



A Method for Creative Scheme Generation for Brand Design of Plush Toys Based on Extension Theory

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Abstract: In the era of branding, the design of plush toy brands often faces a contradiction with the needs of target user groups. Addressing the brand transformation challenges faced by small and micro enterprises in the plush toy industry, this paper proposes a method for generating creative design schemes for plush toy brands based on extension theory. This method involves introducing the theory of primitives, utilizing extension primitives to construct problem models, employing extension diamond thinking for ideation and divergence, and using extension analysis for a comprehensive description of brand design elements. Subsequently, the method involves transforming these elements through extension transformation to generate innovative brand design schemes.

Keywords: Brand design; Plush toys; Extension theory; Idea generation

1 Introduction

The development of science and technology has driven the speed and density of information dissemination to grow geometrically. The significant changes in information dissemination have also accelerated brand communication, gradually shaping a brand-driven economy. As the era of branding has arrived, China has become the largest manufacturer and exporter of plush toys, yet the market share of domestic brands is extremely low. The plush toy industry in China faces a dilemma in brand transformation. How to build and upgrade brands has become a key transformation challenge for toy enterprises [1, 2].

According to related literature, the current mature theories in brand design are mostly proposed by foreign advertising agencies, focusing on brand marketing and communication. Rosser Reeves in the field of brand advertising marketing in Reality in Advertising introduced the famous “USP Theory” [3], emphasizing that the essence of a brand lies in focusing on the differentiated concept of the product; McKinsey & Company’s “McKinsey 7S Model” [4], from a corporate strategy perspective, explains that both the hardware foundations like products and software foundations like brands are equally important in the development process of a company. Domestic brand research is mainly based on new media of the internet, proposing related design principles and strategies. Ma and Hu [5] proposed that based on the context of the internet era, an internet brand image should be built from four aspects: emotional interactivity, intelligent experience, visual diversity, and the fun of new media. Wang [6] elaborated on the trends, basic principles, and design positioning of brand design under the internet background and proposed specific design proposals. Fang and Cai [7] studied the method of user experience innovation driving brand upgrading and gave out the implementation process. Cheng [8] conducted a review of product service systems and service design research, pointing out the current research status, existing problems, and development trends. However, according to our research, both domestic and international studies on brand design lack specific research on practical design methodology. This paper addresses this gap by using extension theory [9–12], utilizing primitives for design element modeling, and applying extension analysis and extension transformation to explore the generation of specific applicable brand design processes and methods.

2 Objective and Condition Definition for the Contradiction in Plush Toy Brand Design

Applying the extension design method to plush toy brand design requires initial modeling of relevant elements using primitives, represented in an orderly tuple $B = (N, C, V)$, wherein B represents a primitive, N represents

the name of the primitive, C represents the characteristic of the primitive, V represents the quantitative value corresponding to the characteristic of the primitive, a single primitive N can have multiple characteristics c_1, c_2, \dots, c_n with v_1, v_2, \dots, v_n respective quantitative values.

$$B = \begin{bmatrix} N, & c_1, & v_1 \\ & c_2, & v_2 \\ & \dots, & \dots \\ & c_n, & v_n \end{bmatrix}$$

In the context of plush toy brand design, primitives are categorized into object elements M , event elements A , and relation elements R . Object elements (M) represent the constituent elements of brand design (such as toys, brand image, promotional posters, platforms, etc.); event elements (A) represent user behaviors in brand design (including needs, experiences, consumption, etc.); and relation elements (R) represent the interactions among the elements of the brand (such as the relationship between brand philosophy and brand products).

Every problem is composed of objectives and conditions. Based on analysis, the primary contradiction in plush toy brand design is that existing brands fail to meet the deeper needs of the consumer group, this leads to the construction of a contradiction problem model for plush toy brand design. Assuming: a problem P is composed of objective G and condition L , forming the contradiction in plush toy brand design, denoted as $P = G * L$. In plush toy brand design problems, when the condition L changes to achieve the objective G , it is termed a compatible problem in the plush toy brand design problem P , denoted as $G \downarrow L$; otherwise, the problem is termed an incompatible problem of P , denoted as $P = G \uparrow L$.

3 Analysis of Plush Toy Brand Design Method Based on Extension Theory

3.1 Analysis of the Diamond Thinking Model in Plush Toy Brand Design

The specific process of the plush toy brand design method is depicted as follows: First, identify the key element B at the starting point of the plush toy brand design thinking pattern. Then, conduct divergent or implicit analysis on this key element B , select the key element after divergence for convergence, and retain the best idea, repeat this cycle until the optimal design point is found. The schematic diagram of diamond thinking in plush toy brand design is shown in Figure 1.

