The Integration of Culture and Technology - A Survey of Museums in Hubei, China

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ABSTRACT

With the integration of culture and technology in modern society, museum should fully utilize information technology to enhance the function of digital service. Through the investigation on 6 museums in Hubei Province, this paper analyzes the information dissemination function, information service, digital resources and facilities, and digital display effects of the museum. By conducting investigation, suggestions can be made for the integration of museum and technology so that museums can become the front line of disseminating diversified culture and exhibiting scientific achievements.

Keywords: *Culture and Technology, Museum, Digital Resource, Exhibition*

INTRODUCTION

With the application of science and technology in different fields and rapid development of cultural industry, the trend of the cultural and technological integration is becoming imperative (Zhou, 2013). Technology can provide new approaches and philosophies to museums. In the meantime, cultural relics exhibited in brick-and-mortar venues can be digitalized into digital museums and disseminated all over the world. Literally speaking, museums become truly approachable to people by the means of information technology (Proctor, 2010). Application of technology in museums can continuously boost the integration of traditional and modern culture to higher level and greatly facilitate the propaganda of national historic culture.

RESEARCH METHOD

Under the background of integration of culture and technology, we handed out questionnaires and conducted field research regarding the function and situation of technology in the construction of museums. Investigation venues selected were 6 museums in Hubei province. Questionnaires were made randomly among visitors on site with a collection of 318 valid copies. The statistics of investigation objects are as shown in table 1. Objects engaged cover all age groups, among which most are young and middle-aged (objects aged between 16 and 40 accounts for 72.2%). Sex ratio is in balance with males narrowly outnumbered by females. With regards to education backgrounds, most objects investigated received higher education. Among them, 62.6% possessed bachelor degree or above. Therefore, the sample distribution is relatively reasonable in this investigation, and its result is sort of indicative.

Table1.*Statistics Table of Objects Investigated*

Statistical Index		Quantity(person)	Ratio(%)
Gender	Male	154	48.4
	Female	164	51.6
Age	Below 16	38	12.0
	Between 16 and 40	229	72.2
	Between 41 and 60	46	14.5
	Above 61	4	1.3
Education Background	Preliminary school and below	18	5.7
	Junior high school	26	8.2
	Senior high school（technical secondary school）	24	7.5
	Junior college	51	16.0

	College and above	199	62.6

The Enhancement of Museum's Information Dissemination Function

The application of technology has profoundly influenced and changed people's ideological concepts and lifestyles. In the same time, it is challenging the information dissemination approaches of museums. For utilizing its role of disseminating culture in the best efficiency, digital technology has become indispensable for museums. It has become mainstream to disseminate information by digital technology. As the bridge linking museums and visitors, Internet, social media and other modern dissemination approaches has boosted participation for the public.
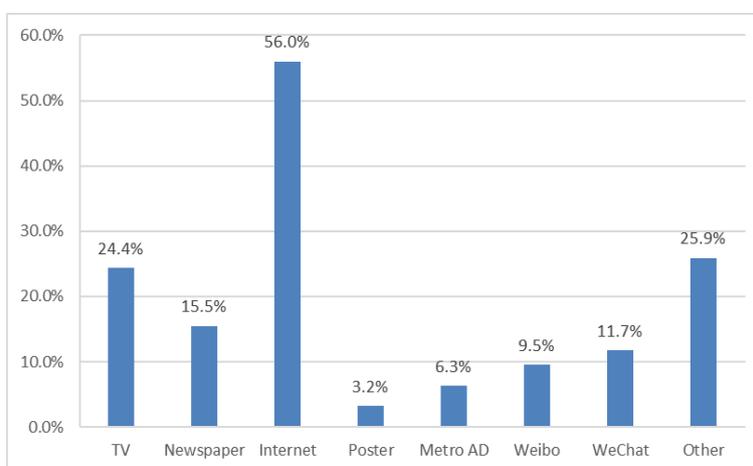

