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Research on Chinese Residents' Consumption Intention of Smart Home Appliances after COVID- 19

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Abstract

Smart home appliances are an inevitable trend for future development, but COVID-19 has affected people's consumption structure. This study aims to investigate the consumption intention of smart home appliances after COVID-19 among Chinese residents and examine whether they differ based on gender, age, population size, education level, and income. A random sampling survey was used to collect 1599 questionnaire data. Use descriptive and differential analysis of SPSS 27 to analyse the collected data. The results found that the mean score of residents to consume smart appliances was 3.82, and the mean of repeated consumption intention is the highest, followed by the initial consumption, and the intention to pay more money has the lowest mean score. Additionally, the study found no significant difference in the gender and income of residents on their intention to consume smart home appliances. Meanwhile, there were significant differences in age, education level, and population size. Finally, the researcher proposed to enhance residents' intention to consume smart home appliances from three aspects: advertising, promotion, and quality.

Keywords: Smart Home Appliances, COVID-19, Chinese Residents, Consumption Intention

Introduction

COVID-19 in 2020 has caused unprecedented economic losses to various industries in China. Consumption habits are consumption behaviour patterns gradually formed by consumers in their consumption activities. Therefore, after the outbreak of COVID-19, while the continuous epidemic has changed consumers' lifestyles, it has also quietly changed consumers' consumption habits during the epidemic (Gan et al., 2021; Novianto et al., 2022). Some scholars have found that the outbreak of COVID-19 has led to a decline in the income of many households and increased market uncertainty (Altig et al., 2020; Wang and Zhang, 2022). Most respondents' consumption has declined, and they have given policy recommendations focusing on increasing disposable income in the short term and stabilizing market expectations in the medium and long term (Lan et al., 2020). Some scholars stated that the overall consumption intention of residents after the epidemic is on the decline, and retaliatory consumption only exists in a few people (Yao, 2022). Some scholars started from psychological factors to study the impact of major public health events on residents' irrational

consumption behaviour and found that the epidemic will increase consumers' conformity, impulsiveness, and scarcity consumption tendency (Sun and Li, 2021; Wahyono et al., 2021).

Bai et al (2012) pointed out that consumption is one of the troikas driving China's economic growth, and it plays an important role that cannot be ignored in terms of economic growth rate, promotion of industrial optimization and upgrading, and improvement of residents' living standards. Sustained and stable consumption growth is the "leading goose" to achieve economic growth and the optimization and upgrading of the economic structure, and it is also the "ballast stone" to ensure the transformation of economic development drivers and the steady improvement of the economic level in the process of the new normal (Wang and Zhang, 2022).

The predicted consumption scale of China's smart home appliance market in 2023 will exceed 100 billion US dollars (ASKCI, 2023), which will be essential to China's economic growth—for example, promoting consumption upgrading, promoting industrial upgrading, increasing employment opportunities, and optimizing energy structure. Therefore, the importance of smart home appliance consumption for China's economic growth is very obvious.

A combination of multiple factors influences consumption intention. The level of economic income is one of the important factors determining residents' intention to consume. The higher the income level, the higher the residents' intention to consume (Akhtar et al., 2021). Levriani et al. (2021) stated that price is a key factor affecting residents' consumption intention. For some high-priced or over-budget goods or services, consumers may hesitate or give up purchasing (Yang, 2017). Syed et al (2022) pointed out that consumers' preferences and needs also affect their intention to consume. If consumers believe that a certain product or service can meet their needs and preferences, they are more likely to be willing to consume it. Family can also affect consumption intention (Kembau & Mekel, 2014). For example, families with children may be more inclined to purchase children's products and educational services, while older people may pay more attention to medical and elderly care services. According to Screen, Purby & Sadarangani (2018); Pookulagara & Koesler (2011), environmental and cultural factors can also affect residents' consumption intention. For example, people from different regions and cultural backgrounds may have different consumption concepts and behaviours. Furthermore, Market promotion and information dissemination also affect consumption intention (Shah et al., 2012; Spears & Singh, 2004). If consumers can understand the benefits and value of a certain product or service, they may be more willing to consume it.