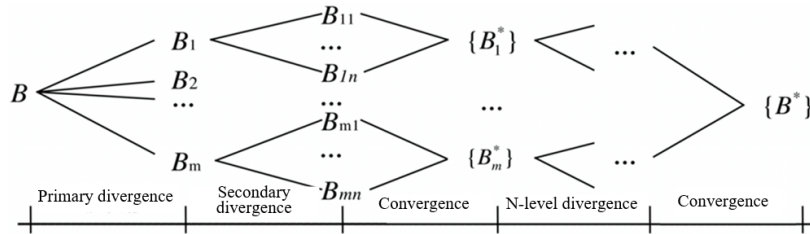


Figure 1. Illustration of diamond thinking in plush toy brand design

Based on the extension theory, the diamond thinking in plush toy brand design can be written as a model:

$$B \dashv \{B_1, B_2, \dots, B_n\} \dashv \{B_{11}, \dots, B_{1n}, \dots, B_{m1}, \dots, B_{mn}\} \vdash \{B_1^*, \dots, B_m^*\}$$

Since plush toy brand design targets diverse audiences, the differences in audience groups lead to varying needs for plush toy brand design. The constraints imposed by users on different plush toy brand design needs also vary, encompassing sensory factors, functional factors, and conceptual factors, among others. Therefore, the objectives of plush toy brand design problems mainly involve the touchpoint needs of user groups, including cognition stage touchpoint needs, perception stage touchpoint needs, and dissemination stage touchpoint needs. During the divergent process of diamond thinking, the needs of plush toy brand design will be analyzed as the target and decomposed hierarchically.

3.2 Implicit and Divergent Analysis in Plush Toy Brand Design

In the contradiction problem of plush toy brand design, the objectives have inclusive and parallel relationships. Through implicit analysis, primitives are used to represent the logical relationship of objectives within the contradiction problem. Superior primitives and subordinate primitives form an implicit system. The and/or rules of implicit analysis are represented as:

- (1) And implication: If B_1 and B_2 are both achieved, then B is necessarily achieved, denoted as $B_1 \wedge B_2 \Rightarrow B$.
- (2) Or implication: If either B_1 or B_2 is achieved, then B is achieved, denoted as $B_1 \vee B_2 \Rightarrow B$.

Divergent analysis of the conditional elements in the contradiction problem of plush toy brand design involves exploring multiple design solutions that satisfy the contradictory problem by diverging conditions. The divergence rules for the conditions in plush toy brand design are represented as:

$$M = (O_m, c_m, v_m) \dashv \begin{bmatrix} O_m & c_{m1} & v_{m1} \\ & c_{m2} & v_{m2} \\ & \dots & \dots \\ & c_{mn} & v_{mn} \end{bmatrix}$$

Based on the diamond thinking in plush toy brand design, implicit analysis of objectives can decompose the overall target needs of plush toy brand design into different sub-goals. Building on the foundation of primitives in plush toy brand design, multiple conditional elements such as sensory factors, functional factors, and conceptual factors are extended from the user cognition level. This systematic approach clearly describes the user's cognition dimensions of the plush toy brand. Then, considering the different characteristics of conditional elements, the characteristics (quantitative values) of conditions are diverged from the perspective of meeting design goals and needs.

The diamond thinking in plush toy brand design, as well as the implicit and divergent analysis discussed in this paper, primarily draw upon methodologies and specific implementations referenced in literatures [13–15].

4 Extension Transformation

After conducting extension analysis on the objectives and conditions of the contradiction problem in plush toy brand design, and clarifying the direction of innovative solutions based on extension analysis, the next step involves specific extension transformations of the analyzed conditional design elements, this transformation aims to convert incompatible contradiction problems into compatible ones through changes in conditions.

In plush toy brand design, the conditional elements undergo object element transformation. The transformation of an object element $M_0 = (N_0, c_0, v_0)$ to another object element $M = (N, c, v)$ or several object elements $M_1 = (N_1, c_1, v_1), \dots, M_n = (N_n, c_n, v_n)$, is termed as the transformation of the object element M_0 , denoted as $TM_0 = M$ or $TM_0 = \{M_1, M_2, \dots, M_n\}$. This mainly involves the displacement and conduction transformations of design elements.

(1) Displacement transformation in plush toy brand design refers to the exchange of single or multiple aspects such as the quantitative value, characteristic, or object of the conditional object element of the contradiction problem, the main rules are:

$$B_0 = (O_0, c_0, v_0), \quad B = TB_0 = (o, c, v)$$

where, B_0 represents the design element primitive involved in the design process, T denotes the transformation of B_0 , and B is the new design element primitive obtained after the transformation.

