Journal of Positive School Psychology http://journalppw.com
2022, Vol. 6, No. 8, 5158-5192

Research On Development Design Of Ceramic Cultural Creative Products Based On Consumer Perception: Case Study Of Beijing Palace Museum

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Abstract

This study mainly draws the conclusion of consumers' perception of ceramic cultural creative products in the Beijing palace museum through questionnaire survey and provides guidance for the research and development of ceramic cultural creative products. After considering the research objectives, perception of the appearance and function of ceramic cultural creative products, research problems, scope and limitations of the research, the researchers determined the quantitative method of data collection, especially the investigation method. Quantitative research refers to the prescriptive scientific research to determine the quantity of a certain aspect of things. It is a research method and process to express problems and phenomena with numbers and measures, and then analyze, test, and explain them, to obtain significance. Quantitative measurement is based on digital symbols. Referring to Slevitch (2011), the source of quantitative research is the positivist paradigm, which advocates the method of embedding statistical segmentation, including reasoning statistics, hypothesis testing, mathematical interpretation, experiments, structured research schemes and questionnaires with limited range answers. The objective of quantitative research is measurable and cannot be separated from variables and assumptions; Variable is a concept, its variables can take many values, and hypothesis is untested hypothesis or proposition of the relationship between variables. According to Håkansson, investigation, post investigation, case study and experimental research are the most used research strategies in quantitative research.

Key words: ceramic cultural and creative products, perception, product appearance, product function

1.0 Research Methodology

This chapter summarizes the research methods and discusses the research methods used in this study in detail. It includes the design of the study, the selection of respondents and data analysis. Figure 1.1 shows the process of conducting and conducting the study.

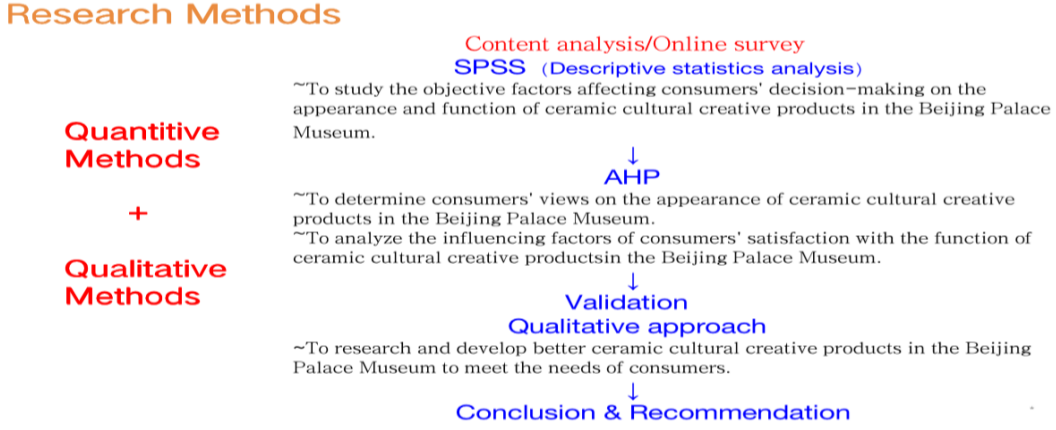

Figure 1.1: Method Framework

The flow chart of research methods in Figure 1.1 explains the different research methods corresponding to different research objectives and explains the whole research process. This study uses two research methods: quantitative research and qualitative research. Flow chart based on research method. The first stage is discussing and determining research issues and all information including the impact of the most popular ceramic cultural creative products of consumers, the appearance and function of ceramic cultural creative products on consumers' satisfaction with ceramic cultural creative products. At this stage, the purpose is to obtain relevant information, understand previous research and provide an idea for the design of ceramic cultural creative products.

The second stage of this study focuses on research design, data collection, survey methods and data analysis. The research design is to reasonably arrange data collection, and then conduct data collection and analysis to obtain numerical results. This study analyzes specific target audience groups. In this way, researchers can easily maintain the accuracy of the results obtained, because random selection will be used to deal with a wide variety of respondents. Traditionally, research has been conducted face-to-face or over the phone, but with the development of online media such as e-mail or social media, research has also been extended to online media. The sampling methods used will also be explained in this study. Moreover, the prediction test is summarized. This chapter also explains the design of the questionnaire and the actual survey.

The data obtained from the actual survey are analyzed in the statistical analysis application software SPSS in the third stage, and the influence of ceramic cultural creative product appearance and function on consumer demand is analyzed by AHP. This study will further analyze the data and discuss the conclusions later. The research conclusions of this paper can provide important references for researchers in related fields such as museum culture and entrepreneurship. Figure 1.1 shows the flow structure of this study. First, find the problems, determine the research problems and research objectives, then review the literature, then select the research methods, conduct the pre-test, investigation, data collection and analysis, and finally draw a conclusion. The process should achieve the research objectives.

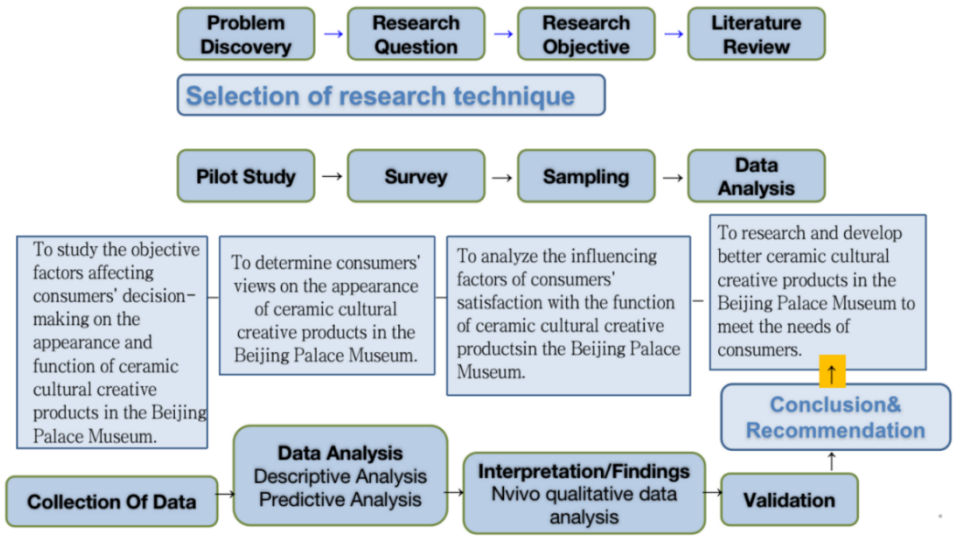

Chart 1: Research flow

1.1 Research Strategy

In this study, after investigating the research objectives and recognizing the gap between previous studies and published literature on consumers' satisfaction with the appearance and function of Museum ceramic cultural creative products, correlation, descriptive statistics analysis and AHP are used to verify the objective factors of consumers' decision-making on the appearance and function of Museum ceramic cultural creative

products and their satisfaction with the appearance and function of products. Descriptive research strategies are used in the questionnaire to count the basic information of Chinese people. Descriptive research will be suitable for the best technical method, because according to (Kelley, Clark, Brown, & Sitzia, 2003), this research method can explain the important factors related to population, socio-economy, age, occupation, attitude, experience, income and knowledge. Although it is mainly used to elaborate the basic data collection information, it is also used to predict some parameters of the whole.

Data were collected in standard form and measured with Likert scale. It was improved by American social psychologist Likert based on the original total plus scale in 1932. This scale can understand people's comprehensive attitude or view on the survey topic. For each project tested, the person will usually choose one of the following options(Dawson, 2019).

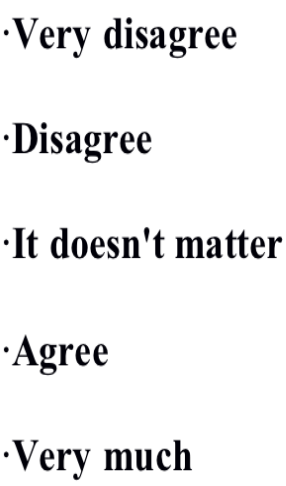

Figure1.2: Likert scale, Source:(Dawson, 2019)

1.2 Methods Overview

For quantitative methods, questionnaire is used as a survey tool. Questionnaire survey provides a relatively cheap, fast, and effective method, which can obtain a lot of information from many people. Data can be collected relatively quickly because researchers do not need to be present when completing the questionnaire. When the interview is not feasible, it is useful for many people. Compared with other methods, questionnaire survey can measure the behavior, attitude, preference, opinion, and intention of a relatively large number of subjects more cheaply and quickly. It is an effective means. Questionnaires usually use open-ended and closed-ended questions to collect data. This is beneficial because it means that quantitative and qualitative data can be obtained(McLeod, 2018). This study raises four research questions, as described earlier in the introduction chapter. The feedback of the questionnaire answered the research questions. The questionnaire is divided into two parts. The first part is the product introduction. The second part is composed of personal information, consumers' perception of product appearance and consumers' satisfaction with product functions. These are questions raised mainly to achieve the objectives. Questionnaires were distributed to people of different ages and income levels in China, including college students, retirees, white-collar workers, teachers, and other professionals. The network survey was used as the survey tool to issue the questionnaire. See the subtopics below for details.

