Artificial Intelligence Applications Used in On-line Retail in China and Their Relationship to Customer Satisfaction and Loyalty

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ABSTRACT

Artificial Intelligence is the creation of intelligent computers and smart computer algorithms that help machines understand human intelligence (IBM Cloud Education, 2021). Artificial Intelligence is created by analyzing behavior and patterns of big data. Artificial intelligence has existed since the 1950s (Song et al, 2019) but during recent times application of AI in various sectors like healthcare, business, entertainment, education, weather, and geology has picked up momentum. To cite a few well-known examples of Artificial Intelligence technology that are used by almost everyone in our day-to-day activities are advanced Google searches, YouTube recommendations, and Alexa (Song et al, 2019).

The advent of technology has brought about innovation and transformation to every aspect of the business world, including the retail industry. The shift in the retail sector becomes obvious when big brick-and-mortar retailers scale down their physical shops and gradually move part of their business online. Consumer attitudes toward online shopping can vary based on demographics, perceived risk, perceived ease of use, and perceived usefulness. Demographic characteristics can further be classified as sex, age, educational qualification, household income, and relationship status, to name a few.

In this study, the aim is to identify artificial intelligence applications and their use in online retail by Chinese consumers. A model has been developed to test the relationships between artificial intelligence applications used for online shopping and customer satisfaction and loyalty.

KEYWORDS: *Artificial Intelligence, on-line retail, Chinese consumer, customer satisfaction, customer loyalty*

Introduction

Artificial Intelligence (AI) can be defined in layman's terms as intelligence demonstrated by machines which in turn helps in reducing manual intervention. Artificial Intelligence is the creation of intelligent computers and smart computer algorithms that help machines understand human intelligence (IBM Cloud Education, 2021). Artificial Intelligence is created by analyzing behavior and patterns of big data. Artificial intelligence has existed since the 1950s (Song et al, 2019) but during recent times application of AI in various sectors like healthcare, business, entertainment, education, weather, and geology has picked up momentum. To cite a few well-known examples of Artificial Intelligence technology that are used by almost everyone in our day-to-day activities are advanced Google searches, YouTube recommendations, and Alexa (Song et al, 2019). In brief, Artificial Intelligence has helped machines develop senses like human beings and it also helps the machine to learn new things on its own (Bernard Marr, 2019). Even though the contribution of AI is vast, our focus of study will be on the 'Impact of AI in online retail in China'. i.e., the focus will be on retail activities carried over the internet, and China being a country with the highest population, which defaults to having a very good customer base and large market will be taken into consideration in this literary review.

Artificial Intelligence (AI)

Artificial Intelligence is summarized as giving a machine the capability to Adapt, Reason, and Provide Solutions, defined as "a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation." Kaplan & Haenlein (2019) "AI can be classified into analytical, human-inspired, and humanized AI depending on the types of intelligence it exhibits (cognitive, emotional, and social intelligence) or into Artificial Narrow, General, and Super Intelligence by its evolutionary stage." Haenlein and Kaplan (2019). Artificial Intelligence takes in raw data, processes, and analyses, to find a solution, for example, when trying to get from point A to point B on a map with multiple routes, initially, one will experiment to find the most convenient route, preferably using Euclidian Distance, but with the use of AI, the machine will take in all the raw data (distance, direction, speed limits, traffic, time of day, etc) and consider all these variables to provide the shortest/quickest route from A to B. This process is also known as Machine Learning

Categories of Artificial Intelligence

Artificial Intelligence generally can be classified into two categories, Weak AI which takes on simple tasks or commands, and Strong AI, virtually on the other end of the spectrum, is self-aware and/or develops emotions, making this

form of AI unpredictable. "Although AGI is less ambitious than strong AI" Fjelland (2020) and "Deep learning and Big Data are among the latest approaches" Fjelland (2020), Artificial Intelligence in retail marketing still falls under the category of Weak AI.