The 14th Five-Year Plan clearly states that China adheres to the strategic cornerstone of expanding domestic demand, accelerates the cultivation of a complete domestic demand system, organically combines the implementation of the strategy of expanding domestic demand with deepening the supply-side structural reform, and leads and creates new demand through innovation-driven and high-quality supply (He et al., 2021). However, COVID-19 has significantly impacted China's economy, affecting consumers' consumption behaviour. Currently, research on the impact of COVID-19 on consumption in China mainly focuses on changes in consumption expenditure, while discussion and research on changes in consumer intention are lacking, and smart home appliances are a powerful engine for expanding domestic demand. Therefore, this study aims to discuss the consumption intention of Chinese residents for smart home appliances after COVID-19.

The questions researched are as follows

- What is the consumption intention of smart home appliances among Chinese residents after COVID-19?
- Does smart home appliances' consumption intention differ by gender, age, education level, family structure, and income?
- What suggestions are for improving residents' consumption intention of smart home appliances?

Research Design

This research aims to examine Chinese residents' intention to consume smart home appliances and determine the relationship between these variables and the residents' gender, age, education level, family structure, and income. The researcher used questionnaires to collect data and complete descriptive and differential analysis.

Research Object

The Chinese household appliance market encompasses various categories of appliances, including but not limited to televisions, washing machines, refrigerators, air conditioners, kitchen appliances, audio equipment, robotic vacuum cleaners, etc. According to the research report (ASKCI, 2023), smart TVs, smart refrigerators, smart air conditioners, and smart washing machines account for about 95% of the market share. Therefore, the research object of the researchers is the consumption willingness of Chinese residents for the above four types of smart home appliances. The smart home appliances in this study have the following common characteristics

1. It can realize remote control and management through the Internet or wireless network. Users can control and monitor smart home appliances anytime and anywhere through smartphones, tablets, or computers.
2. With the ability of automatic operation and intelligent interaction, smart home appliances can automatically adjust parameters and perform operations according to information such as user behaviour patterns, habits, and preferences.
3. With voice recognition and artificial intelligence technology, smart home appliances can recognize the user's voice commands and realize human-computer interaction through voice interaction.
4. With the functions of visual display and interaction, smart home appliances usually use display devices such as LCD screens, touch screens, or LED screens to achieve interaction with users through interface design.
5. With data collection and analysis capabilities, smart home appliances can collect and analyze user usage data and continuously optimize the user experience and product performance based on data feedback and intelligent algorithms.

Sample / Participants

The participants in this study are Chinese residents who voluntarily participate in the survey. Table 1 provides information on several demographic and socioeconomic variables for a given population. The sample size for this population is 1599 individuals. In terms of gender, the population is composed of 600 males (37.5%) and 999 females (62.5%). Regarding age, the largest group is individuals aged 31-40 years (69.8%), followed by those aged 41-50 (18.2%) and 20-30 years (12.0%). Education level shows that 46.2% of the population has an

undergraduate degree, while 41.6% has a postgraduate degree. The remaining 12.2% have a high school education or less. Concerning population size, 44.2% of households have three or fewer individuals, while 31.7% have four individuals, and 24.1% have five or more individuals. Lastly, the income section shows that the largest income group is individuals with an income of 1001-2000 dollars per month (43.6%), followed by those with an income of ≤ 1000 dollars per month (27.3%), 2001-3000 dollars per month (18.4%), and ≥ 3001 dollars per month (10.7%).

Table 1

Summary of demographic characteristics of respondents

Variables	Characteristics	N	%
Gender	Male	600	37.5
	Female	999	62.5
Age (Year)	20-30(Low)	192	12.0
	31-40(Mid)	1116	69.8
	41-50(High)	291	18.2
Education Level	High School	195	12.2
	Undergraduate	738	46.2
	Postgraduate	666	41.6
Population Size	≤ 3	706	44.2
	4	508	31.7
	≥ 5	385	24.1
Income (monthly/\$)	≤ 1000	437	27.3
	1001-2000	697	43.6
	2001-3000	294	18.4
	≥ 3001	171	10.7
		1599	100

Instrument

The consumption intention scale used in this study was adapted from (Liang, 2016; Rahim et al., 2016). The scale divides consumption intention into four parts: initial consumption intention, repeated consumption intention, recommendation intention, and paying a higher cost. The scale consists of four items, using Likert's 5-level scoring method, with scores ranging from 1 to 5. The scale was verified by three experts, and Cronbach's coefficient was 0.826, which met the requirements of academic research (Creswell, 2017).

