A Study on the Paradigm Shift in Exhibition Culture Facilities by the Smart Device Technologies

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Abstract

This study deals with the activation of mobile technology which enables audiences to make a two-way interaction with the cultural facilities and to grant a newer concept of exhibition culture facilities. In other words, the combination of personal mobile device and IT tech would bring a new paradigm that cultural facility is not only a historical archive but also a place for education and entertainment beyond the limitation of real life. The connection between exhibition culture facilities and mobile device would result in a substantial reduction in marketing and PR cost and labor, an offer of TPO(time, place, occasion) service which increases audience accessibility, a storage of enormous amount of information and finally, the discovery of new markets and business opportunities in culture industry.

Keywords: Exhibition Culture Facilities, Museum, Art Gallery, Audiences, Mobile, Mobile Platform, Ubiquitous, IT, CT, Application

1. Introduction

A museum is a good source of original forms of culture and space of education. Due to the recent development in IT technology and the increased desire of the visitors for more interactive cultural and exhibition experience, the exhibition culture facilities nowadays are rapidly proceeding with the convergence between the existing tour programs and the IT technologies. That is, the exhibition industry today is seeing the application of the new paradigm of convergence and interaction between the culture and education in its full length.

Currently, some of the museums, old palaces, and other exhibition facilities provide temporal devices, which are high-end IT apparatus, to the visitors. But, there are many problems with their usage. The IT devices that are provided in the exhibition culture facilities are not being popular among the visitors, because they are not clean in a sanitary perspective and they break down all the times. Also, there is a limit that the contents provided are not occupied by the visitor him/herself and can be used only in the limited exhibition space. For this reason, even after a considerable investment, those facilities which have such IT devices are not putting them in efficient uses.

On the other than, the penetration rate of the smart phone into the market is sky-rocketing today. Many of the visitors to the exhibition facilities possess smartphones. The smart phones are personal belongings. So, there cannot be those issues derived from sharing the hand-held
devices. Therefore, it is necessary to provide the optimized contents to the smart phones of the visitors, as the contents are the key element of the smart phone usage. Also, the establishment of the portal system based on the mobile web which can also be a decent means of education using the valuable contents.

The purpose of this study is to suggest the necessity of the establishment, development and designing of the contents in consideration of the paradigms of exhibition due to the development of the mobile technology in order to overcome the limitations of the IT devices in the most representative of the cultural spaces, the museum.

The exhibition culture facilities, including the museums, are tourism destinations where the visitors may experience the culture in a place where the historical relics are in display. It is also a multi-dimensional educational space. But, the museums, which were a place of learning, nowadays are turning into a space of entertainment where uninhibited thinking and concepts are allowed. As such, the exhibition culture facilities are now turning into something beyond their previous limitations in terms of time and space to allow multi-dimensional approaches as a result of the coming of this new paradigm.

Therefore, the implication of this study would be the establishment of the environment where the exhibition spaces may overcome their off-line limitations and develop into a variety of cultural spaces which are open for everyone.

Table 1. The Changes in the Paradigms of Exhibition Culture Facilities

<table>
<thead>
<tr>
<th>Items Changed</th>
<th>Previous condition</th>
<th>Condition after change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in perception</td>
<td>· History : The keeping of the history and relics</td>
<td>· Tourism : A kind of tourism resource where the visitors may have a first-hand experience</td>
</tr>
<tr>
<td>Main Functions</td>
<td>· Information : Description of the relics in detail</td>
<td>· Education : A space of multi-dimensional education</td>
</tr>
<tr>
<td>Changing elements</td>
<td>· Place : Limited in time and space</td>
<td>· Culture : Various approaches beyond the limitations of time and space are possible</td>
</tr>
<tr>
<td>Expectations</td>
<td>· Refinement : Academic and knowledgable</td>
<td>· Entertainment : Uninhibited thinking and wider knowledge base</td>
</tr>
<tr>
<td>Requirements</td>
<td>· Limited provision of information from isolated, individualized facilities</td>
<td>· Provision of multi-dimensional and comprehensive real-time information on the museum</td>
</tr>
<tr>
<td>Development Direction</td>
<td>· Wait Museum : A museum that waits for its visitors</td>
<td>· Take Museum : A museum that takes lead of the visitors</td>
</tr>
</tbody>
</table>

2. An analysis on the Service Status of the Museum Applications

In this study, the museum application softwares of museums in the United States, France, the Netherlands, and Korea were studied. To be more specific, 8 overseas museums and 4 Korean museums were studied for the functions and services of their application softwares. The details of our research outcome were as follows.