In practical applications, this paper primarily focuses on the exchange transformation of features and quantitative values of sensory factors, functional factors, and conceptual factors.

(2) When a single change in a single or multiple elements cannot resolve the contradiction problem, conduction transformation thinking is utilized. It is known from extension analysis that the conditional elements of a contradiction problem have correlations and implications. When a brand design element undergoes extension transformation, it induces synchronous transformations in other design elements. If there is $B_1 \sim B_2$, an active transformation is implemented on B_1 , there must be a passive transformation on B_2 , then T_φ is called the conduction transformation caused by φ , and the expression of the rule is:

$$\text{If } \varphi B_1 = B_1', \text{ then } T_\varphi B_2 = B_2'$$

In plush toy brand design, based on the interrelationships among elements, it is known that changes in the set of conceptual elements will respectively induce changes in the sets of functional and sensory elements. That is, when conceptual elements change, it will lead to conduction transformations in functional and sensory elements.

5 Practical Application

5.1 Definition of the Contradiction Problem's Objectives and Conditions

(1) Objective Definition

The design of plush toy brands should meet the daily consumption needs of Generation Z. These needs include home usage, emotional companionship, aesthetic representation, personal expression, and social entertainment. The objective of meeting the needs of Generation Z with plush toy brand design is represented as the event element:

$$G = \left[\begin{array}{l} \text{Satisfaction ,} \\ \text{Dominant object ,} \\ \text{Accepting object ,} \\ \text{Demand characteristics ,} \end{array} \begin{array}{l} \text{Plush toy brand design creative scheme} \\ \text{Generation Z crowd} \\ \text{< Functional characteristics, Aesthetic characteristics, Emotional characteristics >} \end{array} \right]$$

(2) Condition Definition

Based on the positioning of plush toy brand design in this paper, and using conjugate analysis, the conditional object element for plush toy brand design is established, its real part $re(O_m)$ consists of sensory and functional elements, and its imaginary part $im(O_m)$ comprises conceptual elements, $L = re(O_m) \otimes im(O_m)$, expressed as:

$$L = \left[\begin{array}{l} \text{Plush toy brand design ,} \\ \text{Sensory elements ,} \\ \text{Functional elements ,} \\ \text{Conceptual elements ,} \end{array} \begin{array}{l} \text{< Shape, Color, Material, Texture >} \\ \text{< Companionship, Decoration, Cushion, Social interaction >} \\ \text{< Chinese culture, Intimate relationships, Social care >} \end{array} \right]$$

5.2 Extension Analysis of the Target Object

(1) Implicit Analysis of the Objective

Plush toy brand design that meets the consumption needs of Generation Z is a broadly defined objective, involving multidimensional design objects such as physical products, print materials, and online platforms. Therefore, based on diamond thinking, this paper conducts implicit analysis of the objective (as shown in Figure 2), dividing the overall objective into different sub-objectives through extension analysis, thus forming a group of objectives. We then prioritize these sub-objectives, denoted as $G_1 \vee G_2 \vee G_3 \Rightarrow G$.

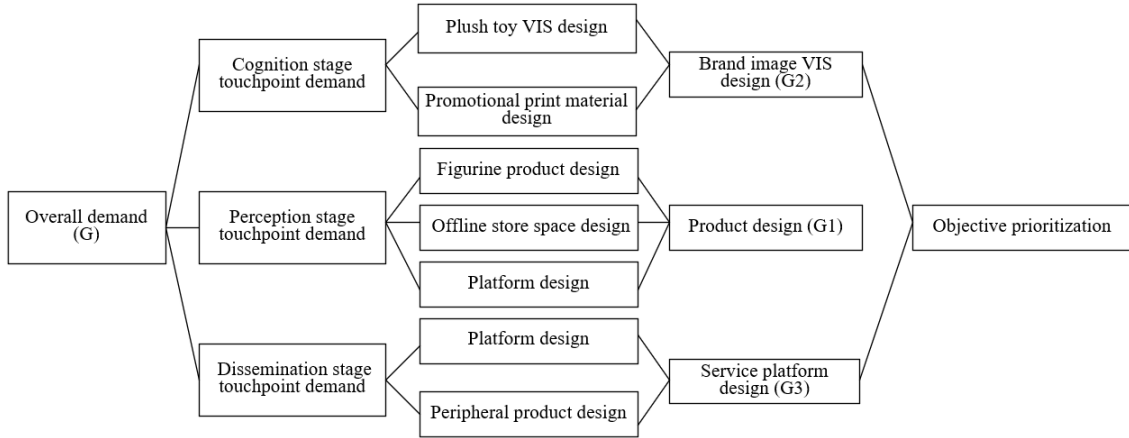


Figure 2. Diamond analysis of objectives in plush toy brand design

From the perspective of the acting object's dimension, the original G (creative scheme for plush toy brand design) is divided into G_1 (plush toy product design), G_2 (plush toy brand image system VIS design), and G_3 (plush toy brand service platform design), each specifically establishing primitives represented as:

