

Research on the Practical Design Process of Lady Bags Through Big Data

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빅데이터를 배경으로 한 여성 가방 실용 디자인 프로세스 연구

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Abstract Based on survey and data analysis, this paper established a separate and hierarchical design process for lady bags. The design process is divided into four parts: survey, concept extraction, separation and hierarchy design and detail improvement. In light of the influence value grade of lady bag design elements, the data of key elements of lady bags were analyzed, and elements related to new product design were extracted to form conceptual elements, and integrated into design experiments at different levels. Then, their usable proportion in design was measured and applied in design to complete the design of new products. Through the experiment, this design process can provide designers with a new design perspective and improves the timeliness and practicability of fashion design.

Key Words : Data Analysis, Design Elements, Lady Bags, Practicality, Design Process

요약 본 논문은 조사 연구와 빅데이터 분석을 바탕으로 여성 가방에 대한 단계별디자인 프로세스를 구축하였다. 이 디자인 프로세스는 조사 연구, 개념 도출, 단계별 디자인, 디테일 개선 등 네 가지 단계로 구분되어 있다. 여성 가방 디자인에 영향을 미치는 요소의 비중을 근거하여 핵심 요소 데이터를 분석하고, 신제품 디자인과 관련된 요소를 추출하여 개념을 조합한 뒤 단계별로 나누어 디자인 실험을 진행하였다. 그로써 디자인에 적용 가능한 비중을 가늠하고, 최종적으로 신제품 디자인에 적용하였다. 이 프로세스는 디자이너에게 새로운 디자인 각도를 제공해 패션 디자인의 실효성과 실용성을 높일 수 있다는 것이 실험으로 입증됐다.

주제어 : 데이터분석, 디자인 요소, 여성 가방, 실용성, 디자인 프로세스

1. Introduction

1.1 Background

Big data is gradually applied in various fields and becomes an important production factor,

which is true of the luggage industry. Expertise to help generate, collect, store, manage, process, analyze, present and utilize data, as well as the information and knowledge derived[1]. However, big data is still at a nascent stage in the fashion

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industry[2]. The design of luggage sees no much improvement, especially the design of fashion lady bags. Among all categories of luggage, lady bags are of the most abundant changes, and consumers have higher and higher requirements for products. The design process suitable for lady bag research and development is more important for designers to improve the design quality. The original design process can not fully meet the fashion and practicality requirements. The designer's previous experiences and an acquired repertoire of various examples and images play a crucial role in problem scoping, ideation, and prioritising[3]. Therefore, designers who lack product experience and do not know much about the structure and technology of luggage will face especially difficult problems. A new design process is needed to improve the timeliness and practicability of fashion design.

1.2 Research Purpose and Objectives

This paper intended to obtain the elements and development trends needed by the design through survey and data analysis, and establish a practical design process of lady bags with separate levels, so as to promote the designed products to be both fashionable and practical. Through this study, the problem of poor practicability of products designed by the fashion product design process was solved. This process allows designers and developers to use existing data to introduce a new design process to complete the design and provides designers with a new design perspective.

1.3 Scope of research

The design process of lady bags is from the design task to the completion of the sample production. The research focus is on before sample production. from the design task to the completion of the design draft before the sample production. As the design process needs data of

product development trend and popular trend, and there is a lack of research theory on the data of lady bag products that can be used for design at present, this part of the content is included in the discussion of this paper, but it is not the focus of the discussion.

2. Theoretical Research

2.1 Definitions

The designer's activity sequence is called the design process[4]. The design process studied in this paper refers to the steps, contents, and transition between them in the design stage.

2.2 Research status

Product development or new product development, which is widely discussed in the literature of product design and industrial design, focuses on the research of design methods and design processes. For example, Eppinger et al. studied the sequence and technical relationship between design tasks to improve the design process and speed up the development progress. Griffin and Page identified the most appropriate method for successful project-level product development, which mainly studies project strategy. Fig. 1 shows that Ulrich and Eppinger put forward a set of clear and detailed product development methods, which integrate the viewpoints of design, manufacturing and marketing, and define the general product development process and key activities in each stage. N. Cross specified the method in the overall strategy from concept to detailed product design and summarized the essence of design idea and design process management from the perspective of product development. Product practical function investigation is a process in which industrial designers put aside the spiritual function and analyze the practical function of the

material level[6]. However, the industrial product design process is practical function-oriented, pays attention to user research, lacks the introduction of fashion elements, and is not suitable for lady bag product design.