Figure1.*Approaches to collecting museum information*

Museum information consists of exhibition, lecture and other activities. Traditionally information is mainly disseminated via TV and newspaper. However, the emergence of new media changed people's approaches of collecting information. Through the investigation on people's approaches to collecting museum information as indicated in Figure1, Internet has become our major approach to collecting information, accounting for 56%. While social media We Chat and Weibo respectively account for 11.7% and 9.5%, and TV and Newspaper take up 24.4% and 15.5% respectively. We can tell that museums still need to pour more energy in paving dissemination approaches of new media and mobile media so as to build a modern dissemination system.
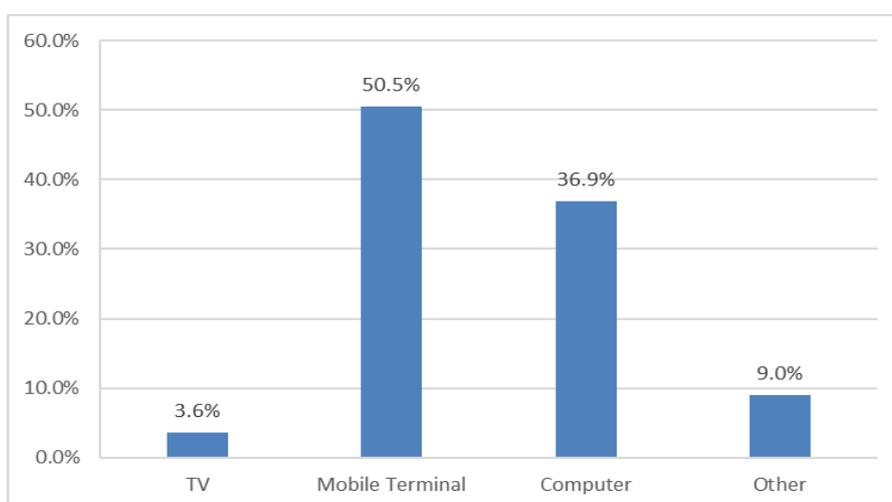

Figure2.*Ways of logging in digital museums*

Then investigation on people's way of logging in museums to obtain digital service was carried out. Its result is as shown in Figure 2. There are 50.5% visitors chose to visit digital museums via mobile terminal to obtain digital service, 36.9% visitors chose digital museums via computer to obtain digital service. With the penetration of mobile terminal and the extension

of industry application, it is trendy to extend museums to mobile platforms. People prefer to obtain museum information and service via intelligent mobile terminal which is beyond the confinement of time and space as they can be accessible to public cultural service anytime and anywhere.

The Optimization of Museum Information Service

The application of information enhanced the

Utilization of museum's cultural resources and operating efficiency and realized intelligent and scientific management of museum operation, which has brought better cultural service to visitors and expedited the sustainable development of museum business. In recent years, with the application of technology in museum, museum's digital resource has become richer and richer, digital exhibition more and more attractive and service mode more and more diversified.

Table2. *Statistic Table of Museum Digital Service*

Digital service	Respective ration
Website	38.7%
RSS push	8.3%
APP information push	15.9%
Email consultation	4.8%
Chat (QQ)consultation	6.0%
Indoor guidance system	9.8%
Audio guide	45.4%
BBS	4.8%
Multi-media display	58.1%
Digital cinema	12.4%

Through the investigation on digital service provided by museums as shown in table 2, we carried out an analysis and concluded that most museums had built their online official websites. At the same time, they also provide multi-media display and audio guidance service in the exhibition. But with the development of mobile internet, the penetration of mobile phone and the

change of people's life habits, people's attitude and ways of receiving information and service have undergone big changes. Museums are keeping the pace of internet to introduce new services, such as APP information push, RSS push, chat consultation, etc. There are 15.9% users engaged tell the museums they visited have the service of APP information push.

Table3. *Statistic Table of Museum's Information Items*

Items of information construction	Respective ratio
Increase multimedia display	55.6%
Application guidance APP	10.8%
Increase approaches to obtaining information of museum service	23.2%
Enrich resources of digital museum	38.4%
Popularize electronic guidance devices	29.5%
Enhance enjoyment of interaction	26.0%
Apply automatic ticket vending and verifying systems	16.8%
Concise information index	22.2%

Investigation statistics of items of museums' information construction in recent years are as shown in table 3. 55.6% visitors choose "multimedia display" as they can intuitionally feel the application of multimedia means in museum exhibitions. 38.4% visitors think museum resources are becoming richer and richer. 29.5% visitors hold that electronic guidance devices are becoming more popular and intelligent. And 26.0% visitors think

museum's interaction is of more enjoyment which can be attributed to the integration application of virtual reality and human-machine interaction technologies. In information era, people's activities are being transferred to virtual space. More and more people are expecting to browse and obtain museum information on mobile platforms. With so many advantages of mobile platforms, effective integration of the demands for digital museums

and the features of mobile platforms can provide great convenience for museum's information exhibition, interaction and service.