2.1. MOMA – The Museum of Modern Art

The audio guides on the contents of the exhibition, schedule, and the artworks in display are provided. On a user-friendly basis, the menu is composed of (1) Calendar (exhibition info
per date), (2) Tour (audio guide on the contents on each floor and exhibition), (3) Art (searching by the artist or the artwork), (4) Info (time, location, ticket), and (5) More (photo, music), etc.

The application also features horizontal view mode, real-time information (via the Internet connection,) and real-time audio-guided tour (LBS) services. It allows the users to view the photos of the artworks in full screen and capture the image to use it as the wallpaper image. The art gallery also provides real-time audio guide. On the other hand, while the audio-voice is playing, there is a quick-time icon displayed on the screen, which is irrelevant and unnecessary information for the users. Further improvement may be possible by switching it with images of the artworks or texts.

2.2. American Museum of Natural History

The application provides the information on the displayed pieces in menus composed of (1) Directory (find exhibition, museum tours, food & shop, restroom & exits) (2) Map (3) Bookmarks, and (4) More.

The application supports horizontal view mode, searching the artworks, searching the locations, and SNS connectivity. Also, the application contributes to increase the accessibility to the facilities in the museum by providing a map and offers challenge feature to make the experience more enjoyable.

2.3. American Museum of Natural History – Dinosaurs

The application provides information on the exhibition by means of image mosaic. The application has menus including (1) Mosaic, (2) Stories, and (3) About (application info). As you click the image, further menus such as Info, Comment, and Send are available.

The horizontal view mode is provided on a limited basis, and the application features commenting on the exhibition, which can also be shared via e-mails or SNS. Each individual exhibition piece composes a mosaic image of a dinosaur, with features to view the individual exhibition or a full-view mode. It also provides a graphical composition where the images of the relics form a palace. However, there is a problem that the image breaks up when they are double-tapped while being displayed in small scales.

2.4. Louvre Museum

This application is provided by Louvre Museum, which has the largest collection of artworks in the world. The menu is composed of (1) Bookmarks (2) A Tour of the Louvre (3) Artworks (4) The Palace, and (5) Visitor information.

The application shows in horizontal view mode only. And the main menu is displayed in a coverflow format. Also, unlike other applications which use lists or icons, the users flip from one image to the next in order to navigate. The UI structure in the full screen horizontal view mode deviates from the iPhone guide, making it unique. But, it can be a problem for users who are not familiar with the horizontal view mode. The design has a classic taste, where a black background and artistic frames decorate the descriptive contents on the artworks.

2.5. Vincent Van Gogh Museum

A variety of contents on the artworks by Van Gogh as well as the personal history of the artist are provided in various methods. The contents, which are systematically organized and presented, include the letters, family, the views of the residences, and interviews with the art historians. They are organized and structured by the time and keywords.
The stories on the life of Van Gogh are provided in three different formats, which are video, data & narration, and artwork gallery. The related stories are provided once the users search the relevant keywords.

The contents are not provided by the individual exhibition items but serviced in a complex structure to convey what the life was like back then. So, it becomes a limitation when one only wishes to see the artworks of Van Gogh. But, the application is differentiated from others by going beyond providing the images and texts only contents to a variety of contents formats including audio-guide and videos.

2.6. Graphic Design Museum

The application software for the Graphic Design Museum in the Netherlands has ① Bladeren ② Plattegrond ③ Zoeken ④ Agenda and ⑤ Info in its menu.

The grid-patterned images may be moved in four directions, where the important images are located in the center. The users may also leave comments on the artworks or score them using SCOR menu. The images of the artworks may be expanded using multi-touch. The software also displays the title of the artworks when they are selected. It would be more desirable for this software to use transition designs with more impact to enhance the fun and enjoyment element of the software.

2.7. Portland Art Museum

This application is used in Portland Art Museum, which has more than 42,000 artwork in its collection, where most of them are of folk art of the indigenous tribes. The introductory photos and the schedules are displayed in the intro screen to provide enhanced accessibility.

The description of the artworks may be selected by searching through the artwork no. Also, unlike other applications, this provides video introduction of each artwork. It is believed that it would be more beneficial if the info on the ongoing exhibition is provided not only via text but also through images and videos to gain higher public awareness.

