Research on the Interactive Experience Design of Museum Cultural Product Customization Platform -Focusing on Shenyang Palace Museum

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박물관 문화상품을 위한 플랫폼의 상호경험디자인에 대한연구 -선양고궁박물관을 중심으로

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Abstract The innovative development of museum cultural products is an important way for museums to play the function of cultural communication with their collections. In the context of consumer upgrading, traditional cultural product design and sales methods gradually fail to meet the diverse needs of consumers. This study aims to propose the construction of a customized interactive experience platform for museum cultural products, promote the development of museum cultural products, and facilitate the inheritance and preservation of museum culture. The research methodology analyzes the model and characteristics of existing cultural product customization platforms by collating existing literature studies, and distributes 159 questionnaires to investigate the needs of cultural product consumers, and finally combines the customization experience with existing e-tailing platform systems according to user needs, proposes a theoretical framework and conducts design practice and usability testing using the Shenyang Palace Museum as an example. The findings show that users have a high acceptance of the customized platform for cultural products and that the design of the customized platform can be used to promote the dissemination of the cultural connotations of museums, optimize the personalized user experience of cultural products, and provide new ideas for the development, design, and retailing of museum cultural products. Based on the above findings, this paper suggests that museums' cultural product development can utilize the design model of customized platforms to further enhance consumers' personalized service experience.

Key Words : Museum Cultural Products, Product Customization, Customization Platform, Interaction Design, User Experience

요 약 박물관 문화 콘텐츠의 혁신적 개발은 박물관이 소장품을 이용하여 문화의 전파 기능을 강화하는 중요한 방법이다. 사람들의 소비 수준이 늘어나고 업그레이드화됨에 따라 전통적인 문화 콘텐츠 디자인과 판매 방식은 날로 늘어나는 소비자들의 욕구를 충족시키지 못하고 있다. 본고는 박물관 문화 콘텐츠의 맞춤형 체험 플랫폼 구축을 제안하여 박물관 문화 콘텐츠의 개발을 촉진하고 박물관 문화의 전승과 보호를 도모하려 한다. 본고의 연구방법은 선행연구를 정리하고 분석하여 기존의 플랫폼 모델과 특징을 분석하고 설문지 159부를 배포하여 문화 콘텐츠 소비자들의 욕구를 조사하였다. 마지막으로 사용자 요구에 따른 맞춤형 체험과 현존하는 인터넷 소매 플랫폼과 결합하여 이론적 틀을 만들었으며 선양 고궁박물관을 중심으로 실험을 설계하고 가용성 테스트를 진행했다. 연구결과를 보면 문화 콘텐츠 플랫폼에 대한 사용자의 수요도가 비교적 높았다. 맞춤형 플랫폼을 이용한 디자인은 박물관 문화 콘텐츠의 확산과 확대를 촉진하며 사용자의 경험을 최적화하여 박물관의 콘텐츠 개발과 디자인, 소매 등에 새로운 생각을 부여한다. 따라서 본고는 박물관의 문화 콘텐츠 개발은 맞춤형 플랫폼에 따라 소비자들의 특성에 맞춰 소비자들의 서비스 경험을 더욱 향상할 것으로 기대한다.

주제어 : 박물관 문화상품, 맞춤형 상품, 맞춤형 플랫폼, 인터랙티브 디자인, 사용자 체험

1. Introduction

Museum cultural products refer to the combination of creative thinking and creative products based on the cultural characteristics of the museum's collection resources, unifying the two abstract consciousnesses of culture and creative thinking, and integrating them into creative products with the cultural characteristics of the museum.As a cultural derivative and concentration of museums, cultural products are an extension of the three major social functions of the museum collection, research, and educational dissemination, and an important medium for showing cultural connotation, driving cultural consumption, and improving humanistic literacy of the public.In today's society, museums have become a major choice for leisure and fun for the general public and an important channel for overseas visitors to learn about Chinese culture. Since 2008, China has started to implement the policy of free museum opening, and relevant departments have formulated a series of policies to subsidize museum operating funds. Meanwhile, museums have increased the development of cultural industries to alleviate the shortage of funds, and the development of cultural products has become an important development strategy for museum cultural industries. According to relevant statistics, the scale of overall museum cultural product transactions in China has grown at a high rate in recent years, with the overall scale tripling in 2019 compared to 2017. (Fig. 1) The Palace Museum in Beijing reached more than 1.5 billion yuan in sales of cultural products alone in 2018. This all shows the huge potential of the cultural product's market.
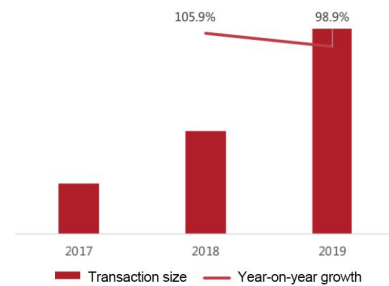
Data source:Ali retail platform

