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AN INVESTIGATION OF CHINESE CONSUMERS' USER EXPERIENCE ON APPs FOR DIGITAL HERITAGE COLLECTIONS

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Abstract:

The digital cultural and creative industry is developing very rapidly, however, the research on its consumer user experience has not received much attention. This study aims to investigate Chinese consumers' user experience with digital heritage collection apps and examines whether they differ by gender, age, and education level. This study adopts a random sampling survey and collects 1587 questionnaire data using the scale adapted by the researcher. The collected data were analysed using SPSS 26. The results found that the overall user experience score of consumers is not high (3.52), the sensory experience is significantly higher than other experience, and the average value of innovation experience is the lowest. The difference analysis data presented that gender has no significant difference in consumers' user experience, but age and education level have significant difference. Additionally, the researcher also proposed three strategies from the perspective of product design to improve consumer user experience.

Keywords:

Digital Heritage Collection, APPs, Chinese Consumers, User Experience.

Introduction

Liang and Chu (2019) pointed out that cultural and creative industries have shown a strong growth momentum in the global economy and cultural fields in most developed countries. The

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state of digital assets and cultural consumption reveals two crucial aspects of the future of cultural consumption. On the one hand, consumers demand new types of cultural products, and on the other hand, digital cultural products are modern methods that can activate cultural heritage (Lu, 2020). With the continuous emergence of new technologies, methods, and forms of digitalization of cultural relics, digital museum collections have become popular, narrowing the distance between cultural relics and modern life and allowing cultural heritage to "live" in a new form (Shi, 2022). "The 14th Five-Year Plan for the Development of the Digital Economy" highlights the acceleration of digital industrialization, which requires a focus on integrating digital technologies and their application across various sectors. This approach aims to facilitate cross-border innovation among industry companies, platform companies, and digital technology service providers. The development of digital museum collections companies is a prime example of the national drive towards cross-disciplinary integration and innovation, as advocated in the Plan (Li, 2022). Modern cultural consumption requires cultivating a cultural preservation attitude to a greater extent than traditional cultural consumption. This includes using various information and communication technology devices better to understand national heritage culture and the natural environment. Addis et al. (2015) state that "new technologies that stimulate all the individual senses can be used to recreate information and content in both educational and entertainment contexts."

Digital heritage collections are a digital-cultural assets (Li,2022). The cultural heritage protection unit conceives digital heritage collections based on internet thinking, uses the internet and blockchain technology for digital production, and the transaction and storage of heritage collections are entirely online. Compared with traditional cultural products, this is the basis for the added value of encrypted digital cultural heritage. At the same time, encrypted digital cultural heritage is easier to trace and identify copyrights. The characteristics of blockchain technology transactions make it easier to anonymize buyer information, and liquidity will be improved to a greater extent. Therefore, at the transaction level, encrypted cultural heritage is better than traditional heritage has a higher premium and will bring additional economic value (Gu, 2022). Gu (2022) pointed out that digital heritage collections can be considered a brand-new cultural innovation product based on digital innovation of existing cultural heritage and copyright protection using blockchain technology, to achieve public accessibility of cultural heritage and economic value.

According to Hsiao & Shen (2023), use the blockchain to carry out safe pre-processing of digital cultural relics such as 3D scanning and holograms, and create and collect digital heritage based on DAO to form a complete protection system and improve the protection level of historical cultural heritage and its derivative cultural content derivative works based on heritage cultural innovation sold in the form of digital collections are permanently open online, and public preservation of works does not constitute infringement. All users can design and publish derivative works, which will be collected in a digital museum. Derivative works work transactions are carried out on the chain, and the rights of creators are largely protected (Zeilinger, 2018). Therefore, online digital heritage collection is an inevitable development trend of the future digital cultural economy.

User experience refers to the overall effect perceived by users when interacting with products or services, an essential concept in human-computer interaction design (Datig, 2015). In the field of interaction design, Forlizzi and Ford (2000) stated that experience comes from the interaction process between people and products, which is the degree to which the product is perceived and understood by users during this process, including the user interface of the

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product, whether the product function is complete and easy to use—direct and indirect psychological feelings during operation and use, etc. In interacting with products, user experience helps evaluate the usability and emotional satisfaction of products or services (Kim et al., 2015). Wang et al. (2020) pointed out that user experience positively affects users' trust and satisfaction with the platform by studying the usage behaviour of mobile APP users. The study by Zheng et al. (2015) found that a good user experience is a significant sustainable competitive advantage, improving user satisfaction and trust and motivating users to continue using. According to Zhu, Zha, and Yan (2020), A good user experience helps users have an encouraging experience when experiencing any system or product, which drives one of the most salient aspects of a product, critical to its success.

China has invested greatly in digital innovation and the protection of cultural heritage. Furthermore, companies have made great efforts to develop many apps for digital heritage collections. However, research pays little attention to the user experience of these apps in China. Therefore, this study aims to determine user experience feedback from consumers of digital heritage collection apps. The research results can provide a basis for enterprises, technical staff, and the government to understand consumer feedback and take necessary intervention measures.