The questionnaire was distributed to all respondents through the Internet. A total of 510 respondents participated in the survey, some of which were returned, and 384 questionnaires were sufficient for this study (please refer to figures 1.3). However, in this study, the researchers decided to use 440 available questionnaires, as proved by Krejcie and Morgan when determining the population table. It took more than one month to complete the questionnaire collection and about five months to input, analyze and process the data input.

1.2.2Development / Contents of the Questionnaires

Questionnaire survey is the main research tool of this study. The purpose is to obtain as much relevant information as possible from the respondents. It contains enough questions to meet the survey objectives. The survey objectives have enough time to answer questions, can also encourage the best response rate, and can obtain information efficiently in a short time. The investigation process includes the following steps:

This study uses two sets of questionnaires, which have been prepared, and then distributed to the cultural creative development

designers of the Palace Museum and researchers with relevant backgrounds for pre-test and effectiveness test. Both questionnaires were self-administered and closed-ended. To strengthen the practical investigation, the opinions and suggestions were considered and incorporated. Then, through e-mail and online survey, the completed questionnaire will be sent to consumers who have purchased ceramic cultural creative products of the Palace Museum, students with ceramic learning background in Jingdezhen Ceramic University, college teachers with art background in China and ordinary consumers. Then, Microsoft Excel and SPSS version 21.0 were used to process the collected data to determine its reliability and validity.

As mentioned above, the first questionnaire is in the form of interview. The main purpose of the interview is to further explore the needs of users and understand the characteristics of consumers in the process of using ceramic cultural creative products. To obtain more views and needs for cultural creative products, a preliminary interview was conducted with the target population in the form of user interview to obtain their real ideas, so as to obtain the next questionnaire design.

The second questionnaire contains 20 questions, including the basic information of consumers, the influencing factors of product appearance on consumers' purchase of products and consumers' acceptance of product functions. It is designed in a simple, straightforward and concise way, and also requires direct and short answers. It takes about 5 to 10 minutes to complete the questionnaire. These three parts are:

The first part is labeled "population", which lists variables composed of personnel information, such as age, gender, academic level, and monthly income.

The second part is marked as the respondents' understanding of the ceramic cultural creative products of the Palace Museum, the channels from which they learned about the ceramic cultural creative products of the Palace Museum, whether they have purchased the ceramic cultural creative products of the Palace Museum, whether they are interested in the replicas of the Palace Museum ceramics, and the impact of the product appearance design on consumers' purchase of products, And from the five point Likert scale index from very important to very unimportant.

The third part is marked as "product function", which lists the three major functions of the product: basic function, psychological function, and additional function. Consumers choose product satisfaction for three different functions. And from the five-point Likert scale index from very acceptable to very unacceptable.

1.2.3 Online survey

Researchers note many benefits of online surveys. Pitkow and Recker (1955) pointed out that compared with the printed and mailed questionnaire survey, the overall cost of online survey is lower, and the questionnaire method saves time, money, and manpower. Questionnaire method can be used for large-scale investigation. The number of Internet users on the network is very large. Everyone has their own ideas. The network questionnaire can understand the different ideas of different people, which will be a large and comprehensive data. Smith (1997) mentioned that online surveys narrow the physical space between researchers and respondents. Smith (1997) also noted that online surveys increased the frankness of responses. No matter whether the researchers participate in the survey or how much they participate, they can understand the basic attitude and behavior of the respondents from the questionnaire. According to Swoboda, Muehlberger, Weitkunat, and Schneeweiss (1997), there were fewer errors in the questionnaire; And improved the response rate to the survey. Batagelj and Vehovar (1998) noted the improvement of data collection speed and efficiency, and the questionnaire results are convenient for statistical processing and analysis. The network survey uses computer technology. Once completed, the reply will be sent to and stored on the server holding the website. Responses to the survey have been completed and automatically collected in tabular form, as well as response information and charts, which can be viewed in a spreadsheet. Finally, Sheehan and Hoy (1999) pointed out that web-based formats provide higher quality graphics, multimedia and presentation capabilities. Many questionnaires are popular only because they have higher

quality graphics, multimedia and presentation ability in a dynamic network environment compared with the printed version.

The research cited was conducted in the first few years of the online survey from 1995 to 1999. At that time, the technology was new, and the response rate was very high. When Swoboda, Weitkunat and Scheeweiss conducted their research, the use of online technology was justified by unheard of response rates alone. The questionnaire is through the use of "sojump" （ https://www.wjx.cn/report/127043593.aspx?sat=1 ） Created as part of sojump's creation of a survey, test, or web input form. The questionnaire can be designed according to the given options and is the advantage of researchers at no cost.

1.3 Population and sampling

Sampling technology is an indispensable method in behavior research. Sampling survey is a statistical analysis method that extracts some actual data from the population according to the principle of randomness and uses the probability estimation method to calculate the corresponding quantitative indicators of the population according to the sample data. In addition, the authors state that the survey results will be economical and accurate because each selected individual has the same possibility to be included in the sample. The main purpose of sampling is to establish representativeness or reduce bias and make recommendations from the results according to the target population.

This paper decided to focus on two sampling methods: random sampling and snowball sampling. Under the condition of limited time and resources, researchers do not have many choices. They choose a simple and convenient method of random sampling. Snowball sampling is through some people to understand a type of people that researchers need to investigate. Researchers can distribute the questionnaire by sharing the meeting place, website, or informing the respondents of their contact information. All the original participants were asked to recommend other people with the same characteristics, and the researchers would contact them immediately.

1.3.1 Determination of Sample Size

As for the question of how many samples the survey should meet, according to Kelley, Clark, brown and sitzia (2003), each study has different sampling methods, research characteristics and models, and there is no correct answer to this question. Chua (2014, P. 233) pointed out that there are four main aspects that determine the sample size of the study, namely: 1) study type, 2) population type, 3) expenditure type and 4) scale measurement. Kelley, Clark, brown and Sitzia (2003) believe that when conducting a survey, the target sample size should depend on three main factors: 1) available resources; 2) Research purpose and 3) statistical quality required for investigation. In addition, time and cost should be considered when determining the sample size. For this study, the population sample size is shown in Table 3.1 below. The significance level of the table was $p < 0.05$ (Krejcie & Morgan, 1970).

Table 1 applies to any defined population. The relationship between sample size and total population is shown in Figure 1. It should be noted that with the increase of population, the sample size increases at a certain rate, and the reduction rate remains relatively stable in more than 380 cases. Refer to small sample technique.

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.
S is sample size.

Figure1.3: Table for determining sample size from a given population-Source: Keijcie and Morgan, 'determining the sample size of research activities', educational and psychological measurement (1970).

It can be seen from table 1.3 that the number of samples reaching 1 million is also approximately 380, so the sample size determination formula is not required to calculate the sample size required for this study, because the table has all provisions.

1.4 Main data of pilot study

This study shared two pilot surveys. For the first pilot, data sources were collected through journals and relevant researchers. Journals are obtained through Google Scholar, and some are searched through the web of science database to obtain published books and online information from the Internet. According to the relevant topics of this study, the relevant literature is purposefully selected to summarize the information design problems to support and achieve the main objectives. The first pilot survey is to find out consumers' needs for product appearance and different functions when purchasing cultural creative products. The survey results are used for practical research. At the same time, the second pilot is constructed according to the interview results of the first pilot, and the problem is combined according to the attribute factors.

The second pilot study was conducted in the early stage of the study. 15 respondents (n: 15) were randomly selected from the

students of Jingdezhen ceramic Institute and consumers who had purchased ceramic cultural creative products. Test the reliability of the questionnaire to ensure that the measurements and variables used in this study are appropriate. The second experiment aims to explore consumers' perception and satisfaction with the appearance and function of ceramic cultural creative products. The second pilot originates from the first pilot, in which the products envisaged to support their daily life are used as evaluation products. In the second section, four product appearances and eleven product functions are used as indicators. Evaluate the appearance selected in the survey of ceramic cultural creative products and formulate a two-way questionnaire for the product function. In the designed questionnaire, the options include question setting with and without this function. Likert scale was used to design the questionnaire, which was concise and clear. These pilot surveys are very important, and this process will enable researchers to determine whether respondents understand the questions and instructions and whether the meaning of the questions is the same for all respondents.