Phase 0: Planning	Phase 1: Concept Development	Phase 2: System-Level Design	Phase 3: Detail Design	Phase 4: Testing and Refinement	Phase 5: Production Ramp-Up
<ul style="list-style-type: none"> • Consider product platform and architecture. • Assess new technologies 	<ul style="list-style-type: none"> • Investigate feasibility of product concepts. • Develop industrial design concepts. • Build and test experimental prototypes. 	<ul style="list-style-type: none"> • Generate alternative product architectures. • Define major subsystems and interfaces. • Refine industrial design. 	<ul style="list-style-type: none"> • Define part geometry • Choose materials. • Assign tolerances. • Complete industrial design control documentation. 	<ul style="list-style-type: none"> • Reliability testing. • Life testing. • Performance testing. • Obtain regulatory approvals. • Implement design changes. 	<ul style="list-style-type: none"> • Evaluate early production output.

Fig. 1. General Product Development Process and Key Activities at Each Stage[5]

The research on the design process of fashion products lacks specialized research materials. Most of the current researches focus on design thinking, fashion management, and fashion consumption[7,8]. Intuition is perhaps being a strong element of the designer’s thinking[9]. At present, there is a lack of theoretical research on the design process of lady bags. Most of the design processes of fashion products summarized by some education and training institutions and fashion lady bag designers are creative-oriented and often cannot give good consideration to practicality[10]. Based on the current situation, it is necessary to conduct a multi-dimensional and in-depth study on the design process of lady bag products.

3. Research Methodology

3.1 Research Method of Influence Value of Lady Bag Design Elements

Firstly, the design elements were comprehensively teased out, and then the parts with high correlation with this study were selected. Finally, through expert interviews, the coefficients of relevant factors in each link were obtained, and

the relationship between the coefficients and the correlation degree of the design was specified and the correlation level was formed, so as to determine the key contents affecting the design. Factors with high correlation with key contents are important factors in lady bag design. On this basis, the practical design process of lady bags was put forward, which takes some variables and corresponding grades as weight parameters.

3.1.1 Design Elements of Lady Bags

As shown in Fig. 2, the lady bag design elements include four parts: lady bag product trend, theme, fashion trend and brand style. According to the shape, color, quality, structure and accessories of the products, the contents involved in each link were analyzed respectively, and the lady bag elements related to the design contained in each link were teased out.

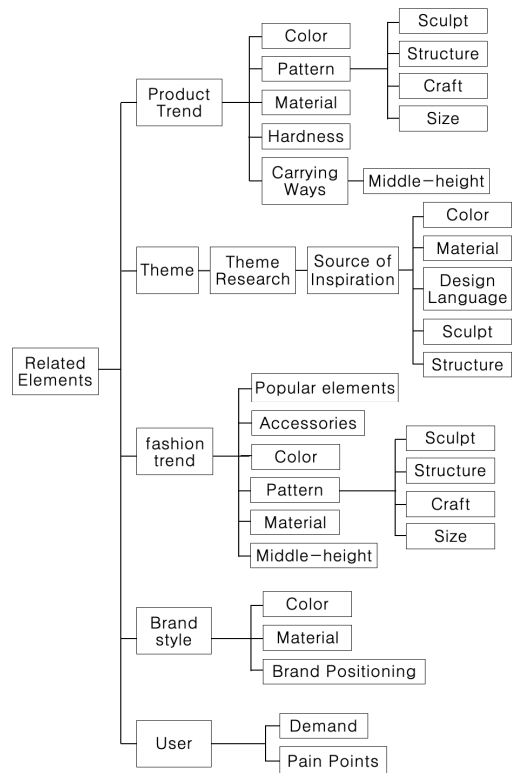


Fig. 2. Design Elements of Lady Bags

3.1.2 Usability Research of Lady Bag Elements in New Product Design

According to the results of combing the design elements of lady bags, it can be seen that the elements related to luggage design contained in the product trend, theme, fashion trend and brand style of lady bags share certain similarities and differences. In the research, through expert interviews and questionnaires, the proportion of influence value of lady bag design elements in each link was determined. The usability of each link and related design elements in new product design was measured according to the proportion of influence value. The five selected experts have been engaged in design and management for more than 12 years in fashion lady bag companies, sports and leisure brand enterprises, designer studios and lady bag fashion brands. When we completed the form, We divided the usability of each element in the new product design into five levels from high to low: A (>50%)、B (40%-50%)、C (30%-40%)、D (20%-30%) and E (<20%) .