Artificial Intelligence Applications in Retail Marketing

Artificial Intelligence (AI) has played a significant role in the evolution of Retail Marketing. Newspaper flyers, mailer coupons, and billboards were once, "Strategies to enhance visibility and target appropriate customers" (Porter, 2008), used as a tactic to entice the customer to enter the store and shop are rapidly fading as personalized advertisements are on a rise such as "Load your offers" or "You may like this" recommendations during an online shopping transaction. Companies are utilizing, "more mobile applications to facilitate the shopping experience being now able to provide a series of new services to their customers such as virtual fitting rooms, chatbots that can provide instant product recommendation and ML algorithms that search for a particular product after analyzing an image provided." (Victoria et al., 2021). Thanks to the ease-of-use of digital technology such as Cell Phones use, AI Applications such as Google Search and Facebook Messenger, have the means to compile and analyze collections of data, and where "Retailing represents the perfect environment for the use and growth of AI since it collects a significant amount of information regarding consumers and their behavior" (Victoria et al., 2021), studying consumer habits and behaviors has never been so easy. This paper will explore how the utilization of Artificial Intelligence applications is used in the customization of personalized advertisements for the consumer in Retail Marketing. I will explore the topics of Retail Marketing, Artificial Intelligence, Artificial Intelligence Applications, and the Use of Artificial Intelligence Applications in Retail Marketing.

Artificial Intelligence in Online Retail in China

The retail industry in China is flourishing thanks to the country's booming economy. From e-commerce to "New Retail," the business is increasingly incorporating fast-evolving technology like AI and machine intelligence. And China aspires to be the world's AI leader.

The retail business in China spent 73.9 percent more on artificial intelligence (AI) in 2018, reaching US$ 240 million. Spending on AI is predicted to grow at a CAGR of 24.7 percent over the forecast period (2019-2025), rising from US $ 360.4 million in 2019 to US$ 1,686.8 million in 2025. This business intelligence research examines market potential and hazards in China's retail industry's implementation of artificial intelligence (AI). This is a data-driven study with 27 charts and 18 tables that provide a deep insight into market dynamics for the country using 20+ KPIs. This study forecasts country-level AI market size and spending (2016-2025) by applications throughout the banking and finance value chain, AI technological areas, and technology.

Artificial Intelligence Industry in China: AI has long been a source of intrigue, having been portrayed as a futuristic technology in science-fiction films. It did, however, become a reality a few years ago, shaking up our daily lives and habits, owing to technological prowess. We can now operate our domestic devices using a variety of methods, including voice control and facial recognition on our smartphones. China is the most technologically advanced country on the planet. The AI industry is undergoing a complete transformation, particularly in terms of business and sales. Let's look at how important the AI industry is in China, from brick-and-mortar stores to e-commerce platforms that use AI technologies.

Artificial intelligence allows computers and machines to imitate the human mind's perception, learning, problem-solving, and decision-making abilities. This technology can not only learn from examples and experience, make decisions, and solve issues, but it can also perform tasks previously only seen in science fiction films. What was formerly thought to be unattainable is now at the heart of innovation. According to recent studies on AI's recent progress, this rising technology will have a significant impact not only on our daily lives, but also in a variety of domains such as military power, politics, and business. AI is unquestionably the hottest topic in the digital arena right now, and it has morphed into a serious economic, cultural, and even diplomatic issue.

China's Ascension to the Top of the AI Industry - Because of bright researchers, engineers, and imaginative entrepreneurs, the United States has always been technologically sophisticated. Many well-known tech companies have developed as a result of the last wave of digital innovation, including Amazon, Apple, Facebook, Google, and Microsoft. Since then, many countries have recognized AI's expanding potential to promote productivity, defend national security, boost competitiveness, and assist in the resolution of societal concerns. China is one big country that has rapidly caught up with the United States and has gradually overtaken this competition over the years. China has been steadily developing a national industrial policy agenda since 2006, reaching a significant milestone in 2010 with the implementation of the Strategic Emerging Industrial Program.

China is expected to dominate the Artificial Intelligence sector over the next few years, thanks to its daring technological ambitions, and some believe it already has. China continues to be a major power in AI R&D, according to Stanford University's Fourth Annual Index, having surpassed the United States in overall journal citations in AI research and publishing more AI papers than any other country. China is currently honing its instruments to maintain its leading position in this difficult but lucrative sector.