1.5 Actual Study

The actual investigation of this study comes from the second pilot study. According to the results of the second pilot study, the outline of the questionnaire is basically the same. Although there are many types of ceramic cultural creative products, only one questionnaire of ceramic cultural and creative products is designed. If there are too many questionnaires and the response time is too long, the respondents will feel tired, bored, and stressed. Therefore, some of them do not complete the questionnaire in a simple way. This will create bias and delay obtaining an appropriate response. To improve the response rate and the reliability of the questionnaire, some skills can be used, such as the questionnaire is concise and easy to understand, sending reminders and merging the same questions. In addition, the question setting of the second questionnaire is based on the first questionnaire. The first questionnaire has included the consideration of different types of ceramic cultural creative products. Considering this problem and its impact on the research (which will lead to inaccurate data collection), The researchers decided to use a questionnaire 2 instead of listing different types of ceramic cultural creative products separately to analyze the design and development of ceramic cultural creative products from this questionnaire. Then conduct actual investigation through network investigation.

1.6 Data Analysis

As mentioned earlier, the research method of this study uses the quantitative research method, and the questionnaire is used as a tool to collect data. To analyze the collected data, it is divided into three stages: 1) data sorting, 2) descriptive analysis, 3) inference analysis

1.6.1Data sorting

At this stage, after data input and before complete data analysis, data processing operations need to be done many times. Some of them belong to the routine processing of data, such as checking unqualified data and paying attention to missing data. However, the scale data obtained from the survey need special treatment, and the researchers also need to check the reliability and validity of the scale.

1.6.2 Descriptive Analysis

Referring to Dawson (2019) descriptive analysis is to seek the information content contained in the data set: it may be a sample of larger population data, or it may represent a complete data set under a specific topic. For numerical data, there are many statistical data that can describe each variable. For example, mean and median, standard deviation and skewness and kurtosis describing the distribution of variables, frequency and percentage, cross table analysis and various charts. The first research method of this paper is descriptive analysis, so as to get the conclusion of the impact of other attributes on the analysis data. The purpose is to see the frequency and percentage of respondents' population statistics. The mean and standard deviation of the data are used to observe the respondents' perception of product satisfaction and product attributes.

1.6.3 Inference Analysis

The research data are generally sample data representing a broader population (an organization, employees, customers, or owners, etc.). The research problem is more concerned with the population than the sample (Dawson 2019). Therefore, it is necessary to use inference analysis method to infer the overall situation from the samples.

This method is used to analyze the impact of product design and function on consumers' perception. The conclusions obtained from the questionnaire and interview data are analyzed quantitatively and qualitatively to infer the satisfaction scores of consumers on different elements, so as to provide guidance for the future design of ceramic cultural and creative products that meet the needs of consumers. The conclusions of the analysis are verified and reported in Chapter 5.

1.6.4 AHP (analytic hierarchy process)

Analytic hierarchy process is a structured technology based on Mathematics and psychology, which is used to organize and analyze complex decisions. According to Wikipedia (2021), AHP was developed by Thomas L. Saaty in the 1970s; In 1983, Saaty cooperated with Ernest Forman to develop expert selection software. Since then, AHP has been widely studied and improved. It represents an accurate method to quantify the weight of decision criteria. Through pairwise comparison, the relative size of factors is estimated by using the experience of individual experts. Each respondent used a specially designed questionnaire to compare the relative importance of each pair of items. This paper mainly analyzes the weight of the appearance and function of ceramic cultural creative products through AHP (analytic hierarchy process) and ranks the importance of product appearance and product function, to provide guidance for the design and development of ceramic cultural and creative products in the Forbidden City.

1.7 Validation

The final stage of analyzing the data is to verify the results. The validation is based on the results generated from descriptive analysis and analytic hierarchy process. Interview and open-ended questionnaire were used to verify the results with NVivo analysis data. Use an open-ended questionnaire because it will allow researchers to better understand the respondents' real feelings about a question. NVivo is a powerful qualitative analysis software, which can effectively analyze a variety of different types of data, such as text, pictures, audio, and video. It is the best tool to realize qualitative research. Explore the development trend, establish a theoretical model, and finally get the conclusion of the research problem (Baidu 2011).

1.8 Summary

This chapter outlines the research methods used and the reasons for using them. This chapter introduces the quantitative research methods used, collects data through investigation, and uses SPSS version 21.0 and Microsoft Excel for analysis. The NVivo software package is used to analyze the data obtained for verification purposes. This paper expounds and explains the research theme through the research method. The researchers also mentioned the reference materials used in the process of information and data collection. The next chapter will introduce the results of the analysis survey in detail and explain them to answer the research questions.

2.0 Data collection and analysis introduction

The research methods used in this study are shown in Chapter three. The fourth chapter mainly studies the results of data collection and analysis of questionnaires and interviews, which are used to solve the problems of this paper. In this chapter, the researcher will describe the data analyzed by quantitative research method, draw conclusions through data analysis, complete the research objectives of the paper, and analyze and explain the results. Then, the results of the investigation and research are provided for the conclusions, suggestions, and overview of Chapter six.

Firstly, analyzed the results of the questionnaire survey, and then carried out the actual survey. The first survey is to determine consumers' needs for the appearance and function of cultural

creative products. Then the actual survey is carried out to collect data, descriptive analysis is carried out, and SPSS is used to generate the mean value. For the actual survey, 440 complete questionnaires were used for this analysis. In this study, about 1200 questionnaires were distributed to the respondents, and a total of 510 (n = 510) questionnaires were received, with a response rate of 36.7%, mainly collected through online questionnaires, e-mails, and online interviews. Through screening, a total of 440 questionnaires (n = 440 people) met the requirements of data analysis and completed the questionnaire survey. 440 questionnaires met the criteria of sample size discussed in Chapter III (see Table 3.1). The researchers distributed questionnaires to the respondents who had purchased the ceramic cultural creative products of the Beijing Palace Museum and those who had never purchased them through e-mail. The collected questionnaires were a reliable group for this study.

2.1 Consumer Interview

The main purpose of this interview and survey is to further explore the needs of consumers and understand the factors considered by consumers in the process of purchasing or selecting ceramic cultural creative products according to the survey results of consumers' perception of ceramic cultural and creative products in the Forbidden City. To obtain consumers' views and needs for ceramic cultural creative products of the Forbidden City, preliminary interviews were conducted to obtain their real ideas, to obtain the next research methods.

1、Purpose of the interview: consumers' views and needs for cultural creative products in the Beijing Palace Museum
2、Types of ceramic cultural creative products in the Beijing Palace Museum Palace cat ceramic lamp; Automatic heating water fountain; Emperor cup; White porcelain Dharma    
3、Interview tools: telephone，Internet，paper and pen
4、Interview content: What factors do consumers first consider when choosing ceramic cultural creative products in the Beijing Palace Museum? What appearance factors will consumers consider when choosing ceramic cultural creative products in the Beijing Palace Museum? What product functions will consumers consider when choosing ceramic cultural creative products in the Beijing Palace Museum?

Table 2.1: Interview outline

Summary of interview results: By interviewing 30 consumers,

sorting out the relevant data and combining with the literature, it is concluded that consumers choose ceramic cultural creative products in the Beijing Palace Museum mainly considering the four aspects：product appearance, product basic function, psychological function and additional function.

	Requirement analysis	Relevant demand points
Analysis of consumers' demand for ceramic cultural creative products in the Beijing Palace Museum	A. Product appearance requirements	Modeling design
		Product color
		Product pattern
		Product material
	B. Basic functional requirements	Price
		Safety and environmental protection
		Quality
	C. Psychological functional requirements	Brand
		Product implication
		Product aesthetics
		Multiple functions
		Scientific and technological elements
		The product package is exquisite
	D. Additional functional requirements	Instructions
		Warranty
		Free delivery service

Table2.2： Analysis of consumers' demand for ceramic cultural creative products in the Beijing Palace Museum

2.2 Practical research and analysis

Basic information of consumer		
Question number	Type	Choice
1	Gender	Men
		Female
2	Monthly income	Less than CNY3000
		CN3000—6000
		CNY6000—10000
		Over CNY 10000
3	Age	Under 18
		18-29 years old

		30-59 years old
		Over 60
4	Education background	High school and above
		Specialty
		Undergraduate
		Graduate and above
5	Ways to understand the cultural creative works of ceramics in the Beijing Palace Museum,	radio and television
		Newspapers and magazines
		Wechat, microblog and other social media
		Tiktok, Kwai, etc. short video platform
		Introduction to family and friends
		Go to the Forbidden City and see it with your own eyes
		Never understand
6	Have you ever purchased ceramic cultural creative products of the Beijing Palace Museum?	Yes
		Never
7	Do you prefer to buy cultural creative products of the Beijing Palace Museum ceramics offline or online?	Online
		Offline
8	ls the selection of ceramic cultural creative products of the Beijing Palace Museum based on perceptual experience or rational decision-making?	Perceptual experience
		Rational decision

Question number	Product attributes	likert scale				
	Appearance and function of product	Very dissatisfied	Dissatisfied	Same as	Satisfied	very satisfied
9	Brand					
10	Implication					
11	Product packaging					
12	Modelling design					
13	Scientific and technological elements					

14	Multiple functions					
15	Materials					
16	Color					
17	Product aesthetics					
18	Pattern					
19	Quality					
20	Price					
21	Safety and environmental protection					
22	Warranty					
23	Instructions					
24	Free delivery service					

Table2.3：Officially issued questionnaire

The original data collected from the questionnaire shall be exported through Microsoft Excel application software. The first part of the data analysis is the demographic information of the respondents and the reliability and validity analysis of the appearance and function of ceramic cultural creative products. The descriptive analysis of the questionnaire uses SPSS application software to generate the mean, standard deviation, skewness, and kurtosis, and carries out reliability analysis, exploratory factor analysis and confirmatory factor analysis. In addition, the differences in the appearance, basic functions, psychological functions, and additional functions of ceramic cultural creative products are analyzed from the aspects of gender differences, income level, age, educational background, ways to understand the ceramic cultural creative products of the Forbidden City and whether they have purchased cultural creative products. Finally, through the analytic hierarchy process (AHP), this paper analyzes the weight of product appearance, basic function, psychological function, and additional function, which affect the satisfaction of cultural creative products, and puts forward better suggestions for the design and development of ceramic cultural creative products.