Table 1. Usability of Various Elements of Lady Bags in New Product Design

Type	Elements	Rank					
		A	B	C	D	E	
Product Trend	Color				21%		
	Material					8%	
	Pattern	Sculpt					5%
		Structure		47%			
		Craft		50%			
	Size	55%					
Middle-Height	57%						
Softness	41%						
Fashion Trend	Color	68%					
	Material			34%			
	Popular Elements	60%					
	Pattern	Sculpt					13%
		Structure				21%	
		Craft					6%
	Size			32%			
Middle-Height				23%			
Accessories	50%						
Theme	Color			31%			
	Material		47%				
	Design Language	63%					
	Sculpt	72%					
Structure			38%				

The brand style in Table 1 is an integral part of the design of brand handbags and plays an important role in establishing recognition of brand products. However, the focus of this project is to establish a design process that can make the designed products both fashionable and practical, so the brand style was not analyzed concretely.

3.2 Establish a Practical Design Process Model for Lady Bags

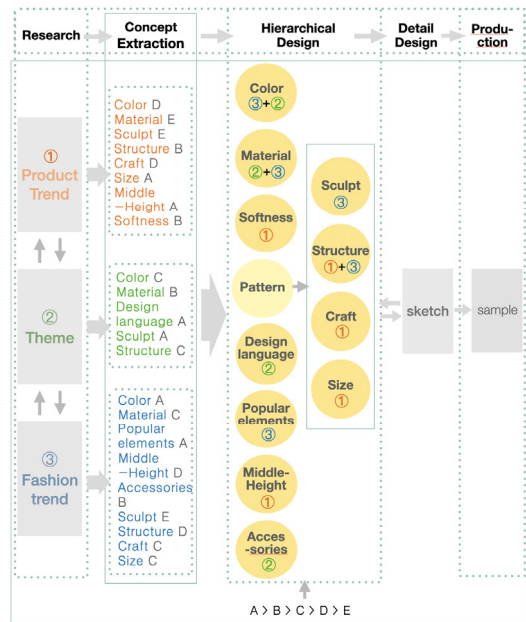


Fig. 3. Factor Separate and Hierarchical Lady Bags Practical Design Process Model

As shown in Fig. 3, the process of lady bag design was divided into three units: survey-concept-detail design and the practical design process model of lady bag was established. Firstly, according to the proportion of influence values of lady bag design elements determined, the survey was carried out; secondly, from all the factors in the five links, the elements with high correlation with the design of lady bag were extracted to form conceptual units; finally, the conceptual elements were measured according to

the proportion of influence values in new product design, and applied to the design to complete the detailed design.

In this process, the usability level of important factors of lady bags in new product design was presented in the form of trends or reference rules in the specific implementation process. The selection of factors in each link and the proportion of cutting into the final design draft can be adjusted properly according to the design tasks and theme requirements. As this study shows, both non-material and material inspiration sources play a role in the design process to ensure the uniqueness and innovation of the design[11].

4. Result Analysis and Evaluation

The usability of lady bag product research in new product design was presented in the form of the trend in the concrete implementation process, which can be used as a reference factor for most lady bag design projects. To facilitate the use in the example verification, we completed this part first.