Fig. 1. The overall scale and growth of museum cultural products

With China's third consumer upgrade, the public has entered the era of personalized consumption. Consumers' emotional and personalized needs have become the new consumption standard. At the same time, the development of Internet technology has facilitated the efficient collection of user needs by museums. For museums, it is necessary to realize the customized production of cultural products, allowing users to participate in the design process and design and develop exclusive products according to their own needs, in line with consumers' pursuit of quality and individuality in the new consumption context. This study summarizes the service model and characteristics of the cultural product customization platform through literature research and case analysis of the customization service platform, and investigates users' needs for cultural product customization through questionnaires, based on which, the theoretical model of the cultural product customization platform is proposed, and design practice, as well as usability testing, is conducted with the Shenyang Palace Museum as an example. This study provides a reference value for improving the satisfaction of museum cultural products consumers, improving the status quo of small and medium-sized museums with a single sales model and insufficient innovation, has some

guiding significance for museums to use cultural products to achieve sustainable cultural heritage of their collections, and provides new ideas for museums to develop and design cultural products.

2. Literature Review

2.1 Current Status of Research on Customized Service Platform Development

As a new product design concept and method in the era of the experience economy, interactive experience design has also become a new idea and method for the development of cultural product design. Jochen Gros (2003) argues that customization can overcome the basic antagonistic relationship between art and industry.Abdesslam (2011) designed a location-based service (LBS) that allows users to use micro notebook computers, tablet computers, personal digital assistants (PDA) to visit the tour guide service platform of handicraft production places with geographic data. This shows that influenced by the development of science, technology, and industries, the customized service design of cultural products is an inevitable trend. Many studies show that the customized service realized with the help of the new technology of the Internet has proved a successful business model in the fields of tourism, finance, and interaction design, and is welcomed by consumers. However, the practices and studies of the customization service platform for cultural products based on the traditional culture of museums are not mature and perfect, and many designs and practices are still in the conceptual stage.

Cultural products are also gradually starting to join the customization model, and some scholars have made some relevant studies on it. Hu Bing et al. (2015)mentioned that consumers are more willing to participate in product customization with strong identity and correlation than those with weak identity and correlation, and for products with strong identity and correlation, consumers have a higher evaluation of customized products driven by social identity motivation than by unique demand. Mai Yueqing (2018) studied the platform architecture of online creative customization services for art derivatives and proposed to build seven services with search services, customized services, design iteration services, production evaluation services, logistics feedback services, shopping value-added protection services, and copyright protection services. A full-link service system with large modules in one. Zhou Ping, Chen Yuwei, and Shi Jiaqi (2019), with Hunan Provincial Museum as the subject of a case study, using the method of service design, put forward the idea and practice of building a mobile application of "Digital Museum and Customization Services for Museum Cultural Products". Meanwhile, the study provided new research ideas for the transformation of traditional museums in the new era. However, the customization method proposed by it was mainly aimed at providing a platform for communication between consumers and designers, and users were not provided with individualized selection. Liu Yan et al. (2015) considered that information interactive cultural products can form interactive experiences with users or audiences, such as cultural product design, cultural environment design (exhibition), innovation of cultural services, and even works of artistic creation so that they can offer in-depth user participation and good user experience, have emotional communication with users and meet the self-realization of users on the spiritual level.

Table 1. Domestic and international custom service platform finishing analysis

Case type	Number	Case name	website	Attribute characteristics	Customization method
DIY customization	1	Ai Dingke	https://www.idx.com.cn/	DIY pattern customization + designer shop	User selected or uploaded images for modular customization
	2	62icon	https://www.62icon.com/	DIY pattern customization + original pattern customization + designer shop	
	3	Zazzle	https://www.zazzle.com/	DIY pattern customization + modular customization + designer shop	
	4	Cultural relics+	APP Store	DIY pattern customization + social + cultural relics science + master works	
Crowdsourcing customization	5	PinMan	http://pm.giftgu.com/	Platform freelance designer + full process service	Platform's own designers provide design services
	6	Zhu Bajie	http://pm.giftgu.com/	Platform freelance designer + full process service	Provide creative products and design services
	7	Luoke	https://www.lkker.com/	Matching designer + designer level + design plan consultation	Individual designers with grade ratings
	8	Luban Cultural and Creative	http://www.lubanwc.com/	Campus cultural and creative designer + cultural product sales + cultural promotion	Campus Cultural and Creative Designers Team
Social customization	9	Etsy	https://www.etsyonsale.com/	Handicrafts + personal shop + community	Communication with designers
	10	Artfire	https://www.artfire.com/	Handicrafts + personal shop	

2.2 Case Study of Cultural Product Customization Platform

In recent years, the advantages of the customized business model have gradually emerged in the market and are highly respected by consumers as a deeply humanized sales business model. However, because there are few cases of museum cultural product customization service platforms, museum service platforms at home and abroad focus on heritage education museum tours, exhibition presentations, and other service contents. Therefore, this paper will use the "analogical research" approach in case studies to select cases of cultural product customization services in related fields for analysis.