2.3 General situation

As described in Chapter 3, this study needs a sample of at least 384 respondents (n = 384). The researchers collected 440 valid questionnaires and decided to use 440 questionnaires that fully participated in the survey for data analysis, to make the analysis results more reliable. The respondents of the questionnaire were selected by random sampling method. As shown in table 4.3, it is the statistics of the basic information of the respondents.

Categories	Options	Number of cases	Percentage
Gender	Men	195	44.30%
	Female	245	55.70%
Monthly income	Less than CNY3000	75	17.00%
	CN3000—6000	117	26.60%
	CNY6000—10000	157	35.70%
	Over CNY 10000	91	20.70%
Age	Under 18	48	10.90%

	18-29 years old	192	43.60%
	30-59 years old	120	27.30%
	Over 60	80	18.20%
Education background	High school and above	66	15.00%
	Specialty	182	41.40%
	Undergraduate	139	31.60%
	Graduate and above	53	12.00%
Ways to understand the cultural creative works of ceramics in the Beijing Palace Museum,	radio and television	84	19.10%
	Newspapers and magazines	55	12.50%
	Wechat, microblog and other social media	74	16.80%
	Tiktok, Kwai, etc. short video platform	85	19.30%
	Introduction to family and friends	48	10.90%
	Go to the Forbidden City and see it with your own eyes	48	10.90%
	Never understand	46	10.50%
Have you ever purchased ceramic cultural creative products of the Beijing Palace Museum?	Yes	202	45.90%
	Never	238	54.10%
Do you prefer to buy cultural creative products of the Beijing Palace Museum ceramics offline or online?	Online	221	50.20%
	Offline	219	49.80%
ls the selection of ceramic cultural creative products of the Beijing Palace Museum based on perceptual experience or rational decision-making?	Perceptual experience	266	60.50%
	Rational decision	174	39.50%

Table2.4: Basic information of questionnaire1

As shown in table 2.4, nearly half of the respondents are aged between 18-29 (43.6%), followed by 30-59 (27.3%), over 60 (18.2%) and under 18 (10.9%). This shows that most of the respondents in this questionnaire are young people aged 18-29. Among the 440 respondents, more than half are women (55.7%) and the rest are men (44.3%) This shows that women are not only the dominant gender among the respondents, but also those who are interested in participating in the research. The academic level of the respondents is also listed in the table. The table shows that 41.4% of the respondents are holders of college degrees, 31.6% are holders of undergraduate degrees, 15% are holders below high school, and 12% are holders of master's degree or above. Secondly, the main ways to understand the cultural creative products of

ceramics in the Beijing Palace Museum are Tiktok, short video, Kwai，WeChat, micro-blog and other social media account for 55.2%. Then, it was seen by newspapers, family members and friends, and to the Beijing Palace Museum. Lastly，10.5% of the respondents had never known cultural creative products of ceramics in the Beijing Palace Museum.

These data illustrate the adequacy of respondents, especially in terms of education. 45.9% of the respondents in the table have purchased ceramic cultural creative products of the Beijing Palace Museum, and the rest have never purchased, accounting for 54.1%. 50.2% of respondents prefer to buy Ceramic Cultural creative products in online shopping malls, and 60.5% of respondents choose ceramic cultural creative products based on perceptual experience.

Score		Number of cases	Percentage
Modeling design	3.00	86	19.5%
	4.00	207	47.0%
	5.00	147	33.4%
Color	2.00	2	0.5%
	3.00	114	25.9%
	4.00	251	57.0%
	5.00	73	16.6%
Pattern	2.00	4	0.9%
	3.00	52	11.8%
	4.00	212	48.2%
	5.00	172	39.1%
Materials	3.00	59	13.4%
	4.00	257	58.4%
	5.00	124	28.2%
Price	2.00	9	2.0%
	3.00	118	26.8%
	4.00	195	44.3%
	5.00	118	26.8%
Safety and environmental protection	2.00	1	0.2%
	3.00	125	28.4%
	4.00	197	44.8%
	5.00	117	26.6%
Quality	2.00	6	1.4%
	3.00	82	18.6%
	4.00	212	48.2%
	5.00	140	31.8%
Brand	2.00	17	3.9%
	3.00	132	30.0%
	4.00	175	39.8%

	5.00	116	26.4%
Implication	1.00	3	0.7%
	2.00	19	4.3%
	3.00	130	29.5%
	4.00	184	41.8%
	5.00	104	23.6%
Product aesthetics	1.00	4	0.9%
	2.00	16	3.6%
	3.00	130	29.5%
	4.00	188	42.7%
	5.00	102	23.2%
Multiple functions	1.00	2	0.5%
	2.00	18	4.1%
	3.00	129	29.3%
	4.00	188	42.7%
	5.00	103	23.4%
Scientific and technological elements	1.00	4	0.9%
	2.00	20	4.5%
	3.00	121	27.5%
	4.00	185	42.0%
	5.00	110	25.0%
Product packaging	1.00	5	1.1%
	2.00	20	4.5%
	3.00	124	28.2%
	4.00	183	41.6%
	5.00	108	24.5%
Instructions	1.00	1	0.2%
	2.00	23	5.2%
	3.00	108	24.5%
	4.00	232	52.7%
	5.00	76	17.3%
Warranty	2.00	26	5.9%
	3.00	56	12.7%
	4.00	222	50.5%
	5.00	136	30.9%
Free delivery service	2.00	14	3.2%

	3.00	150	34.1%
	4.00	207	47.0%
	5.00	69	15.7%
Valid data		440	100.0%

Table2.5: Basic information of questionnaire 2

This questionnaire is scored by Likert scale, with 1 very dissatisfied, 2 dissatisfied, 3 same as, 4 satisfied and 5 very satisfied. The statistical results of the satisfaction scores of most consumers on the appearance and function of products when purchasing ceramic cultural creative products in the Beijing Palace Museum are obtained. Among them, 47% of consumers are satisfied with the modeling design of ceramic cultural creative products, 57% are satisfied with the color of ceramic cultural creative products, 48.2% are satisfied with the pattern decoration of ceramic cultural creative products, 58.4% are satisfied with the material of ceramic cultural creative products, 44.3% are satisfied with the price of ceramic cultural creative products, and 44.8% are satisfied with the safety and environmental protection function of ceramic cultural creative products, 39.8% of consumers are satisfied with the brand of ceramic cultural creative products, 41.8% of consumers are satisfied with the implied function of products, 42.7% of consumers are satisfied with the beauty of products, 42.7% of consumers are satisfied with multiple functions, 42% of consumers are satisfied with scientific and technological elements, 52.7% of consumers are satisfied with the description of ceramic cultural creative products, and 50.5% of consumers are satisfied with the quality assurance of ceramic cultural creative products, 47% of consumers are satisfied with the free delivery service.

2.4 Descriptive statistics

As described in Chapter three, this section evaluates the appearance design and product function of ceramic cultural and creative products. Product appearance is elaborated from four aspects: product modeling design, product color, product pattern and product material. The product function includes the basic function, psychological function, and additional function of the product. The basic function of the product refers to: product price, safety, environmental protection, and quality; Product psychological function: brand, product implication, modeling design, functional diversification, including scientific and technological elements and product packaging design; Additional functions of the product: Instructions, warranty, and free delivery service. Respondents were asked to rate their opinions on each item or opinion using a five-point Likert scale from 1 to 5 (from dissatisfaction to satisfaction).

There are five statements of product satisfaction, and sixteen product attributes need to be evaluated and rated. The five statements of product satisfaction are 1) Very dissatisfaction; 2) Dissatisfaction; 3) General; 4) Satisfaction; 5) Very Satisfaction. The results of descriptive analysis of respondents' Evaluation on product satisfaction and product attributes are shown in table 2.6.