Data Collection and Analysis

Chinese residents answered all the questions in the questionnaire. During the research process, the researchers first informed the participants of the study's purpose, then collected the researchers' demographic data, ensuring their confidentiality. It took approximately 1 minute to complete the data collection. This study received 1600 questionnaires, of which 1 was incomplete and invalid. The researchers used descriptive and differential analysis to analyse the remaining 1599 data. Due to the non-normal distribution of the data, the difference analysis in this study adopts the Mann-Whitney U test and Kruskal-Wallis H test (MacFarland & Yates, 2016; Elliott & Hynan, 2011)

Results

Table 2

Descriptive statistics of consumption intention of smart home appliances

Consumption intention of smart home appliances				
Items	Mean	SD	Min	Max
Initial consumption	3.90	0.80	1	5
Repeated consumption intention	3.95	0.80	1	5
Recommendation intention.	3.80	0.88	1	5
Paying higher cost	3.63	0.80	1	5
Total	3.82	0.77	1	5

Table 3 indicates that Chinese residents' overall consumption intention score for smart home appliances is 3.82. The item with the highest mean score is the repeated consumption intention, with a mean score of 3.58, followed by the initial consumption intention, with a mean score of 3.90. The recommendation intention has a mean score of 3.80, and the intention to pay more money has the lowest mean score of 3.63.

Table 3

Mann-Whitney U test statistics for differences based on consumer gender.

Gender	Consumption intention		Z	p
	Quartile	Mean		
Male	3.75(3.25~4.25)	3.80(\pm 0.74)	-0.597	0.551
Female	3.75(3.25~4.25)	3.83(\pm 0.70)		

Note: Male:600; Female:999.

According to Table 3, the quartile of male and female residents' consumption intention of smart home appliances is equal, including the upper, middle, and lower quartiles. But on the mean, female residents have a higher intention to consume than men. The Mann-Whitney U test showed no significant difference between male and female residents($P>0,05$).

Table 4

Kruskal-Wallis H test statistics for differences based on age

Age	Consumption intention		H	p
	Quartile	Mean		
20-30	3.75(3.50~4.25)	3.81(\pm 0.66)	30.362	0.000
31-40	4.00(3.75~4.75)	4.03(\pm 0.80)		
41-50	3.75(3.00~4.25)	3.73(\pm 0.74)		

Note: 20-35 (Low):192; 36-50 (Mid):1116; \geq 51(High):291

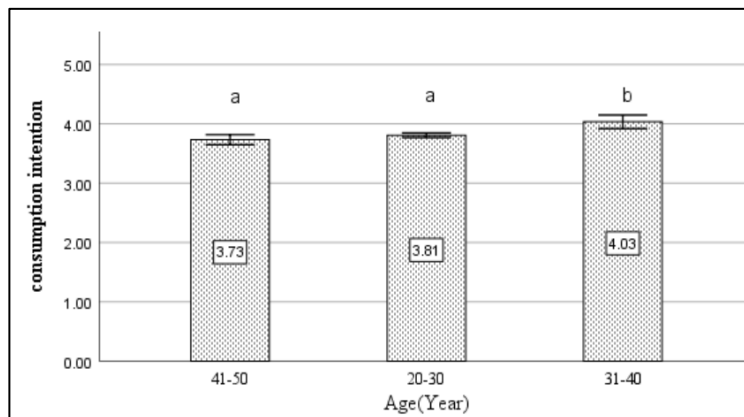


Figure1. Kruskal-Wallis H test statistics for differences based on age

As shown in Table 4, the median and lower quartiles of the low and high age groups are the same (3.75; 4.25), while each quartile of the middle age group is higher than the other two groups. Similarly, the mean value of smart home appliance consumption intention of residents in the middle-aged group is also higher than that of the other two groups, and the mean value of the low-age group (3.81) is higher than that of the high-age group (3.73). Kruskal-Wallis H test analysis showed significant differences among residents of different ages. Figure 2.1 shows that there is no difference between the low age group and the high age group ($P > 0.05$), while there is a significant difference between the two groups and the middle age group ($P < 0.05$).

