Applying Mobile Technology for Developing Cultural and Creative Products in Tourism: A Case Study on The Forbidden City

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Abstract—There have been new requirements for the development of cultural and creative product in tourism. Various technologies are widely used for tackling this, especially the so-called new generation of information technology. Mobile technology is one of the most frequently used. However, there have been few studies concerning questions like why mobile technology is good at this and how to make the best use of it for a better development of cultural and creative tourism product. Within this paper, several typical cases of the Forbidden City are analysed aiming to explore the reasons or theories behind the scene and summarise potential implications and suggestions for future development.

Keywords—mobile technology, cultural and creative product, cultural tourism, creative tourism

I. INTRODUCTION

Since people’s wish for a good life became the principal contradiction of China, in the new era, various crucial changes have been highlighted within tourism filed. One of the most important is the combination between culture and tourism. A good proof is the establishment of the Ministry of Culture and Tourism dedicating to push the cooperation deeper and further. It has been a tendency that people focus more on the spiritual enjoyment during traveling. A major approach to doing that is through experiencing the rich culture of destination, which makes cultural tourism a hot topic worldwide.

However, a good cultural experience is not only about the knowledge acquisition, but also concerning the cheerfulness gained from various psychological processes during travelling, such as deep thinking and imagination, feeling and emotion, even strong will to accomplish something. For example, while visiting the Forbidden City, a traveller may be astonished by the beauty and magnificent of the palace as well as knowing it contains 8707 rooms according to the current statistics. The key point is how to create such cultural experience discussed above. Currently, a major way of doing that is through exploring the cultural creativity and fusing it into tourism product. This kind of cultural and creative product is widely deemed as the main medium for cultural activation, which not only could enrich the cultural experience during travelling, but also may integrate it into people’s everyday life (e.g., a phone accessory with dragon and phoenix design). As travel has been kind of lifestyle, the development of cultural and creative product is becoming more essential nowadays.

Due to the fast development and pervasive utilisation of information technology, both tourism field and cultural and creative industry have been making the best utilisation of the advanced technologies and a variety of cultural and creative programs, applications, systems and installations have been created. Among the pioneers, the Forbidden City is very good at this. It all started from the first attempt of creating a GIF (Graphics Interchange Format), which is known as “Emperor Yongzheng: Feeling Myself Lovely” shown in Fig. 1. A GIF is a type of dynamic image that is composed of various static images switching by specified frequency to achieve kind of animation effect. Thus, Fig. 1 actually shows two screenshots of the dynamic image in sequence.

More importantly, this GIF is created based on a real self-portrait of Emperor Yongzheng depicting him reading a book (see in Fig. 2).

The key question is where and how the creative ideas come from. During Qing Dynasty, Yongzheng was one of the most important emperors. No matter in histories or in films, he is always deemed as serious or even callous. But why do people think he is “cute”? In fact, although he is very serious while dealing with political affairs, his true temperament would be shown on small things in daily life from time to time. He likes doing “cosplay” and imaging himself doing the things that he cannot do. For example, he likes living country life. However, as an emperor, there is no chance for him to do that. Therefore, he ordered a series of paintings depicting himself enjoying the dreamed life, one of which is shown in Fig. 3 depicting him as...
an angler fishing by the river. The paintings are known as the “Amusement of Emperor Yongzheng” and several GIFs have also been generated based on them.

It is reasonable to believe that this kind of contrast is the creativity of the related culture that the Forbidden City utilise. More than that, “cuteness” has become increasingly popular in recent years, especially among young people. It has been widely applied in the design of cultural and creative product, like the palace cat series of the Forbidden City (see in Fig. 3). This kind of combination between the past and the present has become the driven power for cultural innovation. However, the next key question would be whether it is enough. If not, what is next?

![Fig. 3. Series Products of the Palace Cat](image)

With the facilitation of various information technologies, there are more possibilities for people to create in cultural field. Here needs to mention another well-known cultural IP of the Forbidden City known as the “Twelve Beauties of Emperor Yongzheng”, which is also a series of paintings. One of the twelve beauties is shown in Fig. 4 (the first from the left of the paintings) depicting a lady being lost in deep thought while appreciating the antiques around her.