Based on the time of platform creation, cultural product relevance, user volume, social platform recommendation, and service diversification, the following domestic and international cases were selected for analysis, and divided into three types according to the customization method, DIY customization platform, crowdsourcing customization platform, and social customization platform, and the positioning and attributes of each case were analyzed (Table 1).

For the above case analysis :

1) DIY customization mode platforms mainly aim to sell users' DIY products, and only a few platforms consider the cultural heritage service content behind the cultural products. Most of the platforms adopt modular customization, which has a high degree of user participation and can be used as a reference for the consumer customization model in this study.

2) Most of the crowdsourcing service platforms are for enterprises or groups, and there are fewer services for individuals. The services use an online communication mode, which leads to the problems of inaccurate user

descriptions and cumbersome design docking. This type of platform aims to provide a demand resource platform for designers and expand the way designers are employed. However, the cultural attributes are insufficient.

3) The social customization platform mainly serves individuals and cannot support mass production. Etsy is the most mature platform in this category, but the products it provides are mainly original handicrafts, which are confusing and lack cultural symbols. However, it introduces social "elements" to enhance users' participation and recognition through interaction within the platform and sharing and dissemination outside the platform, thus increasing the influence of the platform.

4) In these three types of cases, the service platform of users adopts the model of e-commerce platform, which can be referred to as the e-commerce platform to build the service platform.

Based on the analysis of the customized product platform, the cultural product customization service is defined as six processes: demand - design - manufacture - sales - distribution - feedback. The museum's cultural product platform will be designed based on this process.

2.3 Customization Concept

Customized design mainly provides matching individualized products by understanding customers' special needs and by user intervention in the design process to design and produce processing. Different product structures and process routes may emerge during the design and production process, and their special needs will constantly lead to new ways of combining products.Customization is the beginning of truly personalized consumption. The customer converts from a passive

acceptance to active participation in design in the process of customization, and the designer's identity converts from independent design to assisted design.Personalization started in the handicraft era and was first applied to foreign clothing haute couture, whose greatest feature is the uniqueness of hand-made products. After the industrial revolution, the design and production of products turned into mechanized mass production, and products gradually achieved industrial standardization, which enhanced production efficiency while limiting the development of customization. In the era of material scarcity, users' principle of purchasing goods is more inclined to solve needs rather than pursuing personalization. In the industrial era, the personalized custom design was constrained by the standardization of industrial products. Since the beginning of the 21st century, the market is rich in product variety and can greatly meet the needs of people's lives, so users began to pursue personalization of products to meet their own attributes of individual goods. So producers, to differentiate themselves from the competition and get rid of the standardization constraints, began to develop products that meet the individual needs of users, and the personalization of products also shifted from the traditional one-to-many model to the one-to-one model. Users pay more attention to the culture, emotion, and service conveyed by the products based on the practicality of the products. Human production methods continue to develop from low-level to high-level, and also toward low-cost, high-quality, and personalization.

Customized designs can be broadly classified into three categories :

1) Primary custom design: primary custom design is a simpler model, the product can reflect the basic personalized customer needs,

customization and production process is more mature, the production time is shorter. Such as the market now more mug pattern printing, T-shirt customization, etc.

2) Semi-custom design: Semi-custom design is based on existing products, according to the user's needs for combination and improvement, etc. Or the designer provides semi-formed goods, and the customer completes the post-design. Semi-customization has more options compared to full customization.

3) System customization design: system customization is more comprehensive compared with other customization methods, adding interactive, humanized, and diversified design based on users' personalized needs, enhancing the comfort of the customization process, and paying more attention to the embodiment of service value. Such as smart home customization services. System customization design is the optimization of comprehensive design, is the main direction of future product customization.

The customization platform mentioned in this paper refers to the online design experience of users with the help of the Internet, consumers design their own styles through the online customization platform, and manufacturers are responsible for the production and manufacturing of design solutions. The platform can improve the speed of product development, reduce the production cost of products, increase the modular and parametric design of products, and provide customization process services.

3. Consumer User Group Demand Research and Analysis

3.1 Quantitative Questionnaire Research on Consumers of Cultural Products

To understand the characteristics of consumers of cultural products, their needs and motivations

for consuming cultural products, and their needs and motivations for customizing cultural products, the author conducted a one-month questionnaire survey from September 3 to October 3, 2021. The target group of the questionnaire was "people who have experience in buying museum cultural products." A total of 180 questionnaires were distributed through the Internet, and 159 valid questionnaires were returned, with 20 related questions.