Digital Resources and Modern Facilities of Museums Are Richer

Over the course of building intelligent museums, digital resources and modern facilities are vital guarantees. Modern facilities can not only enhance the management level and operation efficiency of museums, but also provide an information transmitting and sharing platform for cultural relics exhibition, publicity and education, professional studies, academic researches and etc. On the other hand, digital resources are fundamentals for the building of digital museums. They are also precious contents to be displayed in multimedia exhibition. Museums' digitalization is to utilize digital technologies to exhibit museum's cultural heritage by digital forms and service the public with digital resources.
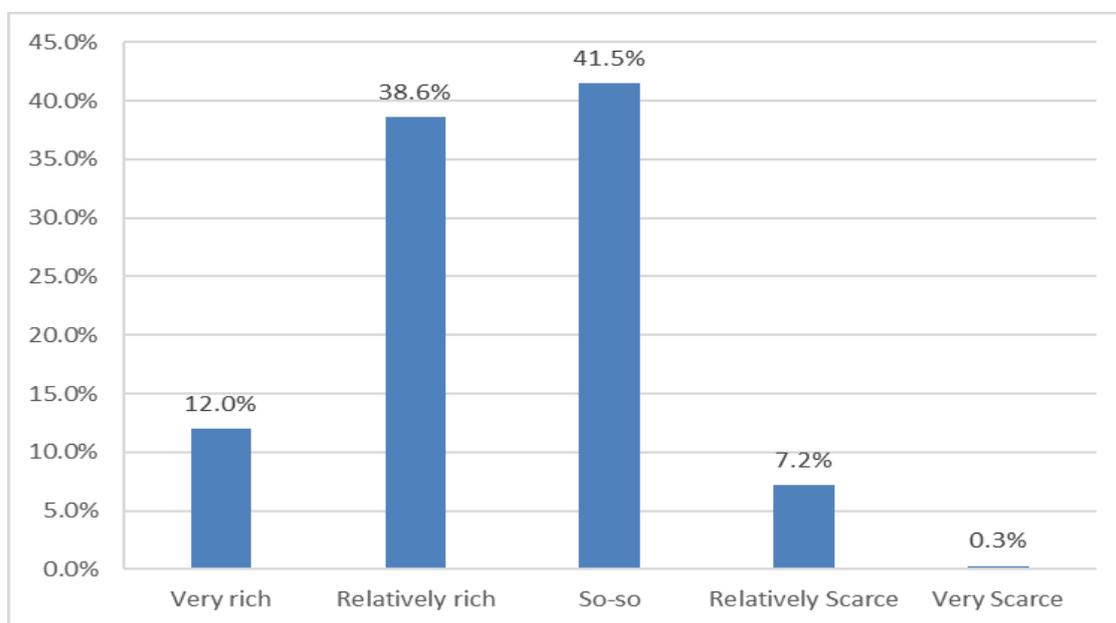

Figure3.*the richness of museum's digital resources*

In the aspect of digital resources establishment, we found all museums have digital cultural resources based on our visit and field investigation. With the help of digitalization technologies like 3D scanning, virtual simulation, cultural relics conserved in museums can be collected and stored in digital form. Over our investigation on museum digital resources' richness as shown in Figure 3, 50.6% investigation objects regard resources' richness as "very rich" and "relatively rich". While only 41.5% investigation objects regard museum digital resources' richness as "so-so". So we can tell exhibition of digital cultural resources are well recognized by most visitors.

In the aspects of museums' modern facilities establishment, electronic guidance systems have been widely applied in every museum. Analysis of the establishment situation of museums' modern facilities was carried out by investigating electronic guidance systems. Traditionally, museums' guidance systems mainly relied on electronic audio speakers and expositors, which could not help visitors to acquire further knowledge. However, intelligent guidance systems can offer location navigation and route planning by locating technology and display exhibits via multimedia information like texts, audios, videos. Meanwhile, intelligent guidance systems can collect visitors' information via cell phones and send information pushes according to data mining, in which case it will realize easier and more efficient management for museums.