Things to know before entering the Chinese AI Market

The Perception of Artificial Intelligence in China - Unlike most Westerners, Chinese people are unconcerned about artificial intelligence or the possibility of their data and privacy being stored online. If you talk to Chinese folks, they will tell you that they are reassured by the fact that the country is covered in cameras. It is advantageous not only in terms of security but also because it has become a part of their daily life. In China, e-

reputation is crucial for enterprises that use AI technologies: Consumers in China are wary of websites and apps that they have never heard of before. They will almost always rely on the experiences and recommendations of other users, as well as reviews. Even if they are accustomed to AI, consumers must be assured that their privacy and personal information will be protected. When it comes to entering the Chinese market, word-of-mouth is one of the most effective ways to acquire new clients, which is why your brand's e-reputation is crucial. Parallel to all of this, the rapid advancement of artificial intelligence, machine learning, and similar technologies has shifted the landscape of many industries, including retail. China's economic expansion began to fuel demand for a variety of items, ranging from food and groceries to fashion and technology.

The New Retail in China - Alibaba's founder, Jack Ma, defined a new retail idea. He coined the term "New Retail" to describe the next stage of growth following e-commerce. A full integration of online and physical operations, logistics, and data is referred to as New Retail. It makes retail operations more efficient and successful while offering customers a seamless shopping experience. To predict stock replenishment and product placement, New Retail employs extensive retail analytics that includes inventory, sales, and consumer data, as well as market trends and other external factors. The next phase is to incorporate machine learning, artificial intelligence, and other advanced tools into this new retail environment.

AI Integration in New Retail in China - In a recent statement, the Chinese government stated that it intends to become the world's AI leader in a few years. China has a large talent pool that is well-versed in new technology. They have fewer limits on data gathering and use, as well as a government that promotes foreign investment in retail to fund these developments. It also has a sizable proportion of youthful customers who are more prepared to provide a lot of personal data in exchange for convenience and tailored services (Cooper, 2019)

Factors that Contribute to a Consumer's Decision to Adopt Online Retail in China

Consumer attitudes toward online shopping can vary based on demographics, perceived risk, perceived ease of use, and perceived usefulness. Demographic characteristics can further be classified as sex, age, educational qualification, household income, and relationship status, to name a few. Notably, in China, the critical factors contributing to consumer decisions in online shopping have two significant determinants: consumer characteristics and medium characteristics. Perceive ease of use can be studied and understood with the help of a technology acceptance model (TAM). With TAM, researchers identified online behavior and factors that influence the tendency to use online shopping. Perceived ease of use is the perception of an individual about the utility of any product/service. Perceived usefulness has demonstrated a significant impact on attitude formation among the Chinese people. Oppositely, the data on perceived ease of use (H3a) is inconsistent. To conclude, both perceived ease of use and perceived usefulness positively influence Chinese consumers' online shopping chances.

Factors that Determine the Success of Online Retailers in China

The study of Jing Zhao et al. presented the so-called Object-Oriented Model The model breaks down the e-commerce process into four phases, namely, (i) information; (ii) ordering, (iii) payment; and (iv) delivery. The researchers believe that having effective strategies in these four phases is the key to flourishing and gaining a competitive position in China's rapidly changing online retail market. Hence, 8848. net's business approach in each of the four phases was used as a model to support the research. The company is the largest successful online retailer in China. Additionally, the study of Xia Zhao et al. discussed two (2) location advantages home bias and country of origin (COO) as having essential roles in online platforms in the context of foreign branded product exchange imported products with brands that are vastly known worldwide. Home bias is not necessarily a dominating location advantage. The United States (US), being an industrialized country, has established a more favorable country image than China as a top manufacturer and exporter. Hence, their null hypothesis was supported.

On the demand side, the findings suggest that the seller's location is an essential clue for the consumers whether to buy or not. Remarkably, the location of the online seller is more vital than its reputation and effort. That is why the location advantages associated with US sellers are more crucial than their reputation and efforts when consumers choose to buy Coach handbags via Taobao.com., the largest online retail platform in China.