![Fig. 4. Twelve Beauties of Emperor Yongzheng (the scene of Antique Appreciation)](image)

The series paintings have been leveraged in various ways by using information technologies. An interesting way of doing that is through using digital technologies as shown in Fig. 6. It is also a GIF created based on the scene of antique appreciation shown in Fig. 4 (the second and third from the left of the paintings). However, differing from the one shown in Fig. 1, this one arouses people much bolder or even fantasy imagination. With the facilitation of technology, not only has the painting been modified, but also a VR (Virtual Reality) headset representing the modern society and its technological level is integrated into the painting, which generates a novel combination between the past and the present. Not only that, a kind of narrative element has also been added to the painting by the technology. The virtual version of an emperor could surprisingly be kind of alternative comfort for a concubine, to whom the chance to see the actual emperor could be scarce. It is also interesting to wonder whether there is a hint of the necessity of using technology for cultural innovation.

Not limited to small attempts like GIF, it is the whole new generation of information technology that has been focused within cultural and creative industry. Compared with other advanced technologies (e.g., Cloud Computing, Big Data and Artificial Intelligence), mobile technology, especially the software section (e.g., mini program and APP), is among the most widely used concerning the development of cultural and creative product. The Forbidden City is one of the first cultural institutions employing mobile technology for innovation and has developed a series of typical mini programs and APPs for people to enjoy. The efforts have drawn a lot of attention and become very popular.

Therefore, the aim of this paper is trying to summarise the rules of applying mobile technology for a good development of cultural and creative product through analysing the typical cases generated by the Forbidden City. Later, the associated theoretical issues would be discussed and several implications and suggestions might be proposed for future study.

II. BACKGROUND

Creative Industry and Creative Tourism

The background of the rise of creative industry is related to the big decline of traditional economy in UK during 1980s [1]. To save the traditional industries and revitalise the economy, in 1998, the “Creative Industries Mapping Document” was proposed by the UK government, within which the concept of “creative industry” was firstly raised specifically indicating the combination between culture and economy. Later, several relevant fields were identified as creative, including art (e.g., music and performing art), handicraft, fashion and design, antiques, architecture, advertisement, publication, video and film, television and broadcast, software, especially interactive entertainment software, and computer game [2].

Many countries in the world have been conscious of the driving power of creative industry to regional economy and social development. Thus, a series of national strategies and policies have been worked out successively [3]. China is one of them. Since around 2007, a focus on promoting the creative issues started to emerge and become increasingly important in China [4]. Compared to countries like Denmark emphasising on the design innovation, China devotes to making the best utilisation of the abundance and richness of culture and the openness of humanistic environment for the development of creative industry, which has been elaborated in the “13th Five Year Plan of Cultural Industry Development”. It actually points out the close relationship between culture and creative industry in China.

It is believed that culture is the most solid foundation for being creative [5, 6]. No matter what creative tool, technique, or method people may use, there still would be no results without any materials or resources. Various cultures (e.g., histories, customs and practices, religions, ethics and art), as the most essential and enduring outcomes generated from the mental activities of previous people, are proved to contain the great value of enriching the spirits of later people [7]. There is the continuity within the development of human society. Various cultures between/within different eras could impose profound influences on each other, based on which the creative elements (e.g., schemes or narratives) might be found for creation [8]. Meanwhile, creativity is also broadly deemed as the core innovative power for the development of cultural products and the nourishment of cultural economy. Creation
is an ever-changing process, which makes creative resources generally flexible and sustainable for innovation.