2.8. Explore 9/11 – National September 11 Memorial Museum

The application provides information on 9/11 attack-related street exhibition and videos of the actual event, of which the menu is composed of ① Tour ② Explore and ③ Timeline, etc.

The software supports limited horizontal view mode. Also, along the actual route, audio-guides and the video footage of the attack are serviced.

It would make a better software if the timeline supports the chronological presentation of the exhibition, guidance on the sequence of the exhibitions to be appreciated, captions in the audio guide, finding the current location of the viewer, and interconnection with Google Maps.

2.9. Gwacheon National Science Museum

This is the application software for Gwacheon National Science Museum, which is composed of 5 dedicated exhibition facilities of the Basic Science Pavilion, High-end Technology Pavilion, Children's Science Adventure, Natural History Pavilion, and Traditional Science Pavilion. Also, the complex includes an outdoor stella projection room, observatory, outdoor exhibition space, and the insect pavilion. The menu of the software is composed of (1) Exhibition, (2) About the Museum, (3) Info, (4) Calendar, (5) Education, (6) Gallery, (7) Photos of the Stars, (8) Twitter, and (9) QR Codes.
The main screen is served in two modes, which are list mode and coverflow mode. The application provides educational event calendar services to allow the users to find out when the desired educational event takes place. Also, the application provides higher accessibility by allowing the users to take photos and upload a post article with it as he/she visits the facility. The software also supports sharing of the contents or questions via Twitter. QR codes can also be used to help the users appreciate the exhibitions.

2.10. Incheon Metropolitan City Museum

The application contains the photos of the 50 items in the collection of the museum. It also provides an audio guide and the information on the facility and its history. The menu of the software is composed of (1) About the museum, (2) About the Exhibits, and (3) Museum Info.

As it presents the exhibits, the cover flow format is used to allow the users to navigate the information pages in horizontal mode by flipping through the pages. If the user selects one of the relics, the audio guide and the text description of the item are served at the same time. Rather than flooding the screen with information, this application provides help to the visitors with the items in the collection, as they search exhibits and navigate through the facility.

2.11. Gyeonggi Ceramic Museum

This is the application software for Gyeonggi Ceramic Museum, which is established with a view to providing, preparing, studying, and collecting data on the products from the site where the ceramic products offered to the royal family of Choseon were made.

The current limitation of the software is that it provides the contents only in texts and photos, reminding one of the crude description of the relics in a school text book, rather than providing the visitors with a comprehensive cultural experience on the pottery culture for the royal family in Choseon era. It seems that further addition of rich contents focused on a storyline would help the visitors understand the pottery art in Choseon era.

2.12. Gwangju Biennale

This application is to guide the users through Gwangju Biennale of Korea. The software provides information on the artists in each gallery, their artworks, the real-time news of Gwangju Biennale and how to get to the exhibition center. The menu is composed of (1) Main (2) Exhibition (3) Program (4) Link and (5) Location. In consideration of the international nature of the event, the contents are presented in Korean and English language simultaneously in the same screens.

A comparison of the application software used by 5 facilities, which are namely The Museum of Modern Art, American Museum of Natural History, Louvre Museum, Gwacheon National Science Museum, and Incheon Metropolitan City Art Museum is shown in the following table.
Table 2. A Comparison between the Application Software used in the Representative Exhibition Culture Centers