The survey included the following aspects :

1) Personal basic information (gender, age, education level, occupation, income).
2) Consumption motives of consumers of cultural product products.
3) Specific consumption methods and needs of cultural product consumers.
4) The current consumption experience of the consumers of cultural products.

3.2 Analysis of Research Results

1) Analysis of basic information: 56.88% of cultural product consumers are female and 43.12% are male. The age distribution of 18~25 years old accounts for the highest percentage (58.75%), followed by 26~35 years old (24.38%). The education level is concentrated in an undergraduate degree, accounting for 43.78%. Occupation accounted for the highest proportion of business personnel 37.5%. In the income research (multiple choice questions), the main group of cultural product consumers have a monthly income of RMB 3,000-5,000 (28.75%), RMB 5,000-10,000 (25.63%) and RMB 10,001-20,000 (24.38%), and others (21.25%). Comprehensive analysis shows that the main group of cultural product consumers are young and middle-aged women with higher income and higher education. This also indicates that the population of this research meets the characteristics of the required sample population and has certain representativeness.

2) Motivation to consume cultural products: According to the questionnaire results, 43.75% of people often buy cultural products, 55.63% said they would buy cultural products occasionally, and only 0.63% never buy cultural products. This indicates that most consumers are willing to consume cultural products. When choosing cultural products, most consumers are most concerned with the cultural value (68.13%), practicality (49.38%), cost-effectiveness (42.5%), and design innovation (33.13%) of the product, followed by aesthetics (24.38%), and brand reputation (11.25%), with the designer (10%) and material process (6.25%) having a psychological impact is smaller(multiple choice). Regarding the current problems of museum cultural products (multiple choice), the percentage of people who chose "lack of cultural value, unable to trigger cultural identity" (64.38%), followed by "homogenization of product style, insufficient innovation" (52.5%), and "poor aesthetics" (29.38%), and "single type and low practicality" (28.13%). This also shows that China's cultural product industries are at the initial stage, facing insufficient product innovation, culture and aesthetics, and homogenization of products under the mass-production model. In the question of what kind of pursuit to purchase cultural products (multiple choice question), 74.38% of the users choose to hope that the products have practicality and can be used in daily life; 49.38% of the users choose to hope that the products are personalized and can reflect their own style and aesthetic taste, followed by product innovation (23.75%) and cultural value (16.88%). Through the above results analysis, consumers' demand for the personalized, innovative, and cultural value of cultural products. And from the problems reflected by consumers, the current cultural

product development and design lack thinking from the perspective of user experience, and the product homogenization is serious, lacking individuality and innovation, and insufficient aesthetics.

3) Consumption methods: In the question of through what channels consumers learn about cultural products (multiple choice question), the percentage of choosing e-commerce platforms (67.5%), through new media platforms such as WeChat and Weibo (36.88%), and museum visits (19.38%). It can be seen that in the Internet era, new media is the main channel for information dissemination, and the promotion of cultural products should make full use of online platforms. Regarding the problems consumers encountered when purchasing cultural products (multiple choice), most users chose "the design style does not meet my requirements" (49.38%) and "no explanation of the cultural elements or stories used in the product" (43.13%), followed by "the way the product is displayed" (43.8%).), followed by "the display is confusing and I can't find the product I am interested in" (41.88%). This indicates that consumers have a high demand for the cultural attributes and design of museum products, which directly affects their shopping choices. At the same time, consumers want a more humanized shopping experience.

4) Consumers' current consumption experience: First of all, 43.75% of users expressed a strong desire to experience cultural product customization services, 30% of users held a hopeful attitude, and only a very small number of users expressed unwillingness to try customization services, indicating that cultural product customization services are accepted by most consumers. Secondly, 60% of users have had the experience of customizing cultural products, of which 34.38% have done so through online customization platforms, followed by design

companies (23.96%) and individual designers (18.75%), with less customization through manufacturers and offline stores, etc. Users who chose not to have customized cultural products accounted for 40%, of which the main reasons were the high cost of communication (41.25%) and the complexity of the customization process (35.63%), followed by the inability to find customization channels (35.63%), and high prices (21.88%). For the existing cultural product customization platform satisfaction survey, using a 5-point scale, the mean score was 2.47, indicating that most users are not satisfied with the existing cultural product customization platform.

Through the analysis of the research results, consumers value cultural value, design creativity, and personalized presentation of cultural products. Most of the cultural products produced by museums show a lack of culture and serious homogenization, which makes it difficult for cultural products to gain consumers' recognition emotionally, and the role of cultural products in cultural communication is not ideal. Second, consumers prefer to obtain information online, while the current sales channels of cultural products are still focused on offline, which is not in line with the current consumer behavior. Most consumers currently need to customize cultural products, and most of those who have used customization services say that they are less satisfied with the customization services they have used. At this stage, the museum cultural products customization platform is less, can meet the user 1 to 1 service needs of the platform communication costs are high, and service costs are also more difficult for users to accept. From the perspective of customization, the network platform is currently the main channel for customization, and with the advent of the 5G era, the use of mobile platforms for museum cultural product customization will become the mainstream way.