Tourism could provide the perfect “space” to promote the combination between culture and creativity and, at the same time, get inspirations from the cultural and creative industry to create better tourism experiences [9]. Firstly, there is a spiritual and cultural connotation within the various natures of tourism. Besides the material aspects (e.g., shopping) of tourism, there would also be a multitude of activities occurred on spiritual level, such as the imagination triggered by the strange pines and rocks in Huangshan, which also reveals the relationship between tourism and creativity. People may undertake various creative activities during travelling. Imagination is one of the most frequently occurred. When people traveling to a new or unfamiliar place, a sort of “imaginative escape” might happen. For instance, if a traveller stayed in a rural lodging, he or she might always get feelings of returning to the nature. This kind of imagination or fantasy gives people a chance to temporarily get away from the real world and discover the authentic self. In recent years, the intersection between tourism, culture and creativity has become an extremely hot topic discussed mainly in the domain of cultural tourism.

Under the influence of experience economy, it has been far from enough for travellers to merely gain knowledge about the destination’s culture. The cultural experience within tourism is required to be more comprehensive to trigger more senses, behaviours, thinking activities and emotions of travellers, with the aim to enhance their feelings and experiences about the destination’s culture and arouse their aesthetic interests and cultural complexes. Thus, the significance of culture has been varied for promoting tourism products and experiences. Based on cultural resources with great diversity, more interactivity and even creativity is demanded during travelling, which leads to the recreation of cultural tourism - creative tourism [10].

Within creative tourism, there are more learning activities that may be undertaken in museums, workshops and lessons during travelling to encourage travellers to take more active participations [11]. For instance, in a creative tourism in Beijing, the activities of learning Beijing opera might be arranged. Travellers may wear the special makeup and clothes, and learn the movements and music for voices in the opera. Through personal experiences, people might be able to gain more deep and comprehensive understandings about the opera culture.

More importantly, for creative tourism, merely improving the interactivity of cultural experience is not enough. The ultimate aim of creative tourism is to help travellers achieve their identity creation, personal development and even self-actualisation by promoting their creative potentials during travelling. Therefore, creative elements would be adopted to the interactive activities. A good example is the embroidery workshop in Suzhou. The art of Suzhou embroidery is a national-level intangible cultural heritage of China, which is famous for its delicate workmanship, beautiful designs and tasteful colours. Conventionally, there would be relevant tours organised in museums telling people the histories, stories and basic knowledge about Suzhou embroidery art. Nowadays, there are an increasingly number of embroidery workshops that could enable travellers to personally try the embroidery skills. More than that, based on the basic knowledge and skills imparted by embroidery artists, travellers would be inspired and encouraged to exploit their creative talents and make their own works of art. In the creation process, in great likelihood, the travellers’ creativity might be enhanced, which is just the desired effect of creative tourism.

In tourism studies, the creativity issues are not only about art and craft products nowadays, but also related to a wide range of tourism activities, including ones like cross-domain or interdisciplinary collaborations, cultivations of creative people, collaborative innovations on and across theoretical, political and industrial levels. However, all of them would eventually be embodied in the development of cultural and creative product in tourism.

**Development of Cultural and Creative Product in Tourism**

Tourism product is always discussed in the domain of tourism destination management. In recent years, besides the tourism themes (e.g., well-being) and specific product types (e.g., cruise), the sophistication of tourism product has been paid a lot of attention, which requires the coordination and cooperation among various tourism organisations, domains, aspects and levels.

The primary resources with great variety owned by the tourism destination play a decisive role for the development of tourism product. For cultural tourism, the product made from cultural resources could be tangible and/or intangible. The Mogao Grottoes of Dunhuang are good examples. Located at the western end of the Hexi Corridor, Dunhuang is one of the principle cities on the ancient “Silk Road”. The city is famous for the ancient grottoes and murals that were gradually created over more than 1000 years of history. The clay sculptures and murals decorated in the grottoes represent the tangible part of Dunhuang culture. At the same time, various cultures (e.g., religious and ethnic culture) incorporated and expressed by the works of art could compose the intangible part. Moreover, these two essential aspects of cultural resources would always depend on one another. Without concrete forms, the intangible needs tangible carriers as the mediums for the dissemination of culture. Likewise, the tangible resources also demand the intangible to promote their interest, novelty and significance. How to make the best use of the mutual relationship has been one of the major topics about the development of cultural and creative tourism product.