<table>
<thead>
<tr>
<th>Item</th>
<th>MOMA</th>
<th>American Museum of Natural History</th>
<th>Louvre Museum</th>
<th>Gwacheon National Science Museum</th>
<th>Incheon Metropolitan City Art Museum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen display</td>
<td><img src="image" alt="MOMA Screen Display" /></td>
<td><img src="image" alt="American Museum Screen Display" /></td>
<td><img src="image" alt="Louvre Screen Display" /></td>
<td><img src="image" alt="Gwacheon National Science Museum Screen Display" /></td>
<td><img src="image" alt="Incheon Metropolitan City Art Museum Screen Display" /></td>
</tr>
<tr>
<td>Characteristics</td>
<td>· Horizontal Mode supported · Realtime News (Internet connection) · Real-time audio guided tour (LBS)</td>
<td>· Horizontal Mode supported · Search for the exhibits and facilities · Share with your SNS</td>
<td>· Supports horizontal view mode only · The main menu is shown in cover-flow mode</td>
<td>· Two modes for main · Event calendar · Visitors may post their own photos and texts · Twitter linkage · Use QR code as you explore the event</td>
<td>· Offer horizontal view in 'About the Artwork' · Audio guide for each relic</td>
</tr>
<tr>
<td>Service Name</td>
<td>Characteristics</td>
<td>MOMA</td>
<td>American Museum of Natural History</td>
<td>Louvre Museum</td>
<td>Gwacheon National Science Museum</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
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<td>----------------------------------</td>
</tr>
<tr>
<td><strong>Tour Information Service</strong></td>
<td>Introduction to the museum, location opening schedule, real-time event information and other basic information service</td>
<td>O (Real-time exhibition service)</td>
<td>O (Real-time exhibition service)</td>
<td>O</td>
<td>O (Real-time exhibition service)</td>
</tr>
<tr>
<td><strong>Search</strong></td>
<td>Theme search, text search for higher accessibility to the exhibition basic information service</td>
<td>O (Artwork/artist)</td>
<td>O (Artwork/facility)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Exhibition viewer Service</strong></td>
<td>Multi-media service using video and audio-guide for easier access to the exhibition</td>
<td>O (audio guide for each floor/exhibition)</td>
<td>O (difficult to check the multi-media)</td>
<td>O</td>
<td>O (video guide for each section)</td>
</tr>
<tr>
<td><strong>Map Service</strong></td>
<td>Provide location service for the exhibition, including line of movement and positioning of the visitors</td>
<td>O (Positioning of the visitor)</td>
<td>O</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Customization Service</strong></td>
<td>Scrapping and customization for the visitors</td>
<td>O (Bookmark/MY TOUR)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Entertainment Service</strong></td>
<td>Providing fun and enjoyment to the viewers as they explore the exhibition</td>
<td>O (Make a wallpaper/podcast)</td>
<td>O (Challenge)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Sharing Service</strong></td>
<td>Posting comments, making recommendations, SNS link</td>
<td>O (E-mail)</td>
<td>O (Twitter/Facebook interlink)</td>
<td>X</td>
<td>O (Posting photos and texts/twitter interlink)</td>
</tr>
</tbody>
</table>
As we can see above, the leading exhibition culture facilities, domestic and overseas, are offering various services for the benefit of the visitors. But, since the coming of the smart society, it is now necessary to establish a more practical form of museum, which provides various information on the museum in a portal-like arrangement using smart-device based applications equipped with a variety of LBS features and free from the limitations of the time and space, so that the visitors do not have to wait in line and the museum leads the visitors instead.

3. The Technical Elements for Proliferation of the Interlinking with the Mobile Platforms

As we have seen above, many museums are endeavoring to ensure effective visiting experience using the smart devices owned by the visitors. But, the current applications go no further than being a supplementary tool for the exhibition contents that are displayed in the facility. Therefore, it is necessary to make better use of the high-end technology, such as specialized, diversified digital contents and augmented reality, in order to establish a web-based portal system that provides user-oriented ubiquitous system and the relevant services, allowing the visitors to appreciate the exhibition contents wherever and whenever. To be more specific, further study would be necessary as follows, for contents management, indoors/outdoors map making, Photo AR establishment, etc.

3.1. Contents Management

In order for the establishment and utilization of database in consideration of the contents information standardization, it is necessary to study on for collecting, analyzing, and verifying contents to be provided and linking them with multi-media contents (text, voice, photo, video, positioning information).

Firstly, it is necessary to secure the standard and expandability with expertise and flexibility by means of establishing contents management system including multi-contents, GPS related AR, video-based AR, indoors/outdoors map, and panorama images.

Secondly, further study is also required for the management of multi-media, including addition, modification, deletion, viewing, history management of the contents, configuration of the roles of the users, authority, and responsibility, means of export/import for standardized format, and the standardized positioning format.

Thirdly, further studies are also necessary for the making and classification of the contents, including the standardized categorizing system for the contents of the exhibition, and standardized multimedia format to allow data compatibility with other systems, etc.

3.2. Making of Indoors/Outdoors Map

In order to prepare maps for outdoors and indoors facilities, it is firstly required to study efficient delivery of the intent of the exhibition. A study is required, in which, by providing contents based on the line of movement and positioning information which are planned by the exhibitors, the intent of exhibition may be delivered directly and effectively.