	N	Minimum value	Maximum value	Mean value	Standard deviation	Skewness	Kurtosis
Brand	440	3	5	4.1386	0.71518	-0.21	-1.03
lmplication	440	2	5	3.8977	0.65856	0.015	-0.47
Product packaging	440	2	5	4.2545	0.69409	-0.553	-0.173
Product aesthetics	440	3	5	4.1477	0.62848	-0.122	-0.535

Scientific and technological elements	440	2	5	3.9591	0.78607	-0.182	-0.777
Multiple functions	440	2	5	3.9773	0.74823	0.004	-1.125
Materials	440	2	5	4.1045	0.74122	-0.372	-0.498
Color	440	2	5	3.8864	0.84076	-0.175	-0.825
Product aesthetics	440	1	5	3.8341	0.86027	-0.342	-0.222
Pattern	440	1	5	3.8364	0.85406	-0.385	-0.019
Quality	440	1	5	3.8455	0.84235	-0.298	-0.319
Price	440	1	5	3.8568	0.87743	-0.449	-0.07
Safety and environmental protection	440	1	5	3.8386	0.88719	-0.465	0.003
Warranty	440	1	5	3.8159	0.78437	-0.432	0.094
Instructions	440	2	5	4.0636	0.81866	-0.769	0.31
Free delivery service	440	2	5	3.7523	0.75161	-0.011	-0.502

Table2.6: Description statistics

The above table is the statistical analysis results of the questionnaire data, mainly including the number of cases, minimum value, maximum value, mean, standard deviation, skewness, and kurtosis, which are used to test the basic level of the questions in the scale and whether the obtained data obey the normal distribution. In mathematical statistics, the statistical values of skewness and kurtosis are often used as the basis for judging whether the data obey the normal distribution. When the absolute values of skewness and kurtosis are less than 3, it indicates that the data meet the normal distribution. The results in the table above show that the absolute values of skewness and kurtosis of each subject are less than 3, indicating that the data obey the normal distribution.

2.5 Common method biases test

To test the common deviation, this paper uses the Harman single factor test method to test the common variance of the recovered data. All the measured data in this paper are put into SPSS for non-rotating factor analysis to test the degree of variation caused by one factor. The results show that the variation explained by the first component is 34.337%, less than 40%, Therefore, there is no common method deviation in this study

Component	Initial eigenvalue			Extract the square sum of the loads			Rotate the square sum of the loads		
	Total	Variance proportion	Accumulate %	Total	Variance proportion	Accumulate %	Total	Variance proportion	Accumulate %
1	14.422	34.337	34.337	14.422	34.337	34.337	5.578	13.281	13.281
2	2.933	6.984	41.322	2.933	6.984	41.322	4.955	11.799	25.080

3	2.303	5.484	46.806	2.303	5.484	46.806	4.031	9.597	34.677
4	2.120	5.047	51.853	2.120	5.047	51.853	3.705	8.822	43.499
5	2.090	4.975	56.828	2.090	4.975	56.828	3.128	7.447	50.946
6	1.662	3.956	60.784	1.662	3.956	60.784	2.888	6.876	57.822
7	1.428	3.401	64.185	1.428	3.401	64.185	2.672	6.363	64.185

Table2.7: Total variance explained

2.6 Reliability and validity analysis of formal questionnaire

2.6.1 Reliability Analysis

	Scale Mean if item Deleted	Scale Variance if item Deleted	Corrected item—Total Correlation	Cronbach's Alpha if item Deleted	Cronbach's Alpha
Modeling design	58.9364	53.650	.469	.885	0.889
Color	59.1773	54.219	.456	.885	
Pattern	58.8205	53.455	.506	.883	
Materials	58.9273	53.689	.542	.882	
Price	59.1159	52.877	.488	.884	
Safety and environmental protection	59.0977	52.981	.508	.883	
Quality	59.1045	53.524	.451	.885	
Brand	59.1886	50.440	.664	.877	
Implication	59.2409	50.930	.603	.879	
Product aesthetics	59.2386	50.902	.611	.879	
Multiple functions	59.2386	51.098	.604	.879	
Scientific and technological elements	59.2182	50.458	.630	.878	
Product packaging	59.2364	50.459	.621	.879	
Instructions	59.2591	53.167	.463	.885	
Warranty	59.0114	52.111	.533	.882	
Free delivery service	59.3227	52.917	.506	.883	

Table2.8: Reliability analysis of formal questionnaire

It can be seen from the above table that the overall Cronbach's alpha coefficient of the questionnaire in this paper is 0.889, which meets the standard of greater than 0.7, indicating that the questionnaire has good internal consistency reliability. The CITC of each question contained in the questionnaire is greater than the standard of 0.4. From the perspective of "deleting the Cronbach's

alpha value of this question", deleting any question will not increase the Cronbach's alpha value. Therefore, the questions of the questionnaire meet the requirements and the reliability of the questionnaire is good.

2.6.2 Exploratory factor analysis of formal questionnaire

KMO and Bartlett test

KMO measure of sampling adequacy		0.893
Bartlett's test of sphericity results	chi-squared approximation	3155.793
	degree of freedom	120
	significance	.000

Table2.9: KMO and Bartlett test

It can be seen from the above table that the KMO value of the scale data is 0.893, the approximate chi square of Bartlett's spherical test is 3115.793, and the p value is less than 0.001, indicating that the questionnaire is suitable for factor analysis.

Topic	Component				
	1	2	3	4	Commonality
Brand	0.801				0.65
Implication	0.785				0.718
Product packaging	0.782				0.623
Modeling design	0.749				0.795
Scientific and technological elements	0.741				0.687
Multiple functions	0.710				0.638
Materials		0.858			0.664
Color		0.830			0.709
Product aesthetics		0.774			0.661
Pattern		0.745			0.655
Quality			0.822		0.58
Price			0.798		0.629
Safety and environmental protection			0.720		0.62
Warranty				0.785	0.725
Instructions				0.781	0.733

Free delivery service				0.737	0.64
Characteristic value	6.026	1.973	1.53	1.196	
Variance contribution rate	23.746	17.578	12.944	12.764	
Cumulative contribution rate	23.746	41.324	54.268	67.032	

Table2.10: Exploratory factor analysis

It can be seen from the above table that four common factors are extracted from exploratory factor analysis, and the extracted four common factors can explain 67.032% of the variation, indicating that the four common factors extracted in this study can effectively explain the 16 questions of the questionnaire and achieve dimensionality reduction; The commonality of the 16 topics is greater than 0.40, indicating that the interpretation rate of the common factor of each topic can reach more than 40%, the load of the topic factor is greater than 0.50 and there is no multiple load, indicating that the correspondence between the topic and the dimension is good. It can also be seen from the gravel map that after factor 5, the gravel map tends to be flat and there is no factor with eigenvalue less than 1. Therefore, it is appropriate to select four common factors, which is consistent with the result after factor rotation.

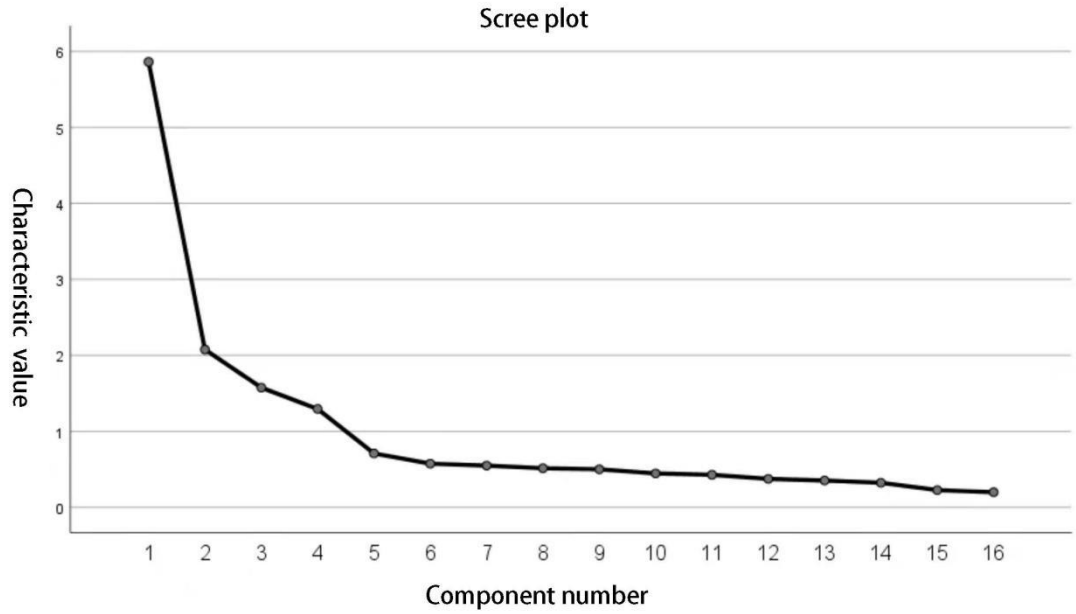

Table2.11: Screen plot

It can be seen from the above table that four common factors are extracted from exploratory factor analysis, and the extracted four common factors can explain 67.032% of the variation, indicating that the four common factors extracted in this study can effectively explain the 16 questions of the questionnaire and achieve dimensionality reduction; The commonality of the 16 topics is greater than 0.40, indicating that the interpretation rate of the common factor of each topic can reach more than 40%, the load of the topic factor is greater than 0.50 and there is no multiple load, indicating that the correspondence between the topic and the dimension is good. It can also be seen from the gravel map that after factor 5, the gravel map tends to be flat and there is no factor with eigenvalue less than 1. Therefore, it is appropriate to select four common factors, which is consistent with the result after

factor rotation.