$$G_1 = \left[\begin{array}{l} \text{Consumption,} \\ \text{Dominant object,} \\ \text{Accepting object,} \\ \text{Demand characteristics,} \end{array} \begin{array}{l} \text{< Plush toy products >} \\ \text{< Companionship, Decoration, Cushion, Social interaction >} \\ \text{< Home usage, Emotional companionship, Personal expression, Social entertainment >} \end{array} \right]$$

$$G_2 = \left[\begin{array}{l} \text{Identification,} \\ \text{Dominant object,} \\ \text{Accepting object,} \\ \text{Demand characteristics,} \end{array} \begin{array}{l} \text{< Plush toy brand image system VIS >} \\ \text{< Companionship, Decoration, Cushion, Social interaction >} \\ \text{< Style aesthetics, Spread and influence, Emotional semantics, Added value >} \end{array} \right]$$

$$G_3 = \left[\begin{array}{l} \text{Ease of use,} \\ \text{Dominant object,} \\ \text{Accepting object,} \\ \text{Demand characteristics,} \end{array} \begin{array}{l} \text{< Plush toy brand service platform >} \\ \text{< Companionship, Decoration, Cushion, Social interaction >} \\ \text{< Social entertainment, Relationship maintenance, After-sales service, Cultural concept >} \end{array} \right]$$

(2) Correlation and Divergent Analysis of Conditions

Starting from the primitives of plush toy brand design, multiple related element primitives are expanded from the user cognition level: sensory elements, functional elements, and conceptual elements. This approach systematically describes the users' cognitive dimensions of the brand. Among these, the conceptual elements of plush toy brand design have related and directional relationships with sensory and functional elements, resulting in Conceptual Elements $\tilde{\rightarrow}$ Sensory Elements, Conceptual Elements $\tilde{\rightarrow}$ Functional Elements.

$$L = \left[\begin{array}{l} \text{Plush toy brand design ,} \\ \text{Sensory elements ,} \\ \text{Functional elements ,} \\ \text{Conceptual elements ,} \end{array} \begin{array}{l} \\ \text{Sensory elements ,} \\ \text{Functional elements ,} \\ \text{Conceptual elements ,} \end{array} \begin{array}{l} \langle \text{Shape, Color, Material, Texture} \rangle \\ \langle \text{Companionship, Decoration, Cushion, Social interaction} \rangle \\ \langle \text{Chinese culture, Intimate relationships, Social care} \rangle \end{array} \right]$$

Once the target group of problems is determined, corresponding sub-conditions L_1, L_2, L_3 are constructed for condition L based on the implied sub-objectives G_1, G_2, G_3 . These sub-conditions are modeled as object elements, respectively are: $L_1 = M_1$ for (plush toy product design), $L_2 = M_2$ for (plush toy brand image VIS design), and $L_3 = M_3$ for (plush toy service platform design), forming three main components, written as:

$$M_1 = \left[\begin{array}{l} \text{Plush toy brand design,} \\ \text{Sensory elements,} \\ \text{Functional elements,} \\ \text{Demand characteristics,} \end{array} \begin{array}{l} \\ \text{Sensory elements,} \\ \text{Functional elements,} \\ \text{Demand characteristics,} \end{array} \begin{array}{l} \langle \text{Form, Size, Quantity, Material, Color} \rangle \\ \langle \text{Type, Interaction, Scene, Service} \rangle \\ \langle \text{Style, Semantics, Culture, Mode, Positioning} \rangle \end{array} \right]$$

$$M_2 = \left[\begin{array}{l} \text{Plush toy brand image system VIS design,} \\ \text{Sensory elements,} \\ \text{Functional elements,} \\ \text{Demand characteristics,} \end{array} \begin{array}{l} \\ \text{Sensory elements,} \\ \text{Functional elements,} \\ \text{Demand characteristics,} \end{array} \begin{array}{l} \langle \text{Color, Pattern, Logo, Packaging} \rangle \\ \langle \text{Type, Interaction, Scene, Purpose} \rangle \\ \langle \text{Style, Semantics, Culture, Mode, Positioning} \rangle \end{array} \right]$$

$$M_3 = \left[\begin{array}{l} \text{Plush toy brand service platform design,} \\ \text{Sensory elements,} \\ \text{Functional elements,} \\ \text{Demand characteristics,} \end{array} \begin{array}{l} \\ \text{Sensory elements,} \\ \text{Functional elements,} \\ \text{Demand characteristics,} \end{array} \begin{array}{l} \langle \text{Color, Layout, Sound} \rangle \\ \langle \text{Type, Interaction, Scene, Purpose} \rangle \\ \langle \text{Style, Semantics, Culture, Mode, Positioning} \rangle \end{array} \right]$$