4.1 Analysis of the Change trend of Lady Bag Products

First of all, the data of lady bag products of 15 leading luggage brands in the world in the past ten years were surveyed, and more than 10 representative lady bag products launched by each brand each year were selected for analysis. The 15 brands included Dissona, Furla, Kate Spade, Loewe, Michael Kors, Miu Miu, Dior, Fendi, Hermes, Louis Vuitton, Prada, Bally, Burberry, Celine, and Coach. How to define design knowledge and how to collect and analysis design data continues to be an issue among design researchers[12,13]. Usually, the research on fashion and fashion will suffer from

selection bias when choosing dependent variables[14], which can be solved by randomly selecting cases and expanding the number of cases. We have analyzed the specific data of more than 5,000 lady bags. This study focused on the elements with grade A in Table 1 and analyzed the changes in height and volume of lady bag products in the recent decade. As can be seen from Fig. 4, in the past decade, the height of the lady bag is getting higher and higher, that is to say, the strap is getting longer and longer. As can be seen from Fig. 5, the size of lady bags has become smaller and smaller in the past decade.

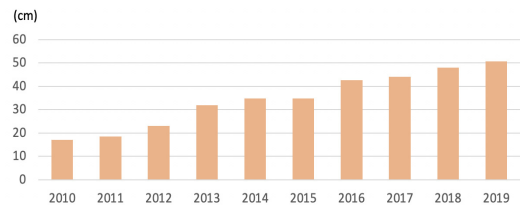


Fig. 4. Change Trend of Heights of Lady Bags from 2010 to 2019

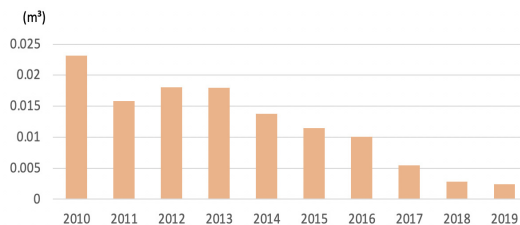


Fig. 5. Change Trend of Lady Bag Volume from 2010 to 2019

Secondly, the product data of lady bags sold by three luggage companies in the past decade were investigated, and the data of lady bags sold were studied and analyzed every five years. No less than 2,000 products were selected in each time period, and a total of 8,150 lady bags were investigated. Through the data survey of sold lady bags, the change analysis of key data was carried out, including height, volume, hardness, structure, etc. Through the analysis of key factor

data of lady bags, the change trend of lady bag products was obtained. As shown in Figures 4 and 5, the changing trend of the height and volume of lady bags is the same as that of the previous part. The height is getting higher and higher, and the volume is getting smaller and smaller. At the same time, as shown in Table 2, the results of this part also show that the structure changes from complex to concise, and the hardness of bags changes from soft to moderate hardness[15].

Table 2. Change Trend of Key Data of Lady Bag

Key Parameters	2006-2010	2011-2015	2016-2020
Middle-height (cm)	12-25	22-35	30-50
Size (cm)	35*45*17	38*26*13	22*16*7
Structure	Double Layers / Multilayer	Single Layer / Double layers	Single Layer
Softness	Soft / Set Exterior	Soft / Semi Set Exterior	Semi Set Exterior

4.2 Example Verification of Practical Design Process of Lady Bags

The completed practical design process of lady bag with factor separation and hierarchy was applied to design practice for verification. Taking the customs of ethnic minorities in Guangxi Zhuang Autonomous Region of China as the theme, the product design with national characteristics is rich in folk customs and unique characteristics, and abundant in datas. Thus, this case was selected for analysis[16,17]. First of all, according to the data obtained from the analysis of the change trend of lady bag products, the product research was completed; secondly, the research on color and popular elements was completed in combination with the popular trend forecast released by WGSN, an authoritative popular trend organization in that year. Then, from the representative customs and

cultural activities of Guangxi ethnic minorities, the elements were extracted for field investigation and data analysis of design theme elements, and the elements that can best represent the theme were screened out. Finally, the factors of new product design formed in the above research were integrated at different levels, and design experiments were carried out to complete the design of new products. Fig. 6 shows the example verification of practical design process of lady bags.