Table 5

Kruskal-Wallis H test statistics for differences based on the education level

Education Level	Consumption intention		H	p
	Quartile	Mean		
High School	3.75(3.25~4.25)	3.71(±0.78)	9.699	0.008
Undergraduate	3.75(3.75~4.25)	3.81(±0.67)		
Postgraduate	4.00(3.50~4.25)	3.87(±0.70)		

Note: High School:195; Undergraduate:738; Postgraduate:666.

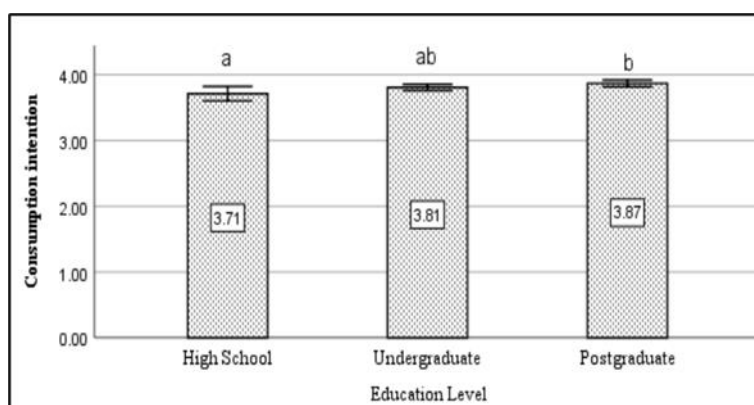


Figure2. Kruskal-Wallis H test statistics for differences based on the education level

Table 5 shows that the median and lower quartiles of high school and undergraduate residents are the same, 3.75 and 4.25, respectively. The upper quartiles of residents with a

bachelor's degree are higher than those with a high school degree. The median and upper quartile of residents with a graduate degree is higher than the other two groups. According to the education level of residents, the consumption intention of smart home appliances is ranked from high to low: graduate students, undergraduate students, and high school students. The data shows a significant difference in the education level on consumption intention of smart home appliances. According to Figure 2, High school residents were not significantly different from undergraduate residents but were significantly different from graduate students. There were no significant differences between undergraduate and graduate residents.

Table 6
 Kruskal-Wallis H test statistics for differences based on population Size

Population Size	Consumption intention		H	p
	Quartile	Mean		
≤3	3.75(3.25~4.25)	3.71(±0.68)	32.945	0.000
4	4.00(3.50~4.20)	3.85(±0.70)		
≥5	4.00(3.50~4.50)	3.99(±0.70)		

Note: ≤3:706; 4:508; ≥5:385.

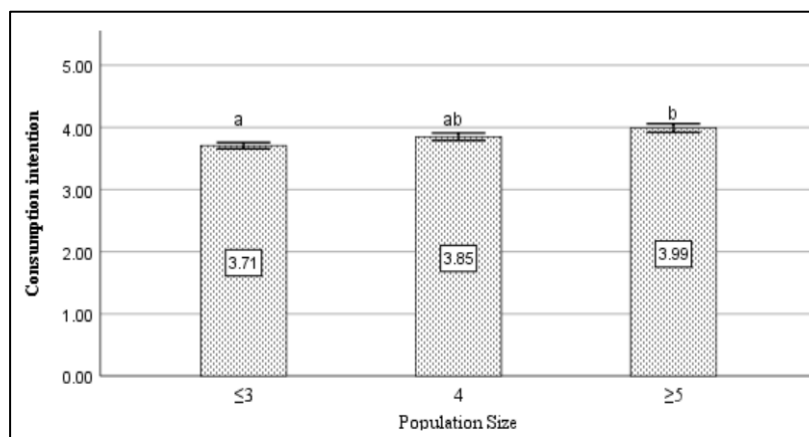


Figure3. Kruskal-Wallis H test statistics for differences based on population Size

Table 5 shows that the median and the upper quartile of the resident family with more than 4 persons and the family with 4 persons are equal (4.00; 3.50), while the median and the upper quartile of the resident with less than 4 persons are both Minimal, 3.75 and 3.25 respectively.