Investigation was conducted on feedback of visitors who used museum electronic guidance devices. In this investigation, assessment was made by Likert scale. The maximum score is 5. Higher score stands for better feedback. Electronic guidance devices score 4.01 on "convenience degree of use", 4.02 on "intelligibility of introduction audio", 4.03 on "accuracy of introduction content and collection's positioning" and 3.87 on "elaboration degree of introduction content". In a word, visitors are relatively satisfied with electronic guidance devices. But there still is big space to make improvement in elaboration

degree and depth of introduction content. Museums should make full use of modern technology to present themselves more efficiently on the basis of excavating cultural connotation of collections.

Table4. *Review Table of Museums' Digital Display Devices*

Review of digital display devices	Respective ratio
Convenient in use, intuitional and conspicuous	47.6%
Attractive to the public and rich in content	55.9%
Not suitable, just like ornaments	11.7%
Interface definition is not high enough	4.4%
Touchscreen is not agile	10.2%
Exhibition content is too simple	18.7%

With interactive multimedia display and photo acoustic effects being applied in exhibition, facilitation of digital display device also influence visitors' experience. Visitors' reviews of digital display devices are as shown in table 4. Visitors who think digital display devices are "attractive to the public and rich in experience" takes up 55.9% and visitors who think electronic display devices are "convenient in use, intuitional and conspicuous" takes up 47.6%.

Effect of Museums' Digital Exhibition

Exhibition is one of museums' key works. The exhibition style directly affects the user's visit experience. Nowadays, the digital exhibitions are more multivariate and interactive as people's habit of receiving information changes. Museums are paying more attention to visitors' experience. Traditional exhibitions mainly depended on real objects combined with text description. Visitors were greatly confined in obtaining related knowledge. So it was hard for museums' resource to be utilized efficiently. But the application of digital technology has eliminated this kind of confinement. Visitors now have the chance to make deeper interaction with exhibits, which can boost visitors' involvement.

Table5. *Statistic Table of the Approach*

The approach to obtaining knowledge in museum	Respective ratio
Real objects+ automatic audio speaker	30.2%
Real objects + expostor	47.2%
Real objects+ interaction system	28.3%
Real objects+ multimedia display	51.3%
Others	1.6%

We investigated visitors on the best approach to obtaining knowledge during their visit, results are as shown in table 5.Visitors who choose the approach of "real objects + multimedia display" takes up 51.3%, visitors who choose the approach of "real objects + expositor" takes up 47.1% and visitors who choose the approach of "real objects+ automatic audio speaker" only accounts for 30.2%. Visitors prefer to enjoy museum exhibitions with multimedia technology engaged, hoping to receive all information exhibited via vision, audio, etc.

Table6. *Statistic Table of Need-to-be-optimized Aspects of Technology Applied in Museum Services*

Need-to-be-optimized aspects	Respective ratio
Display technology needs to be upgraded to make virtual display more real	36%
Interactive display needs to be enhanced	35%
Digital construction of collections needs to be optimized and museums' website contents needs to be enriched	27%
Others	2%

Judging from the investigation on need-to-be-optimized aspects of technology applied in museum services as shown in table 6, 36% visitors think display technology still needs to be optimized and virtual display should be more real, while 35% visitors think interactive display needs to be enhanced. It demonstrates museums should carry out further study on the deeper

integration of modern information technologies and museum applications in future exhibition process.

CONCLUSION

In information era, technology has brought both opportunities and challenges to museums' service modes (Bakhshi,2012). Brick-and-mortar museums should eye much more about applications of high technologies. By high-tech multimedia devices, premium display and spectacular virtual scenes, museums will draw intense interests of experiencing and deliver more comprehensive and elaborate cultural exhibition to visitors (Fan, 2016). Therefore, firs of all, museums should realize their top priority is digitalization and take advantage of new technologies and means to escalate overall level of the integration of culture and technology. Second, by establishing exhibition platform of museums' digital resources, it is feasible to cover all terminals of digital service, in which case education, culture and entertainment services in different forms like digital exhibition and interactive experience can be delivered to the public. Last, as a cultural transmission and education platform in information society, museums should aim at meeting visitors' demands and improving service quality in future.

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