4. Museum Cultural Product Customization Platform Interactive Experience Design

4.1 Customized Design Process Construction for Museum Cultural Products

Based on the current situation of the museum cultural product market and user demand research, this paper proposes a service model of museum cultural product customization platform, with museums as customization service providers, consumers, designers, and museums as platform service objects, using the cultural resources of museum collections and outside design forces to collaborate and innovate, allowing consumers to actively participate in designing products through interactive experiences, forming cultural products with strong independent design cognition can not only bring special commemorate meaning to consumers but also better promote the dissemination and inheritance of the museum's own culture. At the same time, the new model also provides a reference for the development and sale of museum cultural products.

The main modules of the cultural product customization platform are the exhibition hall module, the DIY module, the product preview module, the work display module, and the online order module. Consumers can enter the platform through the museum's promotional QR code or promotion code when visiting the museum. After entering the platform, users can choose to visit the museum exhibits online and freely select the favored cultural elements, and then enter the personalized customization module for program design, or enter the DIY mode directly through the home page.

The core part of the platform is the construction of the material library and the user's own customized design system module.

Considering the design ability limitation of some users, the platform adopts the semi-customization approach, in which the initial design is carried out by the designer who extracts the cultural elements of the museum and then allows users to carry out independent design after forming the material. Compared with the fully customized design, the semi-customization has more choice and is conducive to improving the artistry of the product.

This study constructs a museum-oriented material library model by classifying and integrating museum exhibited artifacts and combining with the demand of interactive experience-based platform, which consists of cultural knowledge library, design material library, and design carrier library. The cultural knowledge base is organized and classified by the cultural and museum experts to integrate the static information base to display the cultural relics in a comprehensive three-dimensional manner, which is convenient for consumers to inquire and understand the relevant knowledge information and designers to extract the cultural elements. The design material library module is divided into three parts: graphics library, decoration library, color library. Graphics library is the unique pattern, color, and shape characteristics of cultural relics and other elements to extract, design, Form a design feature that is easy for consumers to recognize. A decorative library is to further enrich and decorate the main graphics, consisting of symbols, decorative patterns, cultural elements, and so on. Design carrier library is to provide consumers with a variety of product options for the application of creative design solutions, practicality, and cultural integration, but also for the product production links to determine the processing and molding methods(Fig. 2).
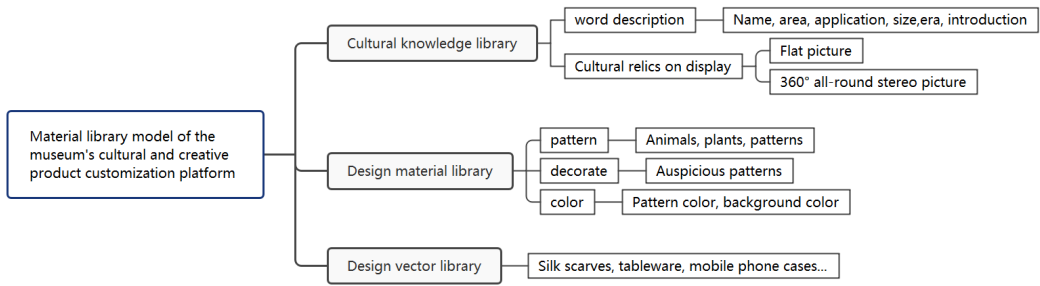
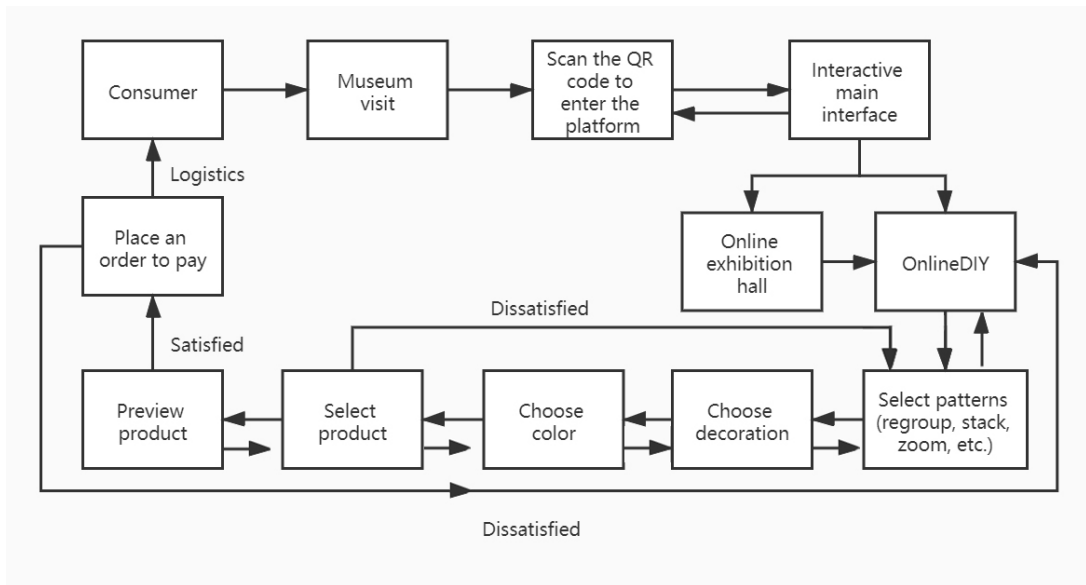Fig. 2. Museum cultural product customization platform material library model