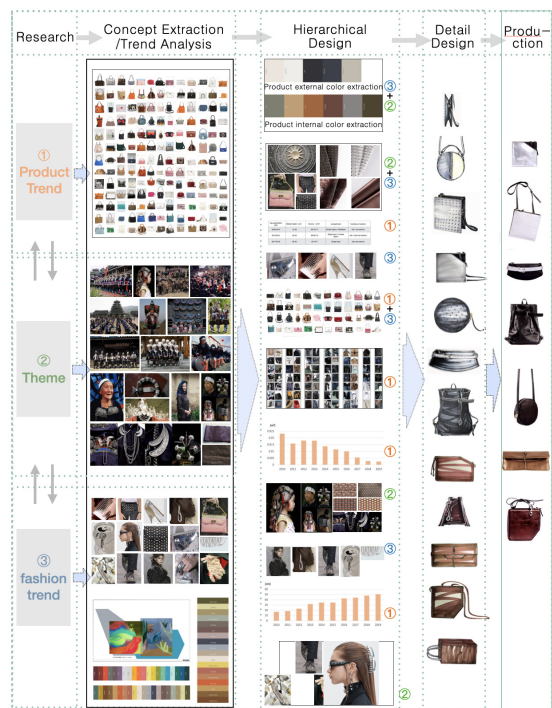


Fig. 6. Example Verification of Practical Design Process of Lady Bags

In the design process, we selected 4 senior students majoring in luggage design who lacked experience in the structure and technology of lady bags, 4 designers with 2 years of lady bag design experience, and 2 designers with 6 years of lady bag design experience. Ten people were divided into two groups, each group with 2 students, 2 designers with 2 years of experience in lady bag design and 1 designer with 6 years of

experience in lady bag design. Before the implementation, the design task was issued to all participants, and the impact level of the completed design elements and the change trend data of lady bags products were provided. For the first group of participants, the practical design process and simple explanation of lady bags with factor separation and hierarchy were provided. Participants in the first group were required to use the practical design process of lady bags for design, while there was no requirement for the second group to use data and design process.

During the experiment, the first group of 5 participants used the practical design process of lady bags as required, and all used the influence level of lady bag design elements and the change trend data of lady bag products. Four people completed the design of lady bag products within the specified time, three people used 70%-80% of the specified time, participants with 6 years of lady bag design experience used 60% of the specified time, and one person did not complete the design beyond the specified time, with a design completion rate of 90%. The reason for failure in finishing the design is that the participants were not skilled in design and cannot adjust the proportion of elements in the design draft according to the requirements of the design task. Also, the participant cannot fully understand and apply the elements. After a further explanation by researchers, the participant completed the design. The participants in the second group all completed the design task within the specified time. One used more than 90% of the specified time, three used 80%-90% of the specified time, and participants with 6 years of experience in lady bag design used 70% of the specified time. The participants in the two groups are the same in fashion level, but the participants in the first group are much more practical than those in the second group. In the second group, two

participants chose to use the impact level of lady bag design elements and the change trend data of lady bag products, including participants with 6 years of design experience and 1 student. Participants with 6 years of design experience have the fastest design speed in the second group of participants, but not as fast as participants with the same experience in the first group. Students who lack experience in luggage structure and technology surpass those who do not use datas in the same group in the practicability of design.

As shown in Table 3, the difference between the two groups can be displayed by dividing fashion, practicality and speed into four grades: A, B, C and D from high to low.

Table 3. Test Results of Practical Design Process of Lady Bags

Modulepartition	Fashion				Practicality				Speed			
	A	B	C	D	A	B	C	D	A	B	C	D
The first group			3	2		1	3	1	1		3	1
The second group			2	3	1	3	1		1	3	1	

5. Conclusion

Through the experiment, this separated and hierarchical practical design process for lady bags based on data analysis is of great help to designers who lack product experience and do not have a deep understanding of the structure and process of lady bags. It can improve the design efficiency and promote the practicability of the products designed by designers while enhancing the fashion degree. Designers with rich experience in luggage structure and technology can also improve their design speed. Meanwhile, the research on the influence level of lady bag design elements and the change trend of lady bag products has solved the problems caused by the lack of research on mature

product elements in the previous design process, especially for designers who lack product experience and do not have a deep understanding of lady bag structure and technology. The analysis results formed by product research can be used in many lady bag designs, and the same research can also be used in men's bag designs. After accumulating certain data, the design project will be completed faster. Due to the difference between the practical design process of the separated and hierarchical lady bag and the design process commonly used by designers, individual person will have problems caused by habits or understanding of the new design process at the initial stage of use, but such problems can be effectively solved through short-term training or frequent use.

In order to facilitate more designers to improve design efficiency, the next step is to conduct research on the design process of other categories of luggage and at the same time conduct research on key data of other categories of bag.

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