An extension analysis using a divergence tree is applied to the conditions of the contradiction problem in plush toy brand design, the conditional object element M_1 {Plush toy product design} undergoes divergent analysis $M_1 \rightarrow \{M_{11}, M_{12}, M_{13}\}$:

$$M_{11} = \left[\begin{array}{l} \text{Sensory elements,} \\ \text{Form,} \\ \text{Size,} \\ \text{Quantity,} \\ \text{Material,} \\ \text{Color,} \\ \text{Filling,} \end{array} \begin{array}{l} \\ \text{Form,} \\ \text{Size,} \\ \text{Quantity,} \\ \text{Material,} \\ \text{Color,} \\ \text{Filling,} \end{array} \begin{array}{l} \text{Animal figurine} \\ \text{25 cm} \\ \text{A set} \\ \text{Long plush} \\ \text{Milky tea color} \\ \text{Cotton} \end{array} \right];$$

$$M_{12} = \left[\begin{array}{l} \text{Functional elements,} \\ \text{Type,} \\ \text{Interaction,} \\ \text{Scene,} \\ \text{After-sales,} \\ \text{Sharing,} \end{array} \begin{array}{l} \\ \text{Type,} \\ \text{Interaction,} \\ \text{Scene,} \\ \text{After-sales,} \\ \text{Sharing,} \end{array} \begin{array}{l} \text{Decoration} \\ \text{Hanging} \\ \text{Bedroom} \\ \text{Return and exchange} \\ \text{Photos} \end{array} \right];$$

$$M_{13} = \left[\begin{array}{l} \text{Conceptual elements,} \\ \text{Style,} \\ \text{Semantics,} \\ \text{Culture,} \\ \text{Service,} \\ \text{Positioning,} \end{array} \begin{array}{l} \\ \text{Style,} \\ \text{Semantics,} \\ \text{Culture,} \\ \text{Service,} \\ \text{Positioning,} \end{array} \begin{array}{l} \text{Cute} \\ \text{Fairy tale} \\ \text{Warm childhood} \\ \text{Traditional retail} \\ \text{High quality} \end{array} \right].$$

The conditional object element M_2 {Plush toy brand image system VIS design} undergoes divergent analysis $M_2 \rightarrow \{M_{21}, M_{22}, M_{23}\}$:

$$M_{21} = \left[\begin{array}{l} \text{Sensory elements,} \\ \text{Color,} \\ \text{Font,} \\ \text{Pattern,} \\ \text{Logo,} \\ \text{Packaging,} \end{array} \begin{array}{l} \\ \text{Color,} \\ \text{Font,} \\ \text{Pattern,} \\ \text{Logo,} \\ \text{Packaging,} \end{array} \begin{array}{l} \text{Red} \\ \text{Rounded and cute} \\ \text{Animals} \\ \text{Text-based} \\ \text{PE plastic} \end{array} \right];$$

$$M_{22} = \left[\begin{array}{l} \text{Functional elements,} \\ \text{Form,} \\ \text{Interaction,} \\ \text{Scene,} \\ \text{Purpose,} \end{array} \begin{array}{l} \\ \text{Form,} \\ \text{Interaction,} \\ \text{Scene,} \\ \text{Purpose,} \end{array} \begin{array}{l} \text{Promotional activity} \\ \text{QR code participation} \\ \text{Holiday promotions} \\ \text{Boost sales} \end{array} \right];$$

$$M_{23} = \left[\begin{array}{l} \text{Conceptual elements,} \\ \text{Style,} \\ \text{Semantics,} \\ \text{Culture,} \\ \text{Service,} \\ \text{Positioning,} \end{array} \begin{array}{l} \\ \text{Style,} \\ \text{Semantics,} \\ \text{Culture,} \\ \text{Service,} \\ \text{Positioning,} \end{array} \begin{array}{l} \text{Cute} \\ \text{Fairy tale} \\ \text{Warm childhood} \\ \text{Traditional retail} \\ \text{High quality} \end{array} \right].$$

