

Planning of Chinese National Musical Instrument Museum Based on Digitalization

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Objectives: With the advent of the digital era, digital information technology has been widely used in various fields of society, and digital museums have also been born one after another. **Methods:** Its birth has brought unprecedented impact and challenges to traditional museums. **Results:** In order to adapt traditional museums to the development of the times, this study integrates digital methods with the planning of the Chinese National Musical Instrument Museum, and proposes three ways to improve the interaction between the museum and visitors, the information of the museum, and the entertainment and gamification of the museum. The museum has been planned and verified by examples. **Conclusion:** It is hoped that through this study, we can make a certain reference to the planning of our national musical instrument museum.

Keywords: digitalization; museum; regulation; musical instruments

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The museum was introduced to China at the end of the 19th century by Westerners visiting China. After the museum was introduced to China, my country established the earliest batch of museums, including the Central Museum and the Palace Museum. Following the reform and opening up, so far, the number of museums in my country has exceeded 6,000, and continues to increase. The emergence and popularization of museums have broken the traditional concept of treasures in my country and played a public education function¹. However, the current construction of museums and the configuration of corresponding facilities in China are relatively backward. In recent years, the rapid development of information technology and the arrival of the digital era have brought unprecedented impacts and challenges to traditional museums. One of the most serious museums. National musical instruments are a bright pearl in the long history of Chinese

history, and it is everyone's responsibility to inherit and promote Chinese national music. Therefore, this study combines computer digital technology with the planning of China National Musical Instrument Museum, hoping to provide some reference for the planning of my country National Musical Instrument Museum.

Polo and others took Istanbul Modern Art Museum (IM) as the research object and analyzed its creative process and its potential impact on the environment. The results of the study indicate that the development of cultural investment in modern art in Turkey is mainly due to private initiatives by large industrial groups and wealthy families, and has received political support in most cases². Wu ZH and others used information technology to identify the collections in your expensive digital museum. They first described the digital construction of the museum and proposed to apply the Internet of Things technology to the construction of digital

museums. Through the museum collection management system based on RFID technology Design and smart guides provide a new way for the construction of smart museums³. Eghbal-Azar K and others believe that digital tour guides play an increasingly important role in informal learning environments such as museums and exhibitions. To determine the strategy for visitors to evaluate the information provided by digital guides, Eghbal-Azar K and others Studies have been conducted in large-scale literature exhibitions. The results of the study show that digital tour guides can predict how much visitors like different types of exhibitions⁴. Kramer RP and others examined the energy saving potential of different setpoint strategies, and used the damage function to assess the degradation risk of the collection, and used adaptive temperature criteria to assess thermal comfort. The museum was modeled by modeling methods. Simulated indoor climate and energy consumption, including heating, cooling, humidification and dehumidification. The results show that the maximum savings can reach 82%⁵. Ferdyn-Grygierek J et al. took the influence of the ventilation system of a Polish museum on energy consumption as the research object, and conducted simulation experiments with CONTAM and ESP-r computer codes. The simulation experiments established multiple areas including exhibition halls and stairs. The model and simulation results show that with the increase of the ventilation air volume, how the heat requirement increases, and the influence of air infiltration on the heat requirements of different types of ventilation systems⁶. Saikawa N and others took the contemporary museum with free appreciation path as the research object, and clarified the relationship between its path choice and audience's spatial cognition. Saikawa N and others first analyze the appreciation paths of various disciplines, and can classify the appreciation paths of various museums. Secondly, through the analysis of the characteristics of the space composition of each museum, it reveals the two major elements that encourage and hinder the path selection of museums. Finally, the "spatial comprehension"

index is used to analyze the text and pictures on the sketch map to reveal the relationship between the spatial cognition and vocabulary of each museum⁷.

It can be seen from the study of scholars at home and abroad that the planning of the Chinese National Musical Instrument Museum has received more and more attention. Scholars from various countries have studied the museum's planning from multiple angles and have achieved good results. However, few scholars plan museums from the perspective of the digital era background. This study combines the current digital era background and museum design and planning. It is expected that the Chinese National Musical Instruments Museum will keep up with the trend of the times and grasp the lifeline and time of the times. Keeping pace with each other and promoting Chinese folk musical instruments.