The average value of residents' intention to consume smart home appliances from high to low is families with more than 4 people, families with 4 people, and families with less than 4 people. In addition, there are significant differences among residents of different household populations.

As seen in Figure 3, there is no significant difference between those with less than 4 persons and those with more than 4 persons, and a significant difference was found between those with less than 4 persons and those with more than 4 persons. No significant difference was found between the family size of 4 people and the other two groups.

Table 7

Kruskal-Wallis H test statistics for differences based on Income

Income (monthly/\$)	Consumption intention		H	p
	Quartile	Mean		
≤1000	4.00(3.25~4.25)	3.80(±0.69)	0.866	0.834
1001-2000	3.75(3.25~4.25)	3.81(±0.72)		
2001-3000	3.75(3.50~4.25)	3.85(±0.63)		
≥3001	4.00(3.50~4.50)	3.88(±0.74)		

Note: ≤1000:437; 1001-2000:697; 2001-3000:294; ≥3001:171

According to Table 7, the median of residents with a monthly income of less than or equal to \$1,000 and greater than \$3,000 are equal (4.00), and in both groups, the upper and lower quartiles of residents with high incomes are higher than those with low incomes residents. The median and lower quartiles of the remaining two groups are the same (3.75). From the perspective of monthly income, residents with higher incomes have a higher mean score of consumption intention of smart home appliances, but the differences between the four groups are small. Based on the Kruskal Wallis H test, it was found that there is no significant difference between residents' income levels and their intention to consume smart appliances.

Conclusion

The research shows that female residents have a slightly higher intention to consume smart appliances than male residents, and there is no significant difference in Consumption intention among residents based on gender. The mid-age group (31-40) residents have the highest intention to consume smart appliances, and there is a significant difference compared to the low-age group (20-30) and the high-age group (41-50) residents. Additionally, it was found that the higher the level of education, the higher the consumption intention of smart home appliances, and a significant difference was revealed between high school residents and graduate students. According to the study, the population size of a family has a significant difference in the consumption intention of smart home appliances, and the data shows that the larger the household population, the stronger the intention to consume. Furthermore, residents' income does not significantly differ in the intention of smart home appliances, while the average value of high-income residents is higher than that of low-income residents. The development of smart home appliances is very rapid, but there is still a lack of intention to consume among residents, especially after COVID-19. Therefore, the researcher proposes the following three strategies to improve residents' intention to consume smart home appliances

1. Advertising: Marketers can provide information and benefits about smart home appliances, such as protecting the environment and improving the quality of life. Organize more smart home appliance knowledge popularization activities to attract more people to pay attention to and understand smart home appliances. In addition, the establishment of experience stores allows residents to experience the advantages of smart home appliances, making it easier for residents to understand and accept the concept and functions of smart home appliances.
2. Promotion strategy: Marketing personnel provides certain discounts or subsidies through policies or business activities to reduce the purchase cost of smart home appliances and attract more residents to participate in the consumption of smart home appliances.

3. Quality assurance: Enterprises provide quality assurance, installation, maintenance, and other services to make consumers feel more at ease, reduce their worries, and improve their confidence and intention to consume smart home appliances.

To enhance residents' inclination to adopt smart home appliances, it is essential to reinforce the promotion of their benefits, offer preferential pricing, and provide guarantee services, among other measures. Such initiatives can gradually enhance residents' awareness and trust in the technology, ultimately increasing their willingness to purchase and enthusiasm for consumption.

Significance and Limitations of the study

This study contributes to the existing literature by investigating the level consumption intention of smart home appliances among Chinese residents after the COVID-19 Pandemic. The research results can provide evidence for sellers, production enterprises, and governments policymakers to understand the current residents' consumption intention and make appropriate intervention measures. Due to the limited sample size, the conclusions of this study have certain limitations. It is hoped that there will be more research on the factors influencing the consumption intention of smart home appliances in the future.

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