The process of developing a cultural and creative product could be generally divided into four phases [12], including the selection of cultural objects, extraction of cultural elements, innovation of design elements and generation of cultural and creative products. At present, a key problem facing us is that the conventional types of products (e.g., handicrafts, jewels and daily supplies) have not been able to meet the higher requirements any more, like the interactivity discussed above. Nowadays, it has been widely accepted that the development of cultural and creative product should be based on the idea regarding “culture as the source, creativity as the core and technology as the support”, which illuminates a possible way for the new stage of the development of cultural and creative product in tourism.

**From eTourism to Smart Tourism**

Tourism is among the first to make the best utilisation of advanced technologies for promoting its development. A specialised field has been formed for this direction, which is known as eTourism. Various technologies have been widely used by tourists, travel agencies, tourism suppliers and public sectors of tourism for facilitating the marketing, experiencing, serving and management of tourism [13].
However, using technologies in tourism for phenomenon analysis and problem solving is not the only thing considered in eTourism. There are more essential issues concerning the variations or transformations of tourism under the influences of the various applications of technology. A good example is the advent of the OTA (Online Travel Agency), such as Ctrip. Because of the fast development and pervasive utilisation of Internet technologies, it has been very common for people to gather information online without too much time and space limitations. It could be quite beneficial for the development of travel agencies, as its ultimate aim is to break the information barriers. Travellers could get more precise and comprehensive information than conventional travel agencies. More than that, travellers can also take more initiatives in terms of the travel decision-making, which could lead to various transformations of travel agency in tourism, such as the modification of the competition model. All of these are deeply associated with the nature and features of Internet technology.

Therefore, thinking from the perspective of technology is necessary in tourism. Nowadays, the so-called first generation of information technology has been paid a lot of attention in eTourism. As is generally known, it could include a wide range of technologies, such as Internet Technology, Mobile Technology, Internet of Things (IoT), Cloud Computing, Big Data and Artificial Intelligence (AI). Each of them has been employed in various explorations of eTourism to continuously push the boundaries between tourism and technology.

For developing the cultural and creative tourism product, the mobile technology is the most frequently used. It could be comprehended from three aspects of mobile technology, that is hardware, software and Internet. The hardware aspect is related to the flourishment of mobile devices, such as PAD, tablet and especially smartphone. According to the statistics, the smartphone popularity rate in China could be around 68%, which means more than half of the Chinese people could access to smartphones, which makes it a convenient and efficient type of device for the interaction with people. According to previous discussions, this feature could get well with the more sophisticated requirements of the development of cultural and creative product in tourism.

In terms of the software, the possibilities for innovation lie in the applications that are specially developed for mobile devices (abbreviate APPs). By the end of December 2019, the number of APPs monitored in the domestic market of China was up to 3.67 million. And the APPs of games, daily tools, e-commerce and life services are among the top four categories of mobile application scale accounted for 57.9% of the total number of APPs. It could be seen that almost every aspect of people’s life could be covered by the huge number of APPs. The various features of APPs (e.g., diversity and flexibility) could also be the great support for the development cultural and creative products in tourism.

As for the Internet aspect, when the mobility is added into the Internet, the connection offered by it not only could link human and technology more smoothly, but also is able to build a better bridge between human and human (e.g., social network) as well as technology and technology (e.g., smart home). There could be more “spaces” for innovation based on the various combinations between human and technology.

Nowadays, eTourism has entered into the new era of smart tourism. The key question is how to be “smart” in tourism and what the implications could be for the development of cultural and creative products in tourism. Generally speaking, several core features of smart tourism have been summarised. First, the information technology of the new generation should be applied. Second, the aim of the technology application is to actively perceive the tourism information and return tourists the timely feedback. Third, the personalised tourism services with high quality and efficiency would be provided. Finally, the smart feature would be mainly reflected in four aspects, including smart marketing, smart experience, smart service and smart management. At this level, the technology and the personalised requirements of tourists are focused in the smart tourism [14].