The conditional object element M_3 {Plush toy brand service platform design} undergoes divergent analysis $M_3 \rightarrow \{M_{31}, M_{32}, M_{33}\}$:

$$M_{31} = \left[\begin{array}{l} \text{Sensory elements,} \\ \text{Color,} \\ \text{Layout,} \\ \text{Sound,} \\ \text{Icon,} \end{array} \begin{array}{l} \\ \text{Color,} \\ \text{Layout,} \\ \text{Sound,} \\ \text{Icon,} \end{array} \begin{array}{l} \text{Sensory elements} \\ \text{List style} \\ \text{Doll-like voice} \\ \text{Skeuomorphic} \end{array} \right];$$

$$M_{32} = \left[\begin{array}{l} \text{Functional elements,} \\ \text{Form,} \\ \text{Interaction,} \\ \text{Scene,} \\ \text{Purpose,} \\ \text{Personnel,} \end{array} \begin{array}{l} \\ \text{Form,} \\ \text{Interaction,} \\ \text{Scene,} \\ \text{Purpose,} \\ \text{Personnel,} \end{array} \begin{array}{l} \text{Online brand store} \\ \text{Purchase} \\ \text{Third-party platform} \\ \text{After-sales service} \\ \text{3 People} \end{array} \right];$$

$$M_{33} = \begin{bmatrix} \text{Conceptual elements,} & \text{Style,} & \text{Cute} \\ & \text{Semantics,} & \text{Fairy tale} \\ & \text{Culture,} & \text{Warm childhood} \\ & \text{Service,} & \text{Traditional retail} \\ & \text{Positioning,} & \text{High quality} \end{bmatrix}.$$

5.3 Generating Creative Solutions Through Extension Transformation

To achieve objective G , extension transformations are applied to the condition object elements identified in the divergent analysis. In extension theory, primitives can undergo transformations such as replacement, addition or deletion, aggregation or separation, expansion or contraction. This paper first applies replacement transformation to the common conceptual element primitive. Given the correlation between conceptual elements and sensory as well as functional elements, a change in the conceptual elements will inevitably lead to transformations in sensory and functional elements. Based on this, conduction transformations are applied to the functional and sensory elements, resulting in new element primitives.

First, a replacement transformation is applied to the common conceptual element primitive. By performing replacement transformation on M_{13} , new element primitives are obtained:

$$M_{33} = \begin{bmatrix} \text{Conceptual elements,} & \text{Style,} & \text{Cute} \\ & \text{Semantics,} & \text{Fairy tale} \\ & \text{Culture,} & \text{Warm childhood} \\ & \text{Service,} & \text{Traditional retail} \\ & \text{Positioning,} & \text{High quality} \end{bmatrix} == M_{23} = M_{33};$$

$$M_{13}' = TM_{13} = \begin{bmatrix} \text{Conceptual elements,} & \text{Style,} & \text{Trendy} \\ & \text{Semantics,} & \text{Cultural heritage} \\ & \text{Culture,} & \text{Traditional Chinese culture} \\ & \text{Service,} & \text{New retail} \\ & \text{Positioning,} & \text{Exquisite and high - end} \end{bmatrix} = M_{23}' = M_{33}'.$$

The replaced conceptual element set $\{M_{13}', M_{23}', M_{33}'\}$ respectively induces conduction transformations in the functional and sensory element sets, forming new element sets $\{M_{11}', M_{12}', M_{13}'\}$, $\{M_{21}', M_{22}', M_{23}'\}$, $\{M_{31}', M_{32}', M_{33}'\}$.

The new conditional element $M_1' = M_{11}' \otimes M_{12}' \otimes M_{13}'$ generated from the conduction transformation is:

$$M_{13}' \rightarrow TM_{11} = \begin{bmatrix} \text{Sensory elements,} & \text{Form,} & \text{Traditional cultural images, such as zodiac series} \\ & \text{Size,} & \text{25 cm} \\ & \text{Quantity,} & \text{Series} \\ & \text{Material,} & \text{Long plush} \\ & \text{Color,} & \text{Traditional cultural colors, blue, red, yellow, white, black} \\ & \text{Filling,} & \text{Cotton} \end{bmatrix} = M_{11}'$$

$$M_{13}' \rightarrow TM_{12} = \begin{bmatrix} \text{Functional elements,} & \text{Type,} & \text{Decorative collection} \\ & \text{Interaction,} & \text{Standing} \\ & \text{Scene,} & \text{Multiple scenes} \\ & \text{Service,} & \text{Additional peripheral products} \\ & \text{Sharing,} & \text{Display on social platforms} \end{bmatrix} = M_{12}'$$

The new conditional element $M_2' = M_{21}' \otimes M_{22}' \otimes M_{23}'$ generated from the conduction transformation is:

$$M_{23}' \rightarrow TM_{21} = \begin{bmatrix} \text{Sensory elements,} & \text{Color,} & \text{Colored black} \\ & \text{Font,} & \text{New calligraphy style} \\ & \text{Pattern,} & \text{Traditional patterns} \\ & \text{Logo,} & \text{Text - based} \\ & \text{Packaging,} & \text{Traditional fabric bags} \end{bmatrix} = M_{21}'$$

$$M_{23}' \rightarrow TM_{22} = \begin{bmatrix} \text{Functional elements,} & \text{Form,} & \text{Promotion} \\ & \text{Interaction,} & \text{Event posters, cards} \dots \\ & \text{Scene,} & \text{Additional peripheral products} \\ & \text{Purpose,} & \text{Promoting brand philosophy} \end{bmatrix} = M_{22}'$$