Further, the study by Shi et al. on who among the three sellers, (i) pure online seller; (ii) pure offline seller; or (iii) hybrid seller, consumers tend to buy, reveals that customers tend to visit the physical store if they are unsure that the product will meet their needs. On the other hand, if the consumer is already satisfied and is previously knowledgeable of the product from the beginning, they will buy it online (Shi, Zhou, & Jiang, 2019). This hypothesis supports the object-oriented model by Jing Zhao et al. discussed previously the information phase/product know-how experience should be exceedingly satisfactory since the more informed the consumer is, the more likely they will use online for their retail shopping. Last of all, according to the study of Zandi et al., there are five factors on which customer satisfaction depends, (i) pricing; (ii) service quality; (iii) website design; (iv) privacy of customer information; and (v) delivery time. The results unveil that online shopping dimensions of website privacy, delivery system, and service quality would improve customer satisfaction in China. The same study is consistent with Jing Zhao et al. that the delivery system influences customer satisfaction.
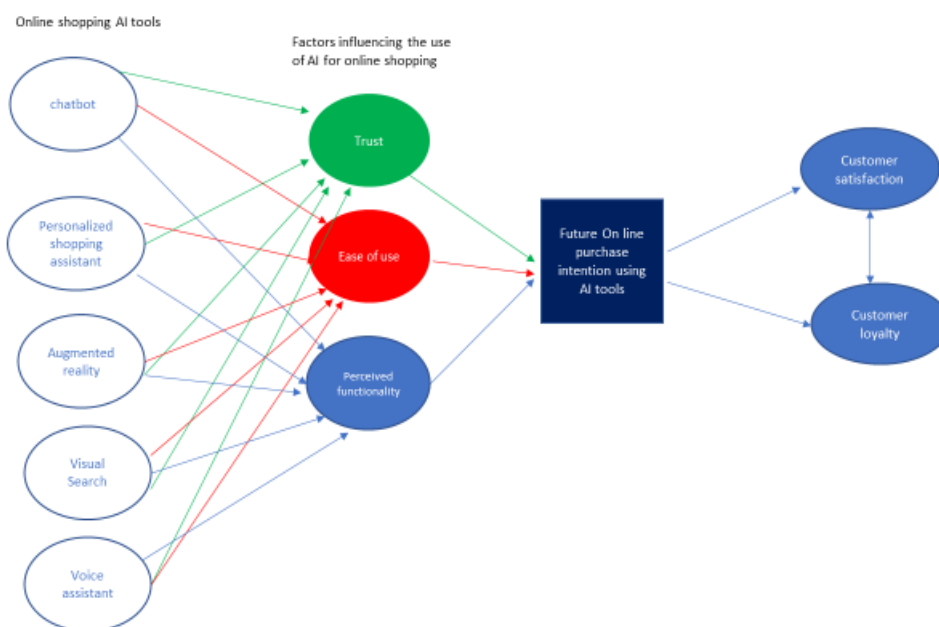
Theoretical Model

Figure 1

Methodology

The study has been carried out with an empirical, quantitative, and descriptive nature. 250 surveys have been completed online during the month of January-February 2022 in Urban China. The online survey was created using the Survey Monkey platform. Convenience sampling supported with snowball technique was deployed and the respondents had to be between the ages of 18-40 and regular users of online shopping tools and platforms. Data collected was manually coded and ran through the SPSS program for Statistical analysis.

To answer the research questions, descriptive statistics, and correlation analyses were used to conclude with Central Limit Theorem indicators and verify the significance of correlation between variables identified in the conceptual model.

Results

Descriptive

1. Based on the survey conducted, all but 1 respondent responded affirmatively to the poll question of using an online medium for shopping. 98 % of folks confirmed that they do indulge online shopping activities across platforms like Amazon, Alibaba, and others.
2. Dividing the above population based on their gender, a staggering 67% of respondents were females. This gives us a clear insight that two-thirds of the population that surfs online for shopping purposes is female.
3. There is, however, a wide variety of folks from different age groups that indulge in online shopping activities. While 7% of the folks are below the age of 24, more than 50% of the majority belong to the age group of 25-