In essence, the English word “smart” is always associated with intelligence. Accordingly, there are generally three types of intelligence proposed by the American psychologist Robert Sternberg, one of which is the creative intelligence, more commonly known as creativity. It refers to a kind of ability to integrate and apply the existing knowledge and skills to cope with the new or special situations. In tourism, the particular situation would be the continuously emerging new tendencies and requirements. Above all, the most common point is that tourists nowadays prefer something interesting to something useful. The novelty and variability of tourist requirements also should be considered in smart tourism. Furthermore, in order to conquer the obstacles, it demands the integration of various kinds of knowledge and could be supported well by the linked technologies with great diversity. These ideas can be valuable implications for developing the cultural and creative products in smart tourism.

III. THE METHOD

The research method used in this study is cased study. A multitude of cases would be studied. All of them come from the Forbidden City, as it is one of the first and widely accepted as the most successful institution on developing cultural and creative products for the culture activation with the support of various advanced technologies, especially the ones belong to the new generation of information technology. A variety of cultural and creative installations have been developed by the Forbidden City and displayed in a special exhibition hall built in the Duamen Gate, such as an installation that can summon the AI ministers imitating the ones in ancient times, a digital wardrobe that can dress you a digital royal clothe when you stand in front of the screen of the installation equipped with the motion sensing device, the virtual version of the Hall of Mental Cultivation based on VR technology and so on. The exploration and attempt conducted by the Forbidden City has greatly boost the applications of technology in the cultural and creative industry.

In order to promote the combination between culture and technology further, the Forbidden City has established a long-term cooperation with one of the tech giants Tencent to seek more powerful help. It was started with a competition named as the “Next Idea” in 2016. Within the innovation competition, based on the cultural resources offered by the Forbidden City, participants were demanded to promote the rich connotations of the cultures to the public by multiple forms including: game, animation, expression pack and music. The cooperation could be mutually beneficial. Not only can the Forbidden City find the creative means for the cultural activation, thanks to the abundant cultures of the Forbidden City, Tencent also has made great achievements in the field of innovation.
A variety of explorations of the Forbidden City are based on the Internet technologies of Tencent, especially the mobile sections. A good example is a mobile game “Cra3 Match” developed by Tencent. A special edition of this game has been redeveloped based on the buildings and architectures of the Forbidden City, such as Jingshi Bridge and Taihe Gate. Once the game was launched, there were nearly 20 million people participating in the game, which makes it a typical instance of the combination between culture, creativity and technology from the cooperation of the Forbidden City and Tencent.

Aside from the recreated mobile game based on a certain pattern, the cases studied in this paper are newly and specially designed for the Forbidden City based on mobile technology. There are basically two types of applications, that is the mini programs especially based on WeChat (shown in Table 1) and independent series APPs (shown in Table 2).

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<th>Name</th>
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<th>Functions</th>
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<tr>
<td>Rap of Emperor Yongle</td>
<td>This H5 is an invitation of the innovation competition held by both the Forbidden City and Tencent.</td>
<td>1. At the beginning, there is a button. 2. Through clicking the button, a small video will be played. 3. After the video ends, a registration notice will pop up to introduce 10 innovative competitions.</td>
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<tr>
<td>Shooting Deer in the Forbidden City</td>
<td>This H5 is used to do the advertising and marketing for the new store of Luckin Coffee opened in the Forbidden City.</td>
<td>1. After opening the H5, there is a painting depicting several royal people hunting a deer, which is painted by the Italian painter Shining Lang in Qing Dynasty. 2. A series of following plots will be displayed while the deer is running for life, within which several other well-known painting of the Forbidden City will be shown creatively. 3. At the end of the H5, the deer will arrive at the new store of Luckin Coffee opened in the Forbidden City and transformed as the logo of the store.</td>
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**Findings: Infusion of Conflicts**

For the mini program cases, the reason why the WeChat is the main platform for mini programs development is that it is one of the most popular social media in China, used, most of the time, on mobile phone by users. Nowadays, with its huge user base, more functions, besides communication, have been explored by WeChat, one of which is the frequently used mini program. It is kind of application that can be immediately used without following steps like download and installation, and user can access to a certain mini program simply by searching the name or, more conveniently, scanning a QR code. Besides the features like universality, immediacy and conveniency, the mini program also shows qualities like flexibility and variety, which can be quite valuable regarding the function realization based on the strong technological support of WeChat.