2.6.3 Confirmatory factor analysis of formal questionnaire

In this study, confirmatory factor analysis was used to investigate structural validity. Structural validity is to explain the consistency between the results obtained from the questionnaire and the theory assumed when designing the questionnaire. Confirmatory factor analysis evaluates the established questionnaire structure through data fitting, then calculates the combination reliability and convergence validity through the factor load value in the model obtained by confirmatory factor analysis. Convergence validity was based on mean variance extraction (AVE) > 0.5. The combination reliability was based on the statistical standard that the CR value was greater than 0.7.

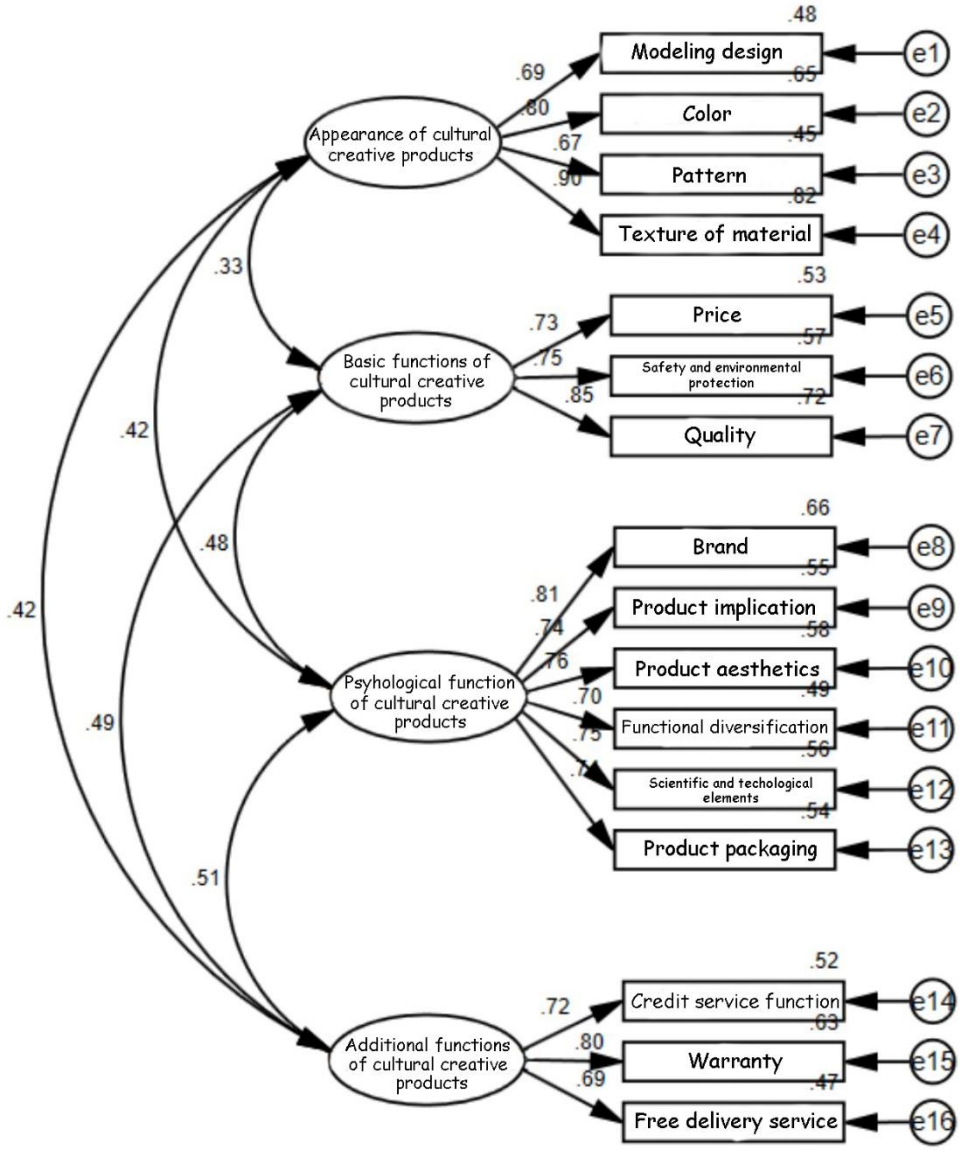

Table2.12: Confirmatory factor analysis

Table2.13: Fit indices of confirmatory factor analysis

Index	Standard value	Model value
c2		174.791
df		98
RMSEA	< 0.08	0.035
GFI	> 0.90	0.952
AGFI	> 0.90	0.934
NFI	> 0.90	0.947
IFI	> 0.90	0.976
TLI	> 0.90	0.971
CFI	> 0.90	0.976
PGFI	> 0.50	0.686
PNFI	> 0.50	0.774
PCFI	> 0.50	0.797
c2/df	< 3.00	1.784

It can be seen from the table that CMIN/ DF is 1.784, GFI is 0.952, AGFI is 0.934, RMSEA is 0.035 and PGFI is 0.686. The fit indices of the measurement model meet the standard value, and the structural validity of the measurement model meets the statistical standard.

Options	Appearance and function	Estimate	S.E.	C.R.	P	Factor loading	CR	AVE
Modeling design	Appearance of cultural creative products	1				0.692		
Color		1.071	0.073	14.767	***	0.804	0.854	0.597
Pattern		0.941	0.072	13.058	***	0.67		
Materials		1.148	0.073	15.739	***	0.903		
Price	Basic functions of cultural creative products	1				0.725		
Safety and environmental protection		0.988	0.072	13.641	***	0.752	0.819	0.603
quality		1.102	0.073	15.056	***	0.847		
Brand	Psychological function of	1			***	0.812		
implication		0.938	0.056	16.617	***	0.744		

Product packaging	cultural creative products	0.951	0.055	17.327	***	0.76		
Multiple functions		0.868	0.056	15.596	***	0.704	0.886	0.565
Scientific and technological elements		0.961	0.057	16.827	***	0.748		
Product aesthetics		0.958	0.058	16.502	***	0.737		
Instructions	Additional functions of cultural creative products	1			***	0.72		
Warranty		1.154	0.086	13.423	***	0.797	0.779	0.541
Free delivery service		0.912	0.076	12.042	***	0.686		

Table2.14: Parameter table of confirmatory factor analysis

It can be seen from the above table that the CR values of the appearance, basic functions, psychological functions, and additional functions of cultural and creative products are 0.854, 0.819, 0.886 and 0.779 respectively, and the AVE are 0.597, 0.603, 0.565 and 0.541 respectively. The combination reliability and convergence validity meet the measurement standards of Statistics. In addition, the factor load value of each topic on its corresponding variable is more than 0.6, P is less than 0.001, which is statistically significant.

2.7 Objective factors influence product appearance and product function

This study analyzes gender, age, educational background, monthly income, ways to understand the ceramic cultural creative products of the Beijing Palace Museum, whether to purchase the ceramic cultural creative products of the Beijing Palace Museum, whether to purchase the ceramic cultural creative products of the Beijing Palace Museum offline or online, whether to choose the cultural creative products based on perceptual experience or rational decision-making, in terms of the appearance of cultural creative products, the basic functions of cultural creative products, the psychological functions of cultural creative products, differences in additional functions of cultural creative products. Among them, gender, whether to purchase the ceramic cultural creative products of the Beijing Palace Museum, whether to purchase the ceramic cultural creative products of the Beijing Palace Museum offline or online, whether to choose cultural creative products based on perceptual experience or rational decision-making, are two classification variables. Using one-way ANOVA, age, education, monthly income, and the way to understand the ceramic cultural creative products of the Beijing Palace Museum are three classification variables or above, one way ANOVA was used.