METHODS

Characteristics of the Digital Age

Today, with the rapid development of information technology, a large number of emerging technologies are emerging, and the speed of knowledge update has been unprecedentedly improved. The arrival of the digital era has subverted all aspects of human life. In the current era of information digitization, information has become one of the most important resources at present, and technological innovation revolves around information processing, information transmission, and information storage. The Internet was originally a computer technology that was born to ensure the security of military information, and then gradually spread to all aspects of the whole society. Eventually, computers around the world were connected through the Internet, thus opening up the information age. In the era of information digitization, people can use the network to transfer and obtain a large amount of information from all over the world. If the Internet realizes the connection between people, then the Internet of Things connects things. Cloud computing and big data, which have

become social hot topics in recent years, have greatly improved the capabilities of information processing, information transfer, and information storage. Among them, cloud computing refers to some kind of computing process that decomposes a huge data calculation program into many small programs, then processes these small programs, and finally returns the processing results to the

user. Big data refers to data collections that cannot be processed by conventional tools within a certain period of time. With the emergence of big data tools in recent years, people have been able to use these tools to mine massive amounts of big data, greatly enhancing the speed The ability to process data.

Table1
Software Usage Questionnaire

Software type	Total people	The proportion
Weibo	32	32%
Facebook	19	19%
Twitter	15	15%
Are using	34	34%

The popularity of the mobile Internet is another characteristic of the digital age. In the current society, people with mobile phones or tablets can be seen anytime, anywhere. According to a survey, the annual shipments of mobile phones and tablets have surpassed the sum of traditional desktop and laptop computers. People can quickly connect to the online world through mobile phones or tablets, which can be carried around, to obtain information, to connect with friends and family, to exchange business activities, and other activities, without being constrained by time and space. The Internet has reduced the distance between people. With the continuous connection between people and the online world, social networks are born. Whether it is Facebook, Twitter, or Weibo, they are all a type of social network. It is a network space that expresses the real life of human beings. Table 1 above is for the use of social software. Questionnaire of the situation. With the continuous improvement of information technology, the real world and the network world are no longer spaces that always exist in parallel. Through the network virtual technology, the network world can be projected into the real world. The current network virtualization technology mainly refers to multimedia

technologies such as virtual reality (VR) and augmented reality (AR). The extensive application of virtual technology has changed people's lifestyle to a great extent, and provided a platform for the coexistence of multiple ways for the spread of knowledge and the sharing of entertainment. In the past, activities such as dating, games, shopping, learning, and even work were indispensable social activities in daily life. However, with the promotion of virtual network technology, this series of activities can be used in virtual spaces, audiovisual spaces, In the digital space. Social activities in a virtual space no longer require face-to-face communication as before, but use machines as a medium, not subject to time, space, or even knowledge. Obviously, digitalization has brought great convenience to people's lives, and many activities are no longer restricted by factors such as time, space, and personal knowledge level, which effectively improves the efficiency of social activities.

New Features of China National Musical Instrument Museum in the Digital Age

The arrival of the digital era store on the one hand provides convenience for browsing museums, but on the other hand, digitalization has also brought huge impacts and challenges to

physical museums. For example, the Canadian Heritage Information Network and the Canadian Virtual Museum established by the fusion of the museum, the museum digitizes the collections in the museum, and establishes the same gallery in the virtual space as the real world. This design increases the virtual world's Authenticity. This fully virtual museum allows people to explore the mysteries of the museum without leaving home, which is very attractive to people. Therefore, to make the development of museums follow the development of the times and keep pace with the times, we can only integrate digital technology into the design and planning of museums, so that people no longer only look at exhibitions

through virtual networks, but are really attracted to physical museums. in. The traditional Chinese national musical instrument museum is mainly based on static display. People must appreciate the Chinese national musical instrument to appreciate it in the on-site museum. However, in order to make the Chinese national musical instrument museum develop better, the museum needs to be combined with modern digital technology to plan the museum It combines traditional exhibition methods with digital exhibition methods to produce new features that attract audiences. Table 2 below is a questionnaire for reasons for reluctance to go to traditional museums.

Table2
Questionnaire for Reasons for Reluctance to Visit Traditional Museum

The reason	Total people	The proportion
Children don't like it	32	32%
The atmosphere is too heavy	21	21%
Don't understand	18	18%
feel bored	39	39%

As written in the book "Digital Survival," "Multimedia is essentially interactive media." The interaction between people and objects can shorten the distance between people and objects, so the Chinese National Musical Instrument Museum in the context of the digital era needs to interact with the audience to make the audience participatory. Products that can interact with the audience can be set up in the museum to attract the audience's attention. For example, the corresponding virtual musical instrument is set next to the musical instrument in the exhibition. Visitors can understand the corresponding musical instrument more clearly by operating the virtual musical instrument. In addition to increasing the interaction between museum musical instruments and visitors, and improving the participation of the audience, the Chinese National Musical Instrument Museum in the context of the digital age should also make full