A good support could be a new emerging web technology known as H5 (HTML5), which is the fifth version of HTML language used for webpage development. Furthermore, H5 is especially good at developing webpages for mini programs. There have been various kinds of features within H5. The one that is particularly related to the development of cultural and creative product is the animated presentation. Furthermore, the vivid effect is achieved mainly through various conflicts created and infused into the mini programs.

The Conflict between the Dynamic and the Static. In terms of the case of “Rap of Emperor Yongle”, it is firstly started with a self-portrait of the Emperor Yongle, which is static. And then, the character in the portrait suddenly becomes “alive”, stands out of the portrait and steps into the reality. As for the case of “Shooting Deer in the Forbidden City”, it also begins with a precious painting created by the famous painter Shining Lang. The depicted people and deer sort of revive from the painting. This strong sense of conflict between the dynamic and static could create a special visual effect that could amuse people to some extent.

The Conflict between the Past and the Present. It is quite obvious within the first case in Table 1. The Emperor Yongle representing an emperor in ancient times is able to do many things that are exclusively in modern times, such as wearing sunglasses, singing rap, riding dance, playing selfie, making friends, etc. For the case of “Shooting Deer in the Forbidden City”, the stories of the past are leveraged for telling the things happened at present. This kind of conflict between the past and the present can give people a feeling of travelling through time and space. By doing so, a kind of surprising, interesting and funny effect would be created, which is particularly popular among young people.

**Findings: Integration of Cultural Resources Based on Narratives**

Narratives are often used to attract people in cultural and creative industry. To construct a good story, the organisation of the storyline is crucial. Sometimes, a prototype will be used and further creations might be conducted through varying the conditions of it. Within the case of Emperor Yongle, he, as an emperor in ancient times, is used as a prototype. The things and people that are closely associated with him are thoroughly
utilised (shown in Fig. 5) for innovation. For example, after sharing the selfie on the WeChat Moments, he received several “thumbs-up” from his empress, concubines, the prince imperial, ministers and so on. The emperor is even able to have a conversation with his concubines within the chatroom, which actually proves again the great innovative power of the conflict between the past and the present discussed above.

More importantly, a comprehensive cultural integration is demanded to facilitate a good storyline and prototype. It is particularly obvious within the case of “Shooting Deer in the Forbidden City”. The main character of the original painting is the sixth son of the Emperor Qianlong and he is depicted as a hunter chasing a deer, in order to pray for prosperity for the Qing Dynasty. As in Chinese traditional culture, a deer could stand for thriving and prosperous future (shown in Fig. 6).

The interesting thing is, while the deer is running for its life, several other famous paintings of the Forbidden City are taken as the background environment of the H5 case (shown in Fig. 7). Each painting integrated into the case represents different cultural contents respectively. For instance, a well-known painting used (the first from the left of the Fig. 7) is the “Along the River During the Qingming Festival” painted by Zeduan Zhang of the Northern Song Dynasty, which depicts the daily life of people of all walks of life during that time.