2.7.1 Gender differences influence product appearance and product function

	Gender	Number of cases	Average value	Standard deviation	t	p
Appearance of cultural creative products	male	195	4.0256	.55900	-2.829	.005
	female	245	4.1765	.55322		
	male	195	4.0051	.64880	-.246	.806

Basic functions of cultural creative products	female	245	4.0204	.64729		
Psychological function of cultural creative products	male	195	3.8308	.70212	-.514	.608
	female	245	3.8646	.67408		
Additional functions of cultural creative products	male	195	3.8803	.67217	.088	.930
	female	245	3.8748	.63857		

Table 2.15: Gender differences

It can be seen from the above table that there are significant differences between different genders in the appearance of cultural creative products ($P < 0.05$). Further through the comparison of mean values, women's score in the appearance of cultural creative products is remarkably higher than that of men, indicating that compared with men, women have a higher understanding of the appearance of cultural creative products. There was no marked difference between different genders in the basic function, psychological function, and additional function of cultural creative products ($P > 0.05$).

2.7.2 Monthly income influence product appearance and product function

Appearance and function	monthly income	Number of cases	Average value	Standard deviation	F	P	LSD
Appearance of cultural creative products	Less than 3000 CNY	75	4.0500	.57540			
	3000-6000 CNY	117	4.0577	.53878	2.053	.106	
	6000-10000 CNY	157	4.1067	.52364			
	More than 10000 CNY	91	4.2308	.62275			
	total	440	4.1097	.56021			
Basic functions of cultural creative products	Less than 3000 CNY	75	3.6578	.59268			
	3000-6000 CNY	117	3.9117	.63937	16.935	.000	4>3>2>1
	6000-10000 CNY	157	4.0934	.63137			
	More than 10000 CNY	91	4.3004	.56885			
	total	440	4.0136	.64726			

Psychological function of cultural creative products	Less than 3000 CNY	75	3.7333	.68060			
	3000-6000 CNY	117	3.7892	.71095	1.983	.116	
	6000-10000 CNY	157	3.8854	.68792			
	More than 10000 CNY	91	3.9615	.64218			
	total	440	3.8496	.68607			
Additional functions of cultural creative products	Less than 3000 CNY	75	3.6889	.64219			
	3000-6000 CNY	117	3.7692	.68294	5.812	.001	3.4>1.2
	6000-10000 CNY	157	3.9597	.63979			
	More than 10000 CNY	91	4.0293	.59140			
	total	440	3.8773	.65292			

Table 2.16: Monthly income differences (Note: in LSD, 4 represents more than 10000 CNY, 3 represents 6000-10000 CNY, 2 represents 3000-6000CNY, and 1 represents less than 3000 CNY)

It can be seen from the above table that different monthly incomes have remarkable differences in the basic functions and additional functions of cultural creative products ($P < 0.05$). Further through the post LSD pairwise comparison, the monthly income of more than 10000 CNY is notably higher than 6000-10000CNY, 6000-10000CNY is markedly higher than 3000-6000CNY, and 3000-6000CNY is significantly higher than less than 3000CNY; It shows that people with higher income have higher requirements for the basic functions of product price, safety, environmental protection, and quality.

In the score of additional functions of cultural creative products, 6000-10000CNY and more than 10000CNY are notedly higher than less than 3000CNY and 3000-6000CNY. It shows that consumers with an income of more than 6000CNY pay more attention to the functions of product instructions, quality assurance and free delivery service than those with a monthly income of less than 6000CNY.

It is concluded from the table that there is no marked difference in the appearance and psychological function of cultural creative products among consumers with different monthly income levels ($P > 0.05$).

2.7.3 Difference of age influence product appearance and function

Appearance and function	Age	Number of cases	Average value	Standard deviation	F	P	LSD
	Under 18	48	4.1979	.52582			

Appearance of cultural creative products	18-29 years old	192	4.0820	.53427	2.394	.068	
	30-59 years old	120	4.0396	.55002			
	Over 60	80	4.2281	.63669			
	total	440	4.1097	.56021			
Basic functions of cultural creative products	Under 18	48	3.6597	.66485			
	18-29 years old	192	3.9028	.64071	17.285	.000	4>3>2>1
	30-59 years old	120	4.0917	.60647			
	Over 60	80	4.3750	.52067			
	total	440	4.0136	.64726			
Psychological function of cultural creative products	Under 18	48	3.8160	.69721			
	18-29 years old	192	3.8090	.69171	1.948	.121	
	30-59 years old	120	3.8167	.67377			
	Over 60	80	4.0167	.67171			
	total	440	3.8496	.68607			
Additional functions of cultural creative products	Under 18	48	3.7986	.68327			
	18-29 years old	192	3.8247	.66399	1.547	.202	
	30-59 years old	120	3.9222	.59052			
	Over 60	80	3.9833	.68928			
	total	440	3.8773	.65292			

Table 2.17: Age differences (Note: in LSD, 4 represents over 60 years old, 3 represents 30-59 years old, 2 represents 18-29 years old, and 1 represents under 18 years old)

It can be seen from the above table that there are remarkable differences in the basic functions of cultural creative products at different ages ($P < 0.05$). Further through the post LSD pairwise comparison, in the basic function scores of cultural creative products, those over 60 years old are significantly higher than those 30-59 years old, 30-59 years old are notedly higher than those 18-29 years old, and 18-29 years old are markedly higher than those under 18 years old. Therefore, the older the age, the price，quality, safety and environmental protection of ceramic cultural creative products are more important. It is not difficult to draw a conclusion from the table that there is no significant difference in the appearance, psychological function, and additional function of cultural creative products among different ages ($P > 0.05$).

2.7.4 Educational background difference influence product

appearance and function

Appearance and function	Educational background	Number of cases	Average value	Standard deviation	F	P	LSD
Appearance of cultural creative products	High school and below	66	4.0644	.51199	4.146	.006	4>1.2.3
	specialty	182	4.1085	.56507			
	undergraduate	139	4.0414	.54640			
	Graduate and above	53	4.3491	.58700			
	total	440	4.1097	.56021			
Basic functions of cultural creative products	High school and below	66	3.9242	.71323	4.414	.005	4>1.2.3
	specialty	182	3.9853	.61376			
	undergraduate	139	3.9808	.65296			
	Graduate and above	53	4.3082	.59503			
	total	440	4.0136	.64726			
Psychological function of cultural creative products	High school and below	66	3.7020	.73177	2.686	.046	2>1.
	specialty	182	3.8974	.68271			4>1.3
	undergraduate	139	3.7938	.65589			
	Graduate and above	53	4.0157	.68427			
	total	440	3.8496	.68607			
Additional functions of cultural creative products	High school and below	66	3.8232	.66466	1.592	.191	
	specialty	182	3.8516	.66341			
	undergraduate	139	3.8681	.63401			
	Graduate and above	53	4.0566	.63963			
	total	440	3.8773	.65292			

Table2.18: Educational background differences (Note: in LSD, 4 represents graduate and above, 3 represents undergraduate, 2 represents specialty, and 1 represents high school and below)

It can be seen from the above table that there are remarkable differences in the appearance, basic functions, and psychological functions of cultural creative products among different educational backgrounds ($P < 0.05$). Further through LSD pairwise comparison, in the appearance score of cultural creative products, graduate students and above are notedly higher than undergraduate, junior college and senior high school and below. Consumers with higher education have higher requirements for product modeling, color, pattern, material, price, safety and environmental protection, quality, implication of cultural creative products, product packaging, functional diversification, scientific and technological elements, and product aesthetics. There was no significant difference in the additional functions of cultural creative products among different educational backgrounds (P >

0.05).

2.7.5 Different ways of understanding cultural creative products influence the appearance and function of products

Appearance and Function	Options	Number of cases	Average value	Standard deviation	F	P	LSD
Appearance of cultural creative products	Radio and television	84	4.0774	.54327	3.927	.001	7>6.5.4.3.2.1
	Newspapers and magazines	55	4.0636	.53623			6>1.2
	wehat microblog and other social media	74	4.1419	.58679			
	Tiktok, Kwai, etc.short vided	85	4.1588	.56279			
	lntroduction to family and friends	48	4.1406	.49170			
	Go to the Forbidden City and see it with your own eves	48	4.3385	.55181			
	Never understand	46	3.8098	.54054			
	Total	440	4.1097	.56021			
Basic functions of cultural creative products	Radio and television	84	3.9960	.63477			
	Newspapers and magazines	55	3.9455	.64395	1.824	.093	
	wehat microblog and other social media	74	3.9144	.65063			
	Tiktok, Kwai, etc.short vided	85	4.0157	.65041			
	lntroduction to family and friends	48	4.0903	.63670			
	Go to the Forbidden City and see it with your own eves	48	4.2639	.63751			
	Never understand	46	3.9420	.64904			
	Total	440	4.0136	.64726			

Psychological function of cultural creative products	Radio and television	84	3.8750	.72987			
	Newspapers and magazines	55	3.7030	.74514	.539	.779	
	wehat microblog and other social media	74	3.8964	.71284			
	Tiktok, Kwai, etc. Short vided	85	3.8431	.66436			
	Introduction to family and friends	48	3.8438	.65450			
	Go to the Forbidden City and see it with your own eves	48	3.8958	.63825			
	Never understand	46	3.8732	.62280			
	Total	440	3.8496	.68607			
Additional functions of cultural creative products	Radio and television	84	3.9365	.73991			
	Newspapers and magazines	55	3.7818	.65174	2.093	.053	
	Wehat microblog and other social media	74	3.8243	.66718			
	Tiktok, Kwai, etc. Short vided	85	3.8902	.60288			
	Introduction to family and friends	48	3.8542	.64470			
	Go to the Forbidden City and see it with your own eves	48	4.1250	.54848			
	Never understand	46	3.7101	.61105			
	Total	440	3.8773	.65292			

Table 2.19: Differences in ways to understand the cultural creative products of ceramics

It can be seen from the above table that there are notable differences in the appearance of cultural creative products in different ways ($P < 0.05$). Further through the pairwise

comparison of LSD, the appearance score of cultural creative products seen in the Beijing palace museum is significantly higher than that of radio, television, newspapers, and magazines; Tiktok, radio and TV, newspapers and magazines, WeChat micro-blog and other social media, shaking hands and short videos, family friends and the Imperial Palace have seen Kwai Fu's own eyes, which are remarkably higher than those they never knew. There was no prominent difference in the basic function, psychological function, and additional function of cultural creative products (P > 0.05).

