attribute concepts and factors related to the adoption of AR online shopping Apps by young adults. This entails choosing a suitable brand design framework for AR online shopping Apps aimed at a youthful demographic. This involved overcoming challenges using these Apps and striving for expertise in the area of online buying with AR. This study addresses three crucial research areas of substantial importance.

This study suggests a design process specifically for creating and improving AR internet shopping Apps aimed at young adults. Choosing the right design framework is crucial for developing and improving AR online retail Apps, which is the primary focus of this thesis. The program includes five distinct areas: AR design, interaction design, experience design, service design, and branding. The program streamlines online shopping, enhances the purchasing experience, and simplifies the shopping process for young adults, thus boosting shopping efficiency. AR online shopping Apps are essential for fulfilling the physical, psychological, and social requirements of young adults and expanding the scope of development for these Apps. The study offers recommendations for creating and designing AR online shopping

Apps. The guidelines aim to offer a novel approach to innovative branding for Chinese adolescents engaged in online buying. The design guidelines outline how AR Apps might be tailored to attract young adults. The study's results are crucial for improving the creation of AR online shopping Apps tailored for young adults.

1.11 Operational Definition

1.11.1 Behavioural Intentions

The quantification of an individual's determination to engage in a specific behavior is commonly known as behavioral intention (Kitchenham, 2004). It is often used as a replacement or sign of actual activity. Historically, consumer research has mostly concentrated on behavioral intention, which relates to the action of eating, purchasing, or the desire to get. The technology adoption literature mostly focuses on the process of integrating new technologies.

1.11.2 Performance Expectancy

According to Venkatesh (2003), Performance Expectancy refers to the extent to which an individual believes that utilizing a system will assist them in achieving improvements in their job performance. Venkatesh (2003) has noted that age and gender play a moderating role in the association between intention and Performance

Expectancy. Regarding gender, males exhibit a greater propensity to adopt novel technologies at a faster pace compared to their female counterparts. Previous research has shown that age does not have a substantial impact on IT usage.

1.11.3 Effort Expectancy

Effort Expectancy, as defined by Venkatesh (2003), refers to the level of ease that is linked to the utilization of the system. If a specific technology becomes excessively challenging, users may opt to abstain from utilizing it. This pertains to the use of the product. Effort Expectancy is analogous to perceived ease of use, reflecting users' perceived difficulties with the information system and positively impacting behavioral intention.

1.11.4 Facilitating Condition

Facilitating Condition, as described by Venkatesh (2003), refers to the extent to which an individual perceives the presence of an organizational and technical framework that enables the utilization of a system. This component pertains to the user's possession of the necessary resources, abilities, and expertise to successfully do the tasks at hand. Facilitating condition encompass the compatibility of the product with other geospatial technologies and data, specifically referring to interoperability.

1.11.5 Social Influence

Social influence refers to the degree to which an individual perceives that influential others want them to embrace the new system. This paradigm highlights the substantial impact that influential adults in our lives, including family members, coworkers, or acquaintances, have on our decision-making about the adoption of specific technologies. Research suggests that as adults gain greater familiarity and expertise with technology, the significance of social influence decreases with time.

1.11.6 Hedonic Motivation

Hedonic motivation refers to the enjoyment or pleasure that comes from using technology. It has been demonstrated to have a significant impact on the acceptance and usage of technology (Venkatesh et al., 2012, p. 161). Venkatesh incorporated the concept of hedonic motivation into the UTAUT2 model. The proposal suggests that the inherent advantages, such as happiness, amusement, lightheartedness, recreation, and pleasure, greatly influence how quickly individuals adopt new technologies.