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| Exhibition in the Forbidden City | It is an app based on both iPhone and Android platforms, which is used to virtualise a 7 × 24-hour online exhibition hall for users to explore. | 1. The original state of the palace, permanent special museums and special exhibitions will be supplied online.  
2. A panoramic view of the exquisite exhibitions of the Palace Museum will be supported online.  
3. The rich connotations of traditional art and palace culture will be introduced. | ![Exhibition](image) |
| Ceramics of the Forbidden City | It is an iPhone app used for showing the ceramic collections displayed in the Hall of Literary Glory. | 1. All the ceramic collections are connected based on the "timeline".  
2. Each collection has clear pictures and professional introductions.  
3. There are 8 exquisite works that can be enjoyed in 360-degree view. | ![Ceramics](image) |
| The Twelve Beauties of Emperor Yongzheng | It is an iPad app used for presenting the digital version of the famous painting of the Forbidden City and giving user a glimpse of the magnificent and elegant palace life of the Qing Dynasty through the twelve screen portraits of beauties. | 1. Most of the cultural relics depicted in the paintings could be compared to the real objects of the Forbidden City  
2. User can view the cultural relics through 360-degree perspective and various interactions, such as detail magnification.  
3. Professional and Comprehensive information and knowledge included in the paintings would be elaborated. | ![Beauties](image) |
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<td>Han Xizai’s Evening Banquet</td>
<td>It is an app based on both iPhone and Android platforms, with the aim to digitalising the famous painting depicting Han Xizai who was an important official of the imperial court of the Southern Tang Dynasty.</td>
<td>1. Professional academic materials will be introduced. 2. The cultural resources will be presented by digital multimedia. 3. There will be innovative interactions between users and the app, within which the aesthetics will be infused for better cultural experience.</td>
<td>[Image](110x333 to 158x382)</td>
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<td>600 Years of the Forbidden City</td>
<td>It is an iPhone app with the architecture of the Forbidden City as the theme.</td>
<td>1. A panorama map is supplied. By using it, user can quickly locate the place he/she wants to go. 2. The professional architectural knowledge and the palace stories behind it have been summarised. 3. There are thinking tasks within this app to help user quickly comprehend the knowledge just learned.</td>
<td>[Image](110x564 to 157x610)</td>
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<tr>
<td>Auspiciousness of the Forbidden City</td>
<td>It is an iPad app used for introducing the auspicious culture of China.</td>
<td>1. Chinese traditional auspicious culture will be introduced through various auspicious symbols. 2. The auspicious symbols will be presented both by majestic royal style and sweet hand-painted style. 3. The exquisite collections of the Palace Museum will be integrated with the hand-painted background. 4. The auspicious symbols and cultures could be viewed by scroll browsing.</td>
<td>[Image](111x486 to 157x534)</td>
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<tr>
<td>Daily Palace Museum</td>
<td>It is an app based on both iPhone and Android platforms, with the aim to help people to explore the amazing details of the Royal daily life, and feel the endless historical life of the treasures handed down from generation to generation.</td>
<td>1. A collection of treasures would be selected every day for displaying.</td>
<td>[Image](111x637 to 157x683)</td>
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<tr>
<td>Emperor’s One Day</td>
<td>It is a mobile game based on both iPhone and Android platforms, which is specially designed for children to learn about the emperor's daily life.</td>
<td>1. The user will play as the role of the emperor. 2. The Forbidden City could be visited virtually. 3. The emperor’s daily life will be introduced, including clothing, having dinner, working and entertainment. 4. The culture learning will be conducted through playing various interesting games and the user will be rewarded for his/her achievements by things like cultural relic cards.</td>
<td>[Image](112x416 to 156x460)</td>
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**Findings: Cultural Relics, Cultural Symbols, Histories, Cultures and Connotations**

There is a general pattern or process on applying mobile technology, especially APP, for the development of cultural and creative product. To begin with, the cultural relics with great variety have been the major mediums. The tangibility of cultural relics makes it more direct to extract the cultural elements for the transformation of the design elements, based on which the series of cultural and creative products would be developed. Another important feature is that the various kinds of cultures in possession of the relics are, most of the time, organised by a variety of cultural symbols. For example, persimmon symbol for “everything goes well” is an essential auspicious symbol in Chinese traditional culture, which is often decorated on/in a relic or directly used as the appearance of a relic. As the totem culture is an important part of Chinese culture, the symbols have been one of the most essential sources of cultural creativity, behind which the histories, cultures and connotations could be infused into the cultural and creative product.