2.7.6 Whether you have purchased ceramic cultural creative products influence product appearance and unction

	Whether you have purchased ceramic cultural creative products	Number of cases	Average value	Standard deviation	t	p
Appearance of cultural creative products	Yes	202	4.2339	.54412	4.374	.000
	No	238	4.0042	.55307		
Basic functions of cultural creative products	Yes	202	4.1188	.61864	3.172	.002
	No	238	3.9244	.65880		
Psychological function of cultural creative products	Yes	202	3.9777	.65341	3.659	.000
	No	238	3.7409	.69564		
Additional functions of cultural creative products	Yes	202	4.0132	.61924	4.095	.000
	No	238	3.7619	.65980		

Table 2.20: Differences of whether have ever purchased the cultural creative products of ceramics

It can be seen from the above table that there are significant differences in the appearance, basic functions, psychological functions, and additional functions of cultural and creative products (P<0.5). The ceramic cultural creative products purchased from the Beijing Palace Museum were markedly higher than those not purchased from the Forbidden City.

2.7.7 Purchased cultural creative products online or offline influence appearance and function of the products

Appearance and function	Prefer to buy cultural ceramic creative products offline or online	Number of cases	Average value	Standard deviation	t	p
Appearance of cultural creative products	Internet Mall	221	4.1041	.53770	-.210	.834
	Palace Museum Cultural and creative store	219	4.1153	.58322		

Basic functions of cultural creative products	Internet Mall	221	4.0588	.63250	1.473	.141
	Palace Museum Cultural and creative store	219	3.9680	.66013		
Psychological function of cultural creative products	Internet Mall	221	3.7700	.70066	-2.460	.014
	Palace Museum Cultural and creative store	219	3.9300	.66296		
Additional functions of cultural creative products	Internet Mall	221	3.9548	.65979	2.516	.012
	Palace Museum Cultural and creative store	219	3.7991	.63793		

Table 2.21: Differences of purchased the cultural creative products of ceramics online or offline

It can be seen from the above table that different purchase methods have prominent differences in the psychological functions and additional functions of cultural creative products ($P < 0.05$). Further through the mean comparison, the physical stores of the Forbidden City are significantly higher than the online mall in the psychological functions of cultural creative products, such as brand, moral, product packaging, multiple functions, scientific and technological elements, and product aesthetics. In terms of additional functions of cultural creative products, like product specifications, quality assurance and free delivery service, the online mall is notedly higher than the physical store of the Beijing Palace Museum. There were no remarkable differences in the appearance, design, color, pattern, material, and basic functions of cultural creative products: price, safety, environmental protection, and quality ($P > 0.05$).

2.7.8 Perceptual and rational choice influence product appearance and function

Appearance and function	The choice of cultural creative products based on perceptual experience or rational decision-making	Number of cases	Average value	Standard deviation	t	p
Appearance of cultural creative products	Perceptual experience	266	4.1231	.55595	.623	.534
	Rational decision	174	4.0891	.56765		
Basic functions of cultural creative products	Perceptual experience	266	3.9812	.65594	-1.301	.141
	Rational decision	174	4.0632	.63243		
Psychological function of cultural creative products	Perceptual experience	266	3.8653	.68949	.592	.554
	Rational decision	174	3.8257	.68210		
	Perceptual experience	266	3.8647	.66482	-.501	.617

Additional functions of cultural creative products	Rational decision	174	3.8966	.63793		

Table2.22: Differences between perceptual and rational choices

It can be seen from the above table that there is no significant difference between perceptual and rational choices in the appearance, basic functions, psychological functions, and additional functions of cultural creative products ($P > 0.05$).

process

The steps of AHP modeling mainly include establishing hierarchical structure model; Construct index judgment matrix at all levels; Index hierarchy single sorting and consistency test; The overall ranking and consistency test of index levels are as follows:

See Table2.23 for the weight of the final ceramic cultural creative product satisfaction evaluation index system.

2.8 Construction of index system by analytic hierarchy

Primary index	Primary index weight	Secondary index	Secondary index weight	Total weight of hierarchy	Total sorting
Appearance of cultural creative products	0.40	Pattern of ceramic cultural creative products	0.42	0.08	1
		Color of ceramic cultural creative products	0.21	0.08	2
		Materials of ceramic cultural creative products	0.19	0.07	3
		Modeling design of ceramic cultural creative products	0.18	0.06	4
Basic functions of cultural creative products	0.32	Safety and environmental protection	0.42	0.06	5
		Quality	0.31	0.06	6
		Price	0.27	0.05	7
Psychological functions of cultural creative products	0.23	Warranty	0.43	0.03	8
		Free delivery service	0.29	0.03	9
		Instructions	0.18	0.04	10

Additional functions of cultural creative products	0.15	Implication of ceramic cultural creative products	0.21	0.02	11
		Product aesthetics	0.20	0.03	12
		Product packaging	0.19	0.03	13
		Brand	0.17	0.03	14
		Multiple functions	0.13	0.04	15
		Scientific and technological elements	0.10	0.03	16

Table2.23: Index system affecting ceramic cultural creative product satisfaction

2.9 Conclusion

Through analytic hierarchy process, we can easily draw the conclusion that the primary and secondary order should be considered in the design and development of ceramic cultural creative products. The appearance of ceramic cultural creative products and Chinese creative products is the arrangement of high-level to low-level indicators in product design and development, followed by the appearance of ceramic cultural creative products, the basic functions of ceramic cultural creative products, the additional functions of ceramic cultural creative products and the psychological functions of ceramic cultural creative products. By calculating the total weight of secondary indicators, we rank the importance from high to low: pattern of ceramic cultural creative products, color of ceramic cultural creative products, material of ceramic cultural creative products, modeling design, safety and environmental protection, quality, price, quality assurance, free delivery service, instructions, implication of ceramic cultural creative products, beauty of ceramic cultural creative products The packaging design and brand of ceramic cultural creative products, the multiple functions of ceramic cultural creative products, and ceramic cultural creative products contain scientific and technological elements.

Through the questionnaire survey of 440 respondents, the influence of objective factors on the appearance and function of ceramic cultural creative products is concluded:

(1) The score of women in the appearance of ceramic cultural creative products is significantly higher than that of men, indicating that women have a higher understanding of the appearance of ceramic cultural creative products than men.

(2) People with higher income have higher requirements for the basic functions of product price, safety, environmental protection, and quality.

(3) Consumers with an income of more than 6000 yuan pay more attention to the functions of product instructions, quality assurance and free delivery service than those with a monthly income of less than 6000 yuan.

(4) The older you are, the more you value the price, quality, safety, and environmental protection of ceramic cultural creative products.

(5) Consumers with higher education have higher requirements for product modeling, color, pattern, material, price, safety and environmental protection, quality, implication of cultural creative products, product packaging, functional diversification, including scientific and technological elements and product aesthetics.

(6) For the appearance of ceramic cultural creative products, what you see with your own eyes in the Forbidden City is significantly higher than that in radio, television, newspapers,

and magazines; Tiktok, radio and TV, newspapers and magazines, WeChat micro-blog and other social media, shaking hands and short videos, family friends and the Imperial Palace have seen Kwai Fu's own eyes, which are significantly higher than those they never knew.

(7) In terms of the appearance, basic functions, psychological functions and additional functions of ceramic cultural creative products, the scores of ceramic cultural and creative products purchased from the Forbidden City were significantly higher than those not purchased from the Forbidden City.

(8) In terms of psychological functions of ceramic cultural creative products: brand, implication, product packaging, multiple functions, scientific and technological elements and product aesthetic feeling, the physical stores of the Forbidden City are significantly higher than those of the online mall.

(9) In terms of additional functions of ceramic cultural creative products: product specifications, quality assurance and free delivery service, the online mall is significantly higher than the physical store of the Forbidden City.

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