34. It appears that this medium of shopping is hugely popular among young adults. It is to be noted that folks of the age group 35-44 do shop around on online platforms contributing to a significant 37%.
4. There are 37.25% of people earning more than CYN 100,000 per annum. Moreover, the majority of the respondents (68.62%) earn more than CYN 75,000 per annum. Only 3 people earned less than 35,000 CNY annually.
5. In the survey, 37 out of 51 people are well-educated and hold either University Graduates or master's or Doctorate degrees. Others who have education till Secondary school or a high school comprise 27% of the total responses received from the survey.
6. More than 85% of people from China live in Tier 1 and Tier 2 cities including Shanghai, Beijing, Chongqing, Tianjin, Guangzhou, Shenzhen, Chengdu, and Nanjing. 4 people live in Tier 3 that includes cities Wuhan, Xian, Hangzhou, and Dongguan. 1 person lived in a Tier 4 city whereas the rest 3 people lived in other cities in China.

What are the benefits of purchasing a product offline?
Hypotheses Tested:

Hypothesis 1:

Ho: Being exposed to AI applications does not cause further intention to use

H1: Being exposed to AI applications does cause further intention to use

Initially, we tried to identify if the consumer is an online shopper or not. From the below figure 1, we can conclude that most people do online shopping in China.

AI Application Tools	Number of consumers using AI Applications	Consumers Further intention to use?	Sig Level	Further intention to use?
Chatbots	77	76	0.26	NO
Virtual assistant devices (Alexa, Echo, Siri)	109	108	0.074	NO
Personalized product recommendation	135	132	0.354	NO
Personalized offers with Augmented reality view	94	90	0.45	NO
Smart Displays	41	40	0.769	NO
Aisle kiosks	6	5	0.056	NO

Table 1

From the above table, we can conclude that all the tools were not further intended to be used in the future because the significance level is less than 0.05. Only one tool, **Virtual Search Solution** view can help retailers to retain the consumers.

Hypothesis 2:

H0: Using an AI application does not increase customer satisfaction

H1: Using an AI application does increase customer satisfaction

To investigate the link between particular AI applications and consumer happiness, a chi-square test was applied.

AI Application Tools	Number of consumers using AI Applications	Number of consumer agrees with AI application increases customer satisfaction	Significance Level	Increases customer satisfaction
Chatbots	77	50	0.101	NO
Virtual assistant devices (Alexa, Echo, Siri)	108	63	0.024	YES
Personalized product recommendation	134	73	0.188	NO
Personalized offers with Augmented reality view	93	54	0.254	NO
Smart Displays	115	66	0.16	NO
Aisle kiosks	6	2	0.529	NO

Table 2

From the above table, we can conclude that most of the tools were not satisfied as we could also observe the significance level is less than 0.05. Furthermore, the applications that boost Customer Satisfaction Are **Virtual Assistant devices**.

Hypothesis 3

H0: Using AI applications does not increase customer loyalty

H1: Using AI applications does increase customer loyalty

AI Application Tools	Number of consumers using AI Applications	Number of consumer agrees that AI application increases customer loyalty	Significance Level	Increases customer loyalty
Virtual assistant devices (Alexa, Echo, Siri)	108	59	0.264	NO
Personalized product recommendation	135	73	0.732	NO
Personalized offers with Augmented reality view	93	57	0.438	NO
Smart Displays	41	31	0.009	YES
Aisle kiosks	6	2	0.453	NO
Virtual search solution	114	67	0.491	NO

Table 3

From the above table, we can conclude that most of the customers were not loyal to particular AI tools as we could also observe the significance level is less than 0.05. However, people are loyal to only one AI tool and that is **Smart Display**.

Hypothesis 4
H0: The level of usage of the application is not related to customer satisfaction

H1: The level of usage of the application is related to customer satisfaction

Please check the Artificial Intelligence tools you have used while shopping on line?ChatBots * I am a more satisfied customer when I shop on line with artificial intelligence tools Crosstabulation

Count

		I am a more satisfied customer when I shop on line with artificial intelligence tools					
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Please check the Artificial Intelligence tools you have used while shopping on line? ChatBots	No Chatbots	14	29	49	58	22	172
	Chatbots	5	7	15	38	12	77
Total		19	36	64	96	34	249

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.763[a]	4	.101
Likelihood Ratio	7.906	4	.095
Linear-by-Linear Association	4.413	1	.036
N of Valid Cases	249		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.88.