**Findings: Aesthetical Interaction and Interactive Aesthetics**

Interactivity is urgently needed in cultural and creative industry, which makes it one of the main reasons why the mobile technology is more preferable by people in terms of the development of cultural and creative product. Especially with the emergence of the smart phone, more interactivities (e.g., phone gestures such as swiping, rolling and zooming) have been added with the aim to enhance the sense of touch for people. It is believed that with more senses triggered, there would be more abundant experiences for people. Thus, several visual technologies also have been superposed on mobile technologies, such as the 3D based 360-degree view and panorama perspective based on real scene technology.

More importantly, as aesthetic experience has become one of the most important tourism and culture experiences to meet the higher tourist demands on the spiritual level, the interactions between human and technology are required to be more aesthetic. The aesthetics used in the cases focuses more on the contents. For example, within the case of “Han Xizai’s Evening Banquet”, there are many people talking, drinking, dancing and playing music instruments. To make
it “alive”, musicians and dancers in the real world are invited to make simulated videos that would be infused into the digital painting. If user clicked a dancer, the dancing figure would become a real dancer in the painting to create the vivid effect. However, the great aesthetician Guangqian Zhu deemed that beauty lies in motion. An obvious instance is dancing, within which various meaningful movements constitute the beauty of dancing together. The question is how to make the interaction between human and technology become real aesthetic, which may go further arousing the deep aesthetic thinking of people.

IV. DISCUSSION

Conflict brings contradiction, which is comprised of two opposites. According to the dialectical materialism, the two opposites are essentially united within the object, which is known as the law of opposition and unity for contradiction. Furthermore, the unity of the opposites has always been the internal power promoting the variation and development of the world. Therefore, the various combinations of conflicts used in the cases of the Forbidden City are actually utilising the most basic power of creation.

Creativity is the core of the development of cultural and creative product. The first question that should be answered is how to understand creativity or “being creative”. There are three essential elements of being creative, that is “new” “surprising” and “valuable”. Three types of creativity are proposed to achieve the surprising effect, which is related to people’s requirement of interest. Combinational creativity, with the aim to make the unfamiliar combinations with the familiar things, is one of them. It makes the combination of opposites more creative.

One of the most important features of mobile technology is its mobility, which could cross the boundaries of time and space and enter into people’s everyday life. There would be more accesses or interfaces for the cultural and creative products to promote information or knowledge to users. With an increasingly number of advanced technologies deployed on the mobile platform, the promoting approaches of cultural and creative contents also could be enriched. Moreover, with more and more daily services installed and personalised data reordered in the mobile device, there can be more possibilities to associate people’s daily life with the cultural and creative contents, like the app of Daily Palace Museum. For now, there is no clear logics behind the app for introducing cultural relics to user. What if the weather app installed in almost every smart phone would be linked with the app of Daily Palace Museum and a cultural relic, say a ceramic vase, could be introduced according to the temperature and humidity required for the ceramic making. Instead of imparting the cultural knowledge directly to the user, this kind of combination is able to shorten the distance between the culture and the people. In summary, the mobile technology could supply an integrative and comprehensive innovation platform for the development of the cultural and creative product.

Art can be the driven power for the integration of culture, creativity and technology. Various cultures can be the solid foundations for art creation. In the meantime, art is also the main approach to exploring the cultural creativities as well as generating new cultures. In particular, as art gradually enters into people’s daily life, cultures could be more easily approachable by infusing modern forms of art, such as the hand-painted creatures in the app of Auspiciousness of the Forbidden City and the cute figures in the app of Emperor’s One Day.

V. CONCLUSIONS

The aim of this paper is to explore the implications and suggestions about applying mobile technology for the development of cultural and creative industry based on the case studies of the Forbidden City. The new requirements for developing cultural and creative tourism products have been summarised, inducing interactivity, sophistication and creativity. The mobile technology, especially the software part, is promising to support the demands, with features like universalism, convenience, interactivity, flexibility, variety and so on. To develop a good cultural and creative tourism product based on mobile technology actually relies on the combination of knowledge and perspectives as well as the integration of resources and technologies.

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REFERENCES