Fig. 3. Construction of Customized Design Process for Museum Cultural Products

The user-defined design system module is designed by the user to select the design target and each design element through the independent design system, and achieve personalized requirements through flipping, scaling, deformation, reorganization, color selection, etc. During the process, users can repeatedly change the design and recombine the design elements until a satisfactory solution is generated. During the customization process, users can view the cultural knowledge or historical stories behind the selected cultural elements at any time to achieve the purpose of cultural communication. After completing the final design, users can view the overall effect of the product through the preview page and determine the purchase intention, and finally pay the deposit online to place an order for production, and the design will be sent to the manufacturer for production and production, which will be delivered to consumers by logistics after the production is completed. In terms of emotional experience, users can share the product solutions they made on social software, thus gaining a sense of identity and satisfaction while realizing the process of cultural dissemination. The overall flow of the system is shown in Fig. 3.

4.2 Service Blueprint

The service blueprint can clearly show the overall operation of the service and depict the back-end interactive services that are invisible to users in a more visual way. The author shows the service blueprint of the DIY customization service model (Fig. 4) in three stages: before, during, and after the service. The museum customization service platform is a museum-operated customization service that requires the participation of museum internal staff, so the museum-side staff, as the service internal staff, is responsible for handling the front-end activities. The back-office staff and the museum side are responsible for handling the platform user data information, which is invisible to the consumer. Meanwhile, designers and third-party distribution logistics companies provide external design and transportation resource support to the museum and also handle user custom consumption data to some extent. The platform background can continuously optimize the system and platform according to the data formed by consumers in the design process, and the relevant designers can also continuously improve the construction of the material library to enhance the user interaction experience index.
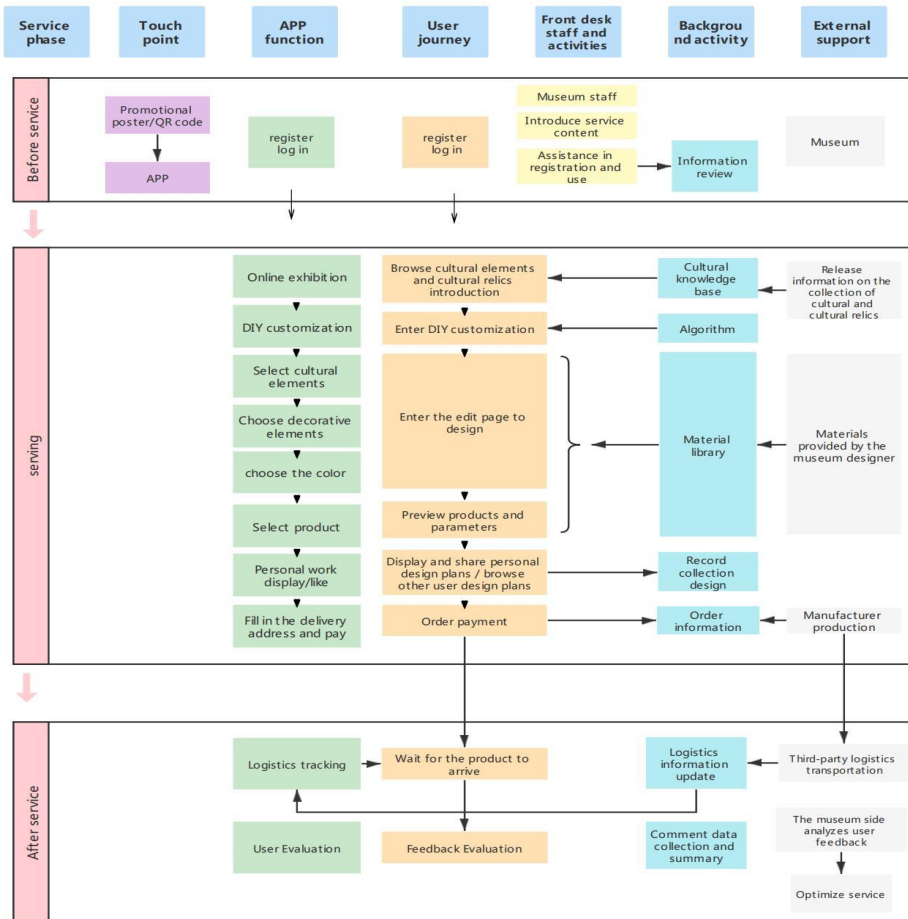