Table 4

Looking at the results of the chi-square in Table 4, we can see the p-value is **0.101** which is greater than **0.05**. Ho is therefore

Hypothesis 5
H0: The level of usage of the application is not related to customer loyalty
H1: The level of usage of the application is related to customer loyalty

Chi-Square Tests for Chatbots			
	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	**8.062[a]**	**4**	**0.089**
Likelihood Ratio	**8.484**	**4**	**0.075**
Linear-by-Linear Association	**1.086**	**1**	**0.297**
N of Valid Cases	**249**		

Table 5

The above table shows the Chi-sq test result, we can see that the significance value is **0.89** which is higher than the critical value of **0.05**. From the above interpretation we have to accept our null hypothesis that is level of usage of application 1 is not related to customer loyalty.

Some other hypotheses analyses revealed the follow**ing results**:
- There is a direct relationship between income and online purchases.
- The level of income is related to online purchases.

For shopping effectiveness, the following hypotheses have been tested
H0: AI-powered applications do not enhance shopping effectiveness
H1: AI-powered applications enhance shopping experience effectiveness.

Chat Bots Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.244[a]	4	.010
Likelihood Ratio	13.944	4	.007
Linear-by-Linear Association	6.012	1	.014
N of Valid Cases	251		

Aisle Kiosks Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.239[a]	4	.182
Likelihood Ratio	4.036	4	.401
Linear-by-Linear Association	2.238	1	.135
N of Valid Cases	251		

Table 6 & 7

Personalised Product Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.663ᵃ	4	.155
Likelihood Ratio	6.729	4	.151
Linear-by-Linear Association	1.318	1	.251
N of Valid Cases	251		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.78.

Virtual Assistant Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.531ᵃ	4	.821
Likelihood Ratio	1.525	4	.822
Linear-by-Linear Association	.002	1	.964
N of Valid Cases	251		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.18.

Table 8 & 9

Smart Display Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.394ᵃ	4	.003
Likelihood Ratio	21.719	4	.000
Linear-by-Linear Association	15.767	1	.000
N of Valid Cases	251		

Personalized Offer Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.287ᵃ	4	.864
Likelihood Ratio	1.338	4	.855
Linear-by-Linear Association	.542	1	.462
N of Valid Cases	251		

Table 10 & 11

Tables 6 through 11 show that the p-value for **smart displays** and **chatbots** is lower than 0.05 which means we are going to accept the alternative hypothesis that these AI tools enhance customer experience. It can also be concluded that other AI tools are not enhancing customer experience because their P-value is higher than 0.05 which resembles accepting the null hypothesis.

For online security quests the following hypotheses have been tested

H0: Usage of personal data does not influence intention to use AI applications when shopping online.
H1: Usage of personal data does influence the intention to use AI applications when shopping online.

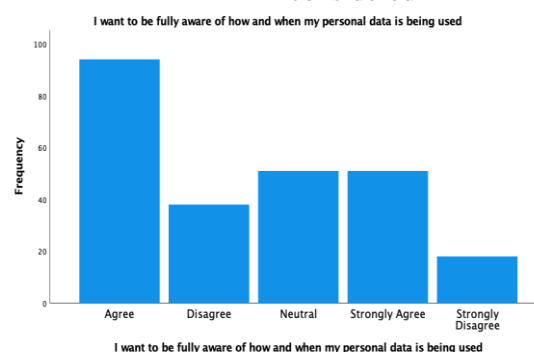Initially, the frequencies of each attribute have been considered

Figure 1

Figure 1 shows that mostly people in China whom we surveyed want to know how their data is being used.
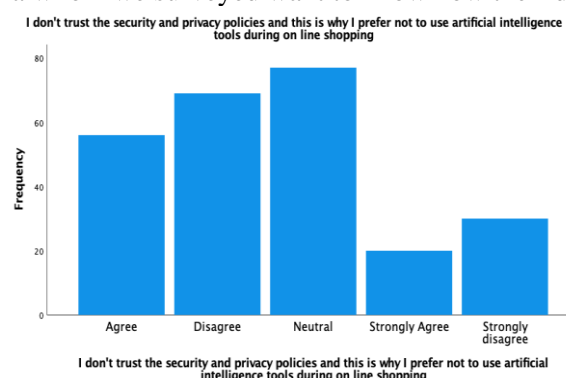

Figure 2

Next Figure 2 reveals that the people of China do not trust any security or policy, that is the reason, they don't like to use AI applications during their online shopping. Here, we observe that most people are neutral and disagree with this fact.