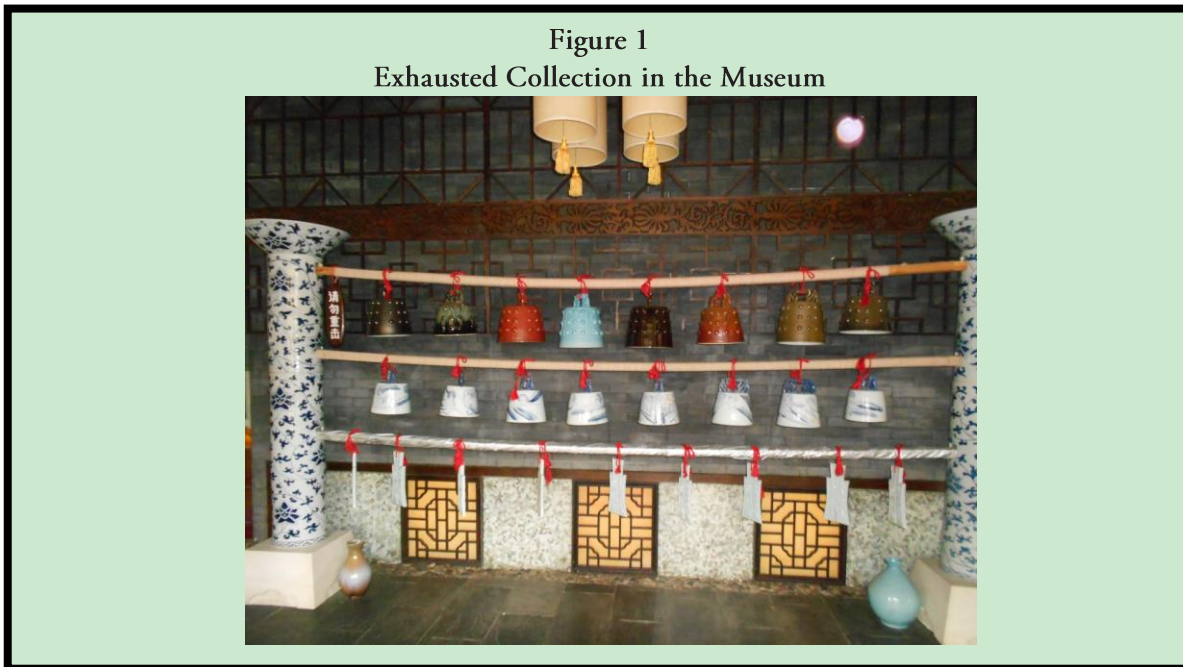
use of the information in the digital age to provide personalized services for the audience. For example, the Milan World Expo held in Italy in 2015 made full use of informatization. The Milan Expo used interactive projection, multimedia integrated turnkey, somatosensory interactive display, interactive cloud and other digital information methods to show people the correct exhibition in the digital era. the way. Similarly, this method can also be used in the planning of the China National Musical Instrument Museum. For example, before participating in the exhibition, you can use the terminal device to find out which exhibition area of the musical instrument you are interested in, and use the terminal device to guide you. In participating in the exhibition, you don't need to ask the museum staff or use the museum to provide a walkie-talkie. You can get the detailed information of the corresponding instrument by scanning the corresponding instrument with your mobile

device. You can also get the information of other instruments related to the current instrument on the terminal. And pointed out the location of the exhibition area of the corresponding musical instrument, through the combination of digital information to provide visitors with personalized services. Next is entertainment and gameplay. Most of the museums now create a solemn atmosphere, which makes the visitors who step into the museum feel a bit heavy. However, in the digital age, learning from games and learning in a relaxed atmosphere are the development trends. Therefore, when planning museums, we should conform to the current social development laws and combine culture and entertainment together. The way of display encourages the audience to enjoy the musical instruments of the Chinese nation with ease. And the audience in the museum is not only adults, but also many children who follow the parents. It is very difficult to let the children stay in the traditional museum for a period of time. Therefore, proper introduction of entertainment elements in the museum and weakening the serious atmosphere in the museum can not only comfort the child, but also attract the child's attention, so that the child can enjoy the fun of visiting the museum.