Fig. 4. Blueprint of museum cultural product customization platform service

5. Cultural Product Customization Platform Design Pattern Case Practice

According to the model of customized cultural product development proposed in the previous article, the actual case design is practiced. The case study was selected from the Shenyang Palace Museum, a famous ancient palace art museum in China in the early Qing Dynasty, which was built in 1625 and contains a very rich collection of palace artworks.The author, through a field trip to the cultural products store of the Shenyang Imperial Palace, found that there are fewer types of goods in the store, homogenization of products, lack of aesthetics, and other problems, and the Shenyang Imperial Palace has not yet developed a customized model of cultural products. Based on the cultural product customization platform model proposed in the previous paper, the Shenyang Palace Museum is used as an example to establish a customization design platform for cultural products.

5.1 Shenyang Palace Museum Cultural Symbols Material Acquisition

Based on the material library model proposed in the previous paper, this paper selects auspicious patterns from the enamel products of Shenyang Palace Museum to extract relevant cultural symbols, such as crane pattern, fish pattern, Ruyi pattern, and lotus pattern, to optimize the design and establish pattern library, decoration library, and color library. Through the designer's redesign, the lines and shapes of the patterns are streamlined to be more in line with contemporary aesthetics. This new way of cultural symbol output and dissemination can enhance the communication and interaction between consumers and products and culture.

5.2 User-customized Product-Based Interactive Experience Interface Design

The overall interface color scheme of the platform adopts the main colors of the overall architectural complex of the Forbidden City in Shenyang - deep red and light yellow, reflecting a sense of retro and traditional Chinese characteristics. When users enter the home page, they can choose to visit the museum exhibits online or directly enter the DIY mode. In the online exhibition hall, users can freely rotate 360 degrees to view the details of the exhibits as well as view the introduction of the exhibits, which facilitates users to better understand the cultural knowledge of the collection. After entering the DIY mode, users can select their favorite cultural element patterns and realize the operations of scaling, deleting, rotating, overlapping, and changing colors of the patterns within the specified parameters through gestures in the picture frame. Clicking the zoom button at the top of the page during the process allows users to view the connotation and origin of the pattern at any time, which helps users to strengthen their knowledge of the culture of the collection. After determining the design scheme, users can instantly preview the 3D model of their design applied to the product. The platform provides users with a variety of products to choose from, mainly practical products, to improve the use of products in daily life, and also in line with users' demand for high practicality of cultural products. On the product details page, users can understand the size, shape, function, and other parameters of the product, giving users a more intuitive feeling to determine whether the customized product is in line with the use of the environment and improve the user experience. At the same time, users can also choose to upload their design plans to the exhibition page,

all users can browse other people's design plans on the pavilion page and praise the favored works, which helps creators to get a pleasant emotional experience of identity, and provides some users who lack confidence in their design ideas or do not have customization needs with existing excellent design cases, further expanding the user scene and scope of the platform(Fig. 5).
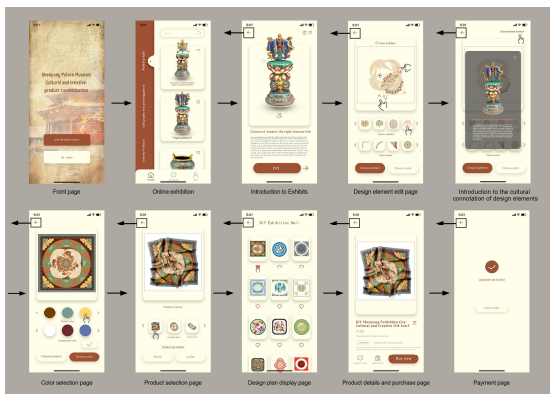

Fig. 5. Shenyang Palace Museum's cultural product customization platform interactive experience interface

5.3 Design Evaluation

5.3.1 Methods

The interactive prototype is built on the Axure production platform. In this test,

consumers of cultural products are selected to participate in the evaluation. According to Nielsen's theory of usability testing, 6-8 people can find more than 80% of the product's usability problems. This usability test recruited 10 consumers and evaluated the following aspects:

1) Users' acceptance of the Shenyang Imperial Palace cultural product customization platform to evaluate. Through interviews and desktop walkthroughs. After interviewing consumers and verbally introducing the entire service process and content to them, consumers check "satisfied", "Normal" and "Dislike" score each service and record the reason. (Table 2)

2) Usability test of users' DIY behavior of cultural product customized services. Invite target users and assign different tasks to them, such as completing a silk scarf customization, etc., and record the problems encountered by users in completing the tasks, and conduct interviews on user performance after the tasks are completed.