The research questions are as follows:
1. What is the user experience level of digital heritage collection apps consumers?
2. Does digital heritage collection apps consumers ' user experience differ according to gender, age, and education level?
3. What are the suggestions for improving the digital heritage collection apps?

Research Design

This study aims to investigate the level of user experience of digital heritage collection apps for Chinese consumers and examine whether consumers' gender, age and education level have difference on user experience. The survey design (descriptive method) was used by the researcher in this study.

Research Object

The Chinese market has nearly dozens of digital heritage collection for consumers, such as TOPNOD, Huan-he, IBOX, etc. These apps have similar functions and content, so the researcher chooses TOPNOD as the research object. TOPNOD is an application based on ant chain technology that integrates digital collection, collection, viewing, and sharing. It has distinctive literary characteristics. Users can browse the digital cultural and creative digital cultural relics on the APP. This digital culture and creativity are exquisite and retro. H.D. digital technology allows digital culture and creative vision to be actual. Users can create an account and then use it, and they can repeatedly browse the static images of digital cultural, creative, and 360 °dynamic rotation images. When users buy, they can experience A.R. experience, digital exhibition halls, generated avatars, 360 ° appreciation, and blockchain certificates, as shown in Figure 1.

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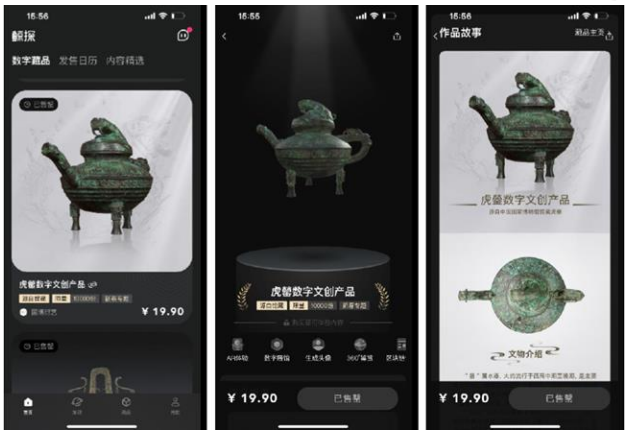

Figure 1: The price, content and function of digital cultural and creative products in TOPNOD

Sample / Participants

Participants in this study are users of the digital heritage collection app (TOPNOD) from China. Table 1 presents the demographics of the sample group.

Table 1: Summary Of Demographic Characteristics Of Participants

Variables	Characteristics	N	%
Gender	Male	990	62.4%
	Female	597	37.6%
Age (Year)	20-35 (Low)	427	26.9%
	36-50 (Mid)	813	51.2%
	≥51 (High)	347	21.9%
Education Level	High School	195	12.3%
	Undergraduate	702	44.2%
	Postgraduate	690	43.5%
Total		1587	100%

Instrument

The user experience scale used in this study was adapted from Huang et al. (2017) and Prebensen & Rosengren (2016). It has 17 items in total and uses the Likert five-degree notation method. The measurement items of digital heritage collection app user experience include sensory experience (4 items), functional experience (3 items), emotional experience (3 items), associated experience (3 items), and innovative experience (4 items). Experts in the field are able to determine the validity of the scale to some extent (Gozum and Hacihasanoglu, 2009). Therefore, three experts evaluated the validity of the scale has t has sufficient reliability.

Data Collection And Analysis Process

The digital heritage collection app (TOPNOD) users answered all the questions on the scale. During the process of data collection, the researchers ensured that the participants were informed about the purpose of the study, emphasized the voluntary nature of participation in the survey, and guaranteed confidentiality of the collected data. The entire data collection process took approximately 5 minutes. A total of 1600 questionnaires were received in this study, 13 of which were invalid, and the remaining 1587 valid questionnaires were analysed.

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Data were analysed using percentage, mean, standard deviation, independent group t-test, and one-way ANOVA.

Results

Table 2: Statistics of Consumer Digital Heritage Collection app User Experience

Dimension	Item	Mean	SD	Min	Max
User experience	17	3.52	0.48	2.00	5.00
Sensory experience	4	3.58	0.61	1.25	5.00
Functional experience	3	3.56	0.68	1.00	5.00
Associated experience	3	3.48	0.70	1.00	5.00
Emotional experience	3	3.55	0.68	1.00	5.00
Innovative experience	4	3.44	0.70	1.25	5.00

According to Table 2, for user experience, the mean score is 3.52. In terms of sensory experience, the mean score is 3.58. The dimension of functional experience has a mean score of 3.56. Similarly, the mean scores for associated experience, emotional experience, and innovative experience are 3.48, 3.55, and 3.44, respectively. Except for associated experience and innovation experience, the scores of other dimensions are higher than the average score of the overall scale.