RESULTS

In this study, the plan of a national musical instrument museum A was changed to an example to study the digital planning of the museum. The museum has a display area of more than 200 square meters, and the exhibits are divided into four series. The collection has more than 100 types and a total of more than 300 objects. The earliest collection can be traced back to the Stone Age more than 7,000 years ago. Figure 1 below shows a museum The collection is full. Museum A has made full use of interactive participation, personalized information and entertainment to rectify and plan the space in the museum. In terms of interactive participation, Museum A has added digital devices such as multimedia interactive screens, interactive screens, and interactive projection lights. The interactive ground curtain equipment is located

on the ground of the museum, and the surrounding light environment is set to be dark. Visitors can interact with the ground in real time through body movements. Museum A will design the interactive ground curtain into the appearance of various folk instruments. Visitors can pass The body movement makes the musical instruments in the ground curtain produce unique sounds, and the setting of the interactive ground curtain can make people feel the romance of the fusion of technology and traditional Chinese folk music culture. Museum A has also set up a 3D projection stage in the center of each exhibition hall. Through virtual reality and projection technology, it can vividly present the picture of musical instrument performance on the stage. Visitors can select instruments and the performance of the corresponding instruments through the screen below the stage. These performances include performances in film and television plays, and performances by live instrument masters. The audience can enjoy the performance of musical instruments through 3D projection and understand the charm of various musical instruments.



In addition to using multimedia technology to enhance the interaction between the museum and visitors, the internal space structure of the museum has also been adjusted accordingly. In the context of the digital age, the internal space of the building should have the characteristics of compounding and diversification. When the musical instrument museum is in a compound state, its internal space and functions will be more diverse than before. The space of the Musical Instrument Museum can be divided into exhibition space, functional space and living space. The functional space is mainly used as a warehouse and technical space, logistics office area, and art research room. Living spaces mainly include rest areas and shops. The exhibition space is the most central area, and is generally used as an exhibition area for Chinese folk musical instruments. In the traditional museums

in the past, these three areas are centered on the exhibition area, supplemented by functional space and living space, and the three exist relatively independently. With the advent of the digital age, it is necessary to make complex adjustments in each space of the museum. Museum A will adjust the space structure of the three, and then reduce the proportion of the exhibition area, so that the importance of living spaces such as shops, rest, and catering will increase, and the proportion in the building will continue to increase. Functional spaces such as warehouses, logistic offices, and technical rooms were not open to the public in the past, but with the development of digitalization, these spaces have also begun to open to the outside world, thereby narrowing the relationship between the museum and the audience.

Table3
Comparison of Passenger Flow Before and After Museum Adjustment

Passenger flow	Before rectification	After rectification
Daily passenger flow	≈12000	≈21000
Monthly passenger flow	≈365000	≈630000
Annual passenger flow	≈4380000	≈7560000

The above table is the comparison of the passenger flow before and after the adjustment of the museum A. It can be seen that after a series of adjustment planning, the passenger flow has been greatly improved, which shows that the adjustment plan made by Museum A for the development of the digital era can attract more visitors and provide a motive force for the continuous development of Museum A.

DISCUSSION

With the rapid development of my country's society, the ideological and cultural level of the masses has also been greatly improved, and people are paying more and more attention to museums, but the existing museum configuration in my country can no longer meet the requirements of the current digital era. In view of this, this study combines modern digital technology with the museum's planning. The museum is planned through the space configuration of the museum, the configuration of modern information technology equipment, etc., and verified by the example of the national musical instrument museum planning. The verification results show that through the adjustment of the museum's interactivity, informatization, and the museum's entertainment and gamification, the attraction of the museum to visitors can be increased. It is hoped that through this study, it can provide a certain reference for the digital development of my country's National Musical Instrument Museum and play a certain role in promoting the inheritance and development of my country's national music.

Human Subjects Approval Statement

This paper did not include human subjects.

Conflict of Interest Disclosure Statement

None declared.

References

1. Eghbal-Azar K, Merkt M, Bahnmüller J, et al. Use of digital guides in museum galleries: Determinants of information selection. *Computers in Human*

Behavior, 2016, 57:133-142.

2. Ferdyn-Grygierek J, Baranowski A. Internal environment in the museum building Assessment and improvement of air exchange and its impact on energy demand for heating. *Energy and Buildings*, 2015, 92:45-54.
3. Kramer R P, Maas M P E, Martens M H J, et al. Energy conservation in museums using different setpoint strategies: A case study for a state-of-the-art museum using building simulations. *Applied Energy*, 2015, 158(NOV.15):446-458.
4. Le Y. A Study of the Exhibition Design of the Geological Museum: Exemplified by the Geological Museum of China. *Acta Geoscientica Sinica*, 2017, 38(2):304-312.
5. Polo, Jean-Francois. The Istanbul Modern Art Museum: An Urban Regeneration Project?. *European Planning Studies*, 2015, 23(8):1511-1528.
6. Saikawa N, Wakisaka K. A study on route selection and spatial cognition in the contemporary museum with a free appreciation route. *Journal of Architecture & Planning*, 2015, 80(710):831-839.
7. Wu Z H. Research on the Application of Internet of Things Technology to Digital Museum Construction. *Acta Geoscientica Sinica*, 2017, 38(2):293-298.