Finally, Spearman's correlation was run and indicated the following result.

Correlations

			First Variable	Second variable
Spearman's rho	First Variable	Correlation Coefficient	1.000	.130[*]
		Sig. (2–tailed)	.	.039
		N	251	251
	Second variable	Correlation Coefficient	.130[*]	1.000
		Sig. (2–tailed)	.039	.
		N	251	252

*. Correlation is significant at the 0.05 level (2-tailed).

Table 12

The significance value is 0.039 which is smaller than 0.05 and the null hypothesis is rejected. personal data does influence the intention to use AI applications when shopping online.

Further transparency of retailers and its impact on consumer intention to use AI in the future was investigated and the results indicated that transparency of retailers on the use of personal data of online shoppers does not influence consumer intention to use AI in the future when shopping online.

Conclusion and Recommendations

The survey results confirmed parts of the model. First, it answered the intention to use it further. There is strong evidence that Chinese consumers are willing to use Artificial Intelligence (AI) applications in online retail. The survey result showed that 94% of respondents answered "Yes" to using AI tools in online shopping further (Question 17). The fact is understandable as China is the largest online retail market in the world. Also, Chinese consumers are familiar with online shopping in their daily lives, regardless of rural or urban areas where they live. Thus, Chinese consumers are demanding more advanced experiences.

Second, the survey also answers part of the reasons for their intention. Several factors were asked to measure the scale of customers' agreement, such as AI tools allowing customers to find the best deals and enhance their shopping effectiveness. These factors accordingly explain their choice of future use.

Third, the level of customer satisfaction and loyalty when using AI tools in online retail is also confirmed. 44% of customers said they were satisfied, and 54% said they were more loyal (Question 13). This level of satisfaction and loyalty is only for AI tools in general, not for any specific applications.

Each AI application has different impacts on customer experience and loyalty.

Nevertheless, the previous research has not yet addressed these differences and measured the level of impact for each AI application. It is helpful to further examine to what extent each AI application impacts customer satisfaction and loyalty separately. Some AI tools might have positive effects, but some may result in customer discomfort. In those cases, there is a research need to examine the reasons for the inconvenience so that online retailers and marketers can adjust how to approach customers and improve their sales performance. Therefore, we propose two areas to further research.

The first proposal is about the impacts of Augmented Reality (AR) and Virtual Reality (VR) on customer experience and loyalty. AR and VR are emerging technologies among AI-powered tools that allow online shoppers to feel and encounter products or services without physical touch. 31% of respondents in the survey said they had used AR in online shopping. Together with the growth in the metaverse world, AR and VR are attracting much interest from consumers.

Future research can address the following questions:
- To what extent do AR and VR tools affect the Chinese customer experience in online retail?
- To what extent the customer experience of using AR and VR being different between product categories?
- Are Chinese customers more interested in online sales with AR and VR?

The second proposal is the impact of chatbots on customer experience and customer loyalty. Chatbots are AI-powered tools that support online retailers to answer queries rapidly whenever shoppers need assistance during their online shopping journey. Chatbots are popular tools. However, only 33% of respondents said they had used it during online shopping in the previous survey. There is a need for further research to understand the reasons behind and examine better approaches for online retailers.

Future research can address the following questions:
- To what extent are Chinese customers satisfied with chatbot service?
- To what extent does chatbot service impact customer loyalty in online retail in China?
- What are the reasons for the comfort experience when interacting with chatbots?
- What are the reasons for the discomfort experienced when interacting with chatbots?

In conclusion, parts of the current model have not been solved by the survey. Further research needs to focus on the impact of each AI application on customer experience and customer loyalty to better understand Chinese online shoppers.

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