The new conditional element $M_3' = M_{31}' \otimes M_{32}' \otimes M_{33}'$ generated from the conduction transformation is:

$$M_{33}' \rightarrow TM_{31} = \begin{bmatrix} \text{Sensory elements,} & \text{Color,} & \text{Neutral colors} \\ & \text{Layout,} & \text{Card} \\ & \text{Sound,} & \text{Storytelling voice} \\ & \text{Icon,} & \text{Skeuomorphic} \end{bmatrix} = M_{31}'$$

$$M_{33}' \rightarrow TM_{32} = \begin{bmatrix} \text{Functional elements,} & \text{Form,} & \text{Online purchase platform and community} \\ & \text{Interaction,} & \text{< Homepage, Community, After - sales, Consumption >} \\ & \text{Scene,} & \text{WeChat Mini Program + WeChat Community} \\ & \text{Purpose,} & \text{Communication and sharing, Handling idle items} \\ & \text{Personnel,} & \text{One - to - one service officer} \end{bmatrix} = M_{32}'$$

Through extension transformation, a new plush toy brand design scheme $M^* = M_1' \wedge M_2' \wedge M_3'$ is generated, which is design concept oriented at popular Garage Kits and aims at promoting traditional Chinese culture. The plush toy products are primarily based on traditional Chinese cultural images, focusing on a series of products for trendy collection and decoration, such as the Chinese Zodiac or mythological figures from the Classic of Mountains and Seas. The color scheme of the toys matches traditional hues in accordance with their cultural imagery. The plush toy brand image system also follows the design concept, combining dark colors with traditional colors to create a trend of national style. Traditional calligraphy is used as the brand font, and traditional cultural patterns are extracted for application in brand derivative products and packaging, using traditional fabrics for product packaging. For the brand service platform, a dedicated lightweight shopping mini-program on WeChat is chosen, and WeChat groups are used for brand community interaction and services. The brand service platform is built within the WeChat ecosystem, maintaining a consistent visual style with the brand identity system.

6 Implementation of the Plush Toy Brand Design Scheme

Based on the creative solutions derived from the extension algorithm analysis, further in-depth design is conducted. The design concepts are sketched and visualized, presenting the specific design practices through visual language. The presentation of creative solution M^* is carried out in three modules: plush toy product design, plush toy brand image identification VIS system design, and brand service platform design.

It is known that the design scheme M^* focuses on promoting traditional Chinese culture through trendy figurines. By applying diamond thinking to M^* , specific national trend design themes were identified. After brainstorming and expert consultation, the design theme was converged to the quintessence of Chinese opera, specifically focusing on Peking Opera for this design. At the product level of the brand, Peking Opera is characterized by five distinct character types: Sheng (male lead), Dan (female lead), Jing (painted face), Mo (male supporting role), and Chou (clown). These characters, with their notable features and high recognizability, are reimagined and redesigned as the main products of the plush toy brand. At the brand image system level, Peking Opera is known for its diverse and vivid colors with strong visual impact and specific meanings. These colors are flexibly applied to the brand image and platform interface design to enhance the brand's color recognizability. The Lingdu-Kunpeng style is selected as the calligraphy font for brand promotion, and traditional patterns are chosen for brand promotional packaging, emphasizing the brand's concept of promoting traditional culture. At the brand platform level, elements such as ancient patterns, Peking Opera facial makeup, and calligraphy are used in the design, integrating opera and national trend elements.