The user's behavior paths, emotions, and operations during the test were recorded, Observation of the user's behavior was made for analysis.

Table 2. Test task list

Task number	Perform task
Part One: Service Acceptance Test	1. The author introduces the entire service process, and explains with the relevant interfaces and touch points. Users express "like", "normal" and "dislike" opinions on the service process. Note: Ask users for thoughts when they express dislike
Part Two: Usability Testing	1. Browse the online exhibition hall to view pictures and introductions of cultural relics.
	2.Choose a favorite cultural relic to customize cultural products
	3.Customize a silk scarf in the DIY module, and edit the pattern selection, color selection, etc.
	4.View the cultural connotation of each design element
	5.Browse product details and place an order to buy
	6.Post design trends and like other users
	7.Check logistics status

5.3.2 Test Results

1) Service Acceptance Test Results

Consumers are invited to rate the service process, starting from "unsatisfied", "average", "satisfied", and calculated according to 1, 2, and 3 points respectively. The results are as follows(Fig. 6):
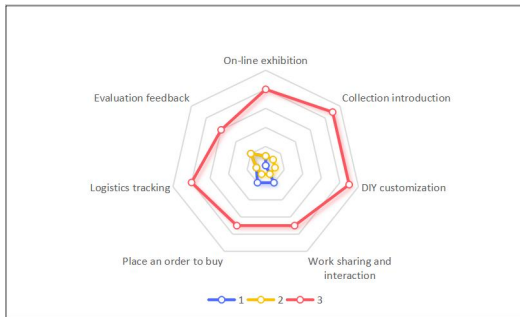

Fig. 6. Service acceptance test result

In general, consumers are highly satisfied with the service process of the customized platform and believe that they can meet the basic needs of customized services for cultural product industries. Consumers feedback that the concept of customization is very novel, and you can get a sense of accomplishment when you complete the creation. At the same time, the introduction and page display of museum collections have also been well received, and users think it is helpful to understand the cultural content of the museum. In addition, the social module has aroused the interest of consumers to actively participate, and it is believed that the solution will be helpful to the maintenance of platform users. Most users are satisfied with the cultural elements provided by the platform, indicating that each pattern has its meaning behind it, which is both beautiful and conducive to conveying cultural connotations.

2) Usability Test Results

The observation method is used to record the user's operating behavior and emotions, and the interview method is used to explore the user's inner views and expectations of the platform. The test results show that most users can smoothly complete the entire process of product customization. And in terms of operation, users' feedback was "easy to operate" and "easy to operate with interactive gestures". 87% of users were satisfied with being able to show their design plans and get likes from others because they believed that they could obtain a sense of identity and emotional interaction. 90% of users thought that compared with traditional cultural products, customized museum cultural product can better realize individuation, allow users to have a deeper understanding of the cultural knowledge behind the patterns, and achieve better cultural communication effects. The test also revealed that 10 users designed completely different product solutions. Although all testers used the same cultural elements for customization, different unique and personalized design solutions were produced because each person's choice of how to arrange and combine the elements and their color choices were based on their own preferences. The test results proved that the service model of the customization platform had a positive impact on users' satisfaction and proved its effectiveness. However, 30% of interviewees hoped that the text function can be added so that they can add their names and favorite words or sentences. About this, the function will be increased in the next round of improvement.

6. Conclusion

With the development of museum wisdom, personalized user experience and services have become the key construction content of museums, and the development and research of museum cultural products based on personalized

services will become an inevitable trend. The purpose of this paper is to propose the construction of a customized platform for the development of museum cultural products, to involve users in the design of cultural products using interactive experiences, to provide more personalized products and online services, and to promote the dissemination and preservation of museum culture. The specific research results are as follows.

(1) The results of 159 questionnaires were used to find out the shortcomings of cultural products consumers for the current stage of cultural products and the demand for a customized platform for cultural products. The survey results show that most consumers believe that most museum cultural products on the market have insufficient culture and homogenization. When shopping for goods consumers focus on the cultural attributes of cultural products, personalization, and expect to provide online services and other needs.

(2) Based on the user needs, a theoretical model of the museum cultural product customization platform is constructed, including the system module design, customization process design, material library model design, and service blueprint of the cultural product customization platform, which builds a new model of an interactive experience for consumers to provide museum cultural products with self-designed customization solutions.

(3) Under the guidance of the theoretical model, the prototype of the cultural product customization platform was carried out in Shenyang Palace Museum as an example, and user satisfaction and practicability were demonstrated through usability testing.

This study helps to provide a new service model reference for the customization development and sales of museum cultural products.

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