Table 3: Statistics For Differences In User Experience Based On Consumer Gender

Dimension	Male		Female		t	p
	Mean	SD	Mean	SD		
Sensory experience	3.59	0.62	3.56	0.59	-0.781	0.435
Functional experience	3.58	0.67	3.53	0.70	-1.621	0.105
Associated experience	3.48	0.70	3.48	0.70	0.007	0.994
Emotional experience	3.55	0.68	3.55	0.70	0.038	0.970
Innovative experience	3.46	0.70	3.40	0.70	-1.626	0.104
User experience	3.53	0.48	3.51	0.47	-1.124	0.256

Table 3 presents the mean of male consumers (3.53) is higher than that of female consumers (3.51). Except for the similar mean values of associated experience and emotional experience, the average scores of male consumers in the other three dimensions are higher than those of female consumers. The t-test result finds that gender have no significant difference in the user experience of consumers' digital heritage collection apps ($P>0.05$).

According to Table 4 below, the average user experience score of consumers in the low age group is 3.41, which is lower than the other two groups. The middle age group has the highest average value of 3.58, followed by the high-age group (3.54). From the perspective of various dimensions, the functional experience score of the low age group is the highest, and the sensory experience average value of the middle age group and the high age group is the highest. The three groups have the lowest average value in the dimension of innovation experience. One-way ANOVA tests whether significant differences exist between consumers' user experience and age structure. According to the test results, age significantly impacts user experience ($p<0.05$).

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Table 4: One-way ANOVA Statistics For Differences In User Experience Based On Age

Dimension	20-35 (Low)		36-50 (Mid)		≥51(High)		f	p
	Mean	SD	Mean	SD	Mean	SD		
Sensory experience	3.44	0.58	3.64	0.64	3.61	0.54	16.704	0.000
Functional experience	3.46	0.66	3.61	0.69	3.58	0.67	6.634	0.001
Associated experience	3.35	0.66	3.54	0.73	3.49	0.65	10.550	0.000
Emotional experience	3.44	0.65	3.60	0.73	3.58	0.61	7.900	0.000
Innovative experience	3.34	0.66	3.49	0.74	3.44	0.64	6.246	0.002
User experience	3.41	0.44	3.58	0.51	3.54	0.42	18.266	0.000

As shown in Table 5, consumers with undergraduate education have the highest average user experience (3.58), followed by graduate students (3.55) and high school students (3.25). The user experience of high school students is lower than the other two in all five dimensions. In contrast, undergraduate students are higher than graduate students in all dimensions. Undergraduates and postgraduates have the lowest scores on innovation experience, 3.48 and 3.47, respectively. One-way ANOVA data show that user experience significantly differs among consumers with different education level.

Table 5: One-way ANOVA Statistics For Differences In User Experience Based On Age

Dimension	High School		Undergraduate		Postgraduate		f	p
	Mean	SD	Mean	SD	Mean	SD		
Sensory experience	3.28	0.59	3.64	0.60	3.60	0.60	28.445	0.000
Functional experience	3.27	0.68	3.64	0.64	3.56	0.70	23.083	0.000
Associated experience	3.24	0.66	3.53	0.68	3.50	0.71	14.231	0.000
Emotional experience	3.26	0.67	3.60	0.66	3.59	0.69	21.413	0.000
Innovative experience	3.20	0.67	3.48	0.68	3.47	0.71	13.564	0.000
User experience	3.25	0.46	3.58	0.46	3.55	0.48	39.550	0.000

Discussion and Conclusion

The research results show that the user experience of China's digital heritage collection app is not high, among which the average score of sensory experience is the highest, and the innovative is the lowest. The difference analysis results show that there is no difference in user experience in the variable of consumer gender, but there are significant differences in age and education level. Currently, digital heritage collections have great potential. On the one hand, information about cultural relics and heritage should be preserved in weighty history books and enter people's daily lives. Digital collections can bring relics to life and bridge the gap between cultural artifacts and the public. On the other hand, digital collections support cultural and creative development and play an essential role in promoting cultural relics, museum culture, and marketing. Digital collections are an effective means of promoting cultural and historical knowledge. With the strengthening of industry standards, digital collections will not be just a temporary trend but will have even broader prospects in the future. Therefore, the researcher proposes the following suggestions for improvement:

1. Focus on user needs, and balance professionalism and entertainment.

In developing digital heritage collection apps, the core role of user needs should be fully recognized, and development should be centred around user experience. Technology is just a way to solve problems and should be used to showcase design solutions, not to replace content. Regarding app design, a balance should be struck between professionalism and entertainment.

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2. Enhance multi-sensory interactive experiences and deepen immersion.
To provide users with a more comprehensive understanding and a fully immersive experience and to create a multi-dimensional narrative and aesthetic, users' senses should be mobilized as much as possible. A single digital model display, image, or text explanation will lower user expectations and dampen their enthusiasm. In response to this situation, the app design should, first and foremost, be user-friendly and the operation and interaction should conform to users' natural cognition and habits.

3. Increase user participation and strengthen the connection to daily life.
The connection and similarities between cultural heritage and modern life should be sought out and demonstrated, helping viewers " pull" from daily life to associate with cultural heritage content and think about topics they may not have touched. To achieve this, app developers or government departments can leverage their strengths to design and plan interactive experiences or activities that are engaging and shareable. The purpose of participation is to help users create new meaning based on their cognition, and the design of the experience should increase user participation. Good participation experiences not only enhance the playability of the application and promote the interaction between online and offline experiences but can also provide beneficial insights for daily life.

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