Secondly, a study on the conversion of the contents and the matching with the map information is also required. Another study is required through which, by using the CAD data of the building design, the information from the plan is converted into GIS data that can be displayed on the smartphones. The contents data then are matched on the designated locations on the map.
3.3. Photo AR(Augmented Reality) Establishment

For realization of Photo AR, firstly, studies on the experiential contents provision are required. Further study is required by which, by using the high-end video-based augmented reality technology, experiential contents are provided to the visitors to help them achieve enjoyment and at the same time learning experience. It would be also desirable if the visitors may get detailed description of an exhibited item by means of the image-recognition system on a smart phone when they stand in front of a relic.

Secondly, a study on contents based searching is required. A study on provision of easier interface that can be more convenient for the users by means of image comparison using camera view through image based AG technology is necessary.

4. Expected Effect Due to Mobile Platform Technology Development

The expected effects of the development of mobile platforms may include the differentiation and invigoration of the exhibition guiding by means of efficient and strategic response to the changes of the digital environment, the pattern of appreciating the exhibitions, differentiated exhibition environment, saving of the marketing cost, and the contribution to the growth and invigoration of the culture and tourism industry. Details of the expected effect can be as follows;

4.1. Strategic Response to the changing Smartphone Environment

Prompt response to the smartphone environment will contribute to strengthening of the strategic competitiveness. It will allow us to prepare the basis of the exhibition environment by means of securing standardized contents DB. It will also make it possible to lead the way of new exhibition guidance by providing advanced services in comparison to the similar exhibition events, resulting in improved reputation of the facility. It would also be possible to accommodate the demands of the visitors limitless beyond the limitation of the exhibition space by inviting the participation by the visitors through interactive communication channels with the public.

4.2. Changes in the Pattern of Appreciations of the Exhibition Culture Facilities

Another expected effect from the development of mobile platform is to change the exhibition culture facilities, including museums, into a space which is focused on the convenience of the visitors. The change of the exhibition culture facilities from a mere place of knowledge and learning to an integrated entertainment space will be even further accelerated. The development of the interactive communication channel, establishment of the museum portal service, the studies on the mobile media and IT technologies converged will result in even more convenient exhibition environment with 'a curator on my hand.' Also, a new environment where the visitors may enjoy the contents without the limitation of time and space may be a reality.

4.3. Provision of Differentiated Exhibition Environment by Means of the Optimization of the Mobile Technology

It would be possible to expect enhanced reality and involvement of the visitors using the augmented reality and panorama technology. It is expected that the satisfaction of the visitors will be maximized by simulation effect beyond the mere provision of photos. On top of this, by using the latest smartphone technology, the charm of the contents will be maximized, and
it would be possible to provide services of various forms such as photos, voices, and videos, etc.

4.4. Effective Saving of the Marketing Costs

Since the promotion is now possible without the limit of the time and space, the cost for marketing can be saved. Also, it would relieve the facility management from the burden of shortage of manpower for promotion, guidance, and other related activities and allow them to store a vast amount of information as the limit of the content amount is now lifted.

4.5. Effective Saving of the Marketing Costs

Nowadays the usage of the IT infrastructure for the cultivation of the cultural tourism industry with high value-added is expanding, while the open Wireless Internet environment is established and the usage of smart technology takes root as a major trend in major tourist destinations. While the importance of the positioning related services in the cultural tourism is increasing as non-group tourist is increasing, LBS convergence is now a must for the cultural tourism industry using the smartphones as an IT based platform. With this, a new market for the industry would be possible for the cultural facilities and exhibition industry.

5. Conclusion

The paradigm of the exhibition culture facilities is now changing from what they were, that is, from a mere place of experience and sight-seeing to a space of entertainment with free thinking and understanding. That is, the exhibition culture facilities are now turning into a new cultural space where there is no limit in time and space, allowing various approaches.

In this environment, the changes for the exhibition culture facilities are now a must, not an option. Developing technologies to improve the convenience of the visitors in response to the changing environment is no longer an auxiliary service apart from the exhibition itself. It is a core element to ensure optimized exhibition experience.

The technology using the mobile goes beyond mere transfer of information now. It is now evolving to the direction where the maximization of the convenience of the visitors is possible by converging a variety of technologies. Therefore, the exhibition culture facilities of today should actively seek to develop and use the mobile technologies.

The development of the technologies that would allow the interlinking between the exhibition culture facilities and mobile platforms will not only provide an application to the visitors. It should be aimed at making a ubiquitous environment in which the contents of the exhibition are possible without the limitation of time and space. I expect the studies on the various technologies examined in this study are performed in many fields continuously.

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References


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