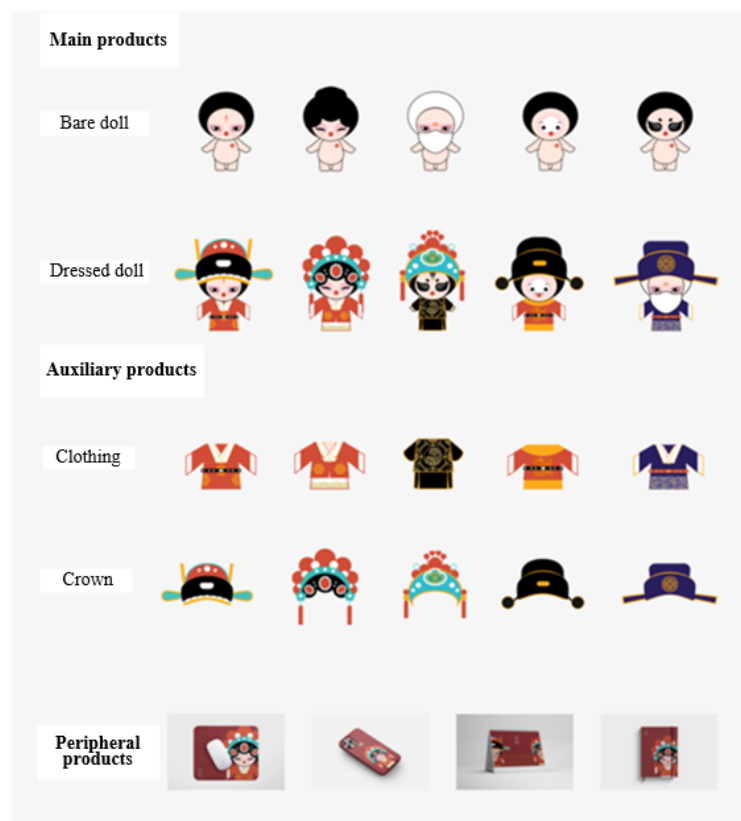


Figure 3. Display of Peking opera-themed brand design products

6.1 In-Depth Design of Plush Toy Brand Product Extension

The Peking Opera-themed plush toy brand products are categorized into three types, as shown in Figure 3:

(1) Main Products: Peking Opera character image plush toy figurine series, including four series - “Sheng Series, Dan Series, Jing Series, Chou Series” with each series offering bare dolls and dressed dolls.

(2) Auxiliary Products: Peking Opera character costumes and props, allowing consumers to purchase different outfits separately to dress up their dolls.

(3) Peripheral Products: Brand-derived peripheral products such as pillows, tapes, cups, notebooks, and other cultural and creative peripherals, which expand the brand’s influence through everyday items and can also serve as gifts to maintain customer relationships.

6.2 Deepening the Design of the Plush Toy Brand Image System

In line with the opera concept, the character “戏” (Xi, meaning ‘drama’ or ‘play’) is chosen as the core element of the brand name, defining the brand name as “有戏” (You Xi, meaning ‘promising’ or ‘there’s play’). This name signifies that the brand revolves around the theme of opera culture, while also conveying a deeper message of positive intention and promising prospects. The name also carries an emotional connotation for consumers: life is like a play, and everyone is the main character in their life’s drama. The brand logo for “有戏” is designed in a seal style, incorporating the frequently seen national style plum blossom elements in Peking Opera. The brand’s promotional font uses Lingdu Kunpeng calligraphy style, and the main text font is Fangzheng Qingke Ben Yue Song Simplified. The primary color scheme of the brand is brick red, representing the national color, complemented by gold, emphasizing the brand’s luxuriousness with a red and gold color combination. Traditional Chinese patterns such as auspicious patterns, cloud patterns, swastika patterns, and chain patterns are used as brand packaging and promotional materials. The design scenarios for the brand image identification system mainly feature brand peripheral products, as shown in Figures 4-8.



Figure 4. Logo of the Peking opera plush toy brand image identification system



Figure 5. Font of the Peking opera plush toy brand image identification system

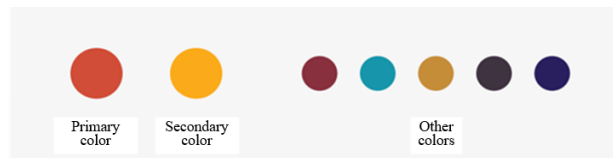


Figure 6. Color scheme of the Peking opera plush toy brand image identification system



Figure 7. Pattern design of the Peking opera plush toy brand image identification system



Figure 8. Application scenarios of the Peking opera plush toy brand image identification system

6.3 Deepening the Design of the Plush Toy Brand Service Platform

With the shift in consumer behavior from offline to online, an online brand service platform becomes a critical bridge between the brand and its consumers. The design of such a platform should adhere to principles of complete functionality, smooth interaction, and aesthetic interface to enhance the user's contact experience with the brand, thereby increasing brand affinity and creating brand value. The “有戏” plush toy brand service platform is structured based on user needs into several key modules: home, shopping, doll community, and my account, addressing users' main needs such as shopping, communication, after-sales, and brand information. The platform's interface design style follows the overall brand style, maintaining consistency in design principles. Interface colors utilize traditional Chinese colors like crow black, rust red, silver white, tea white, and frost color. The layout incorporates card-style arrangement for easy consumer access to image information, and icons use a unified linear style, which is clear in meaning and aligns with the national style. The specific interface design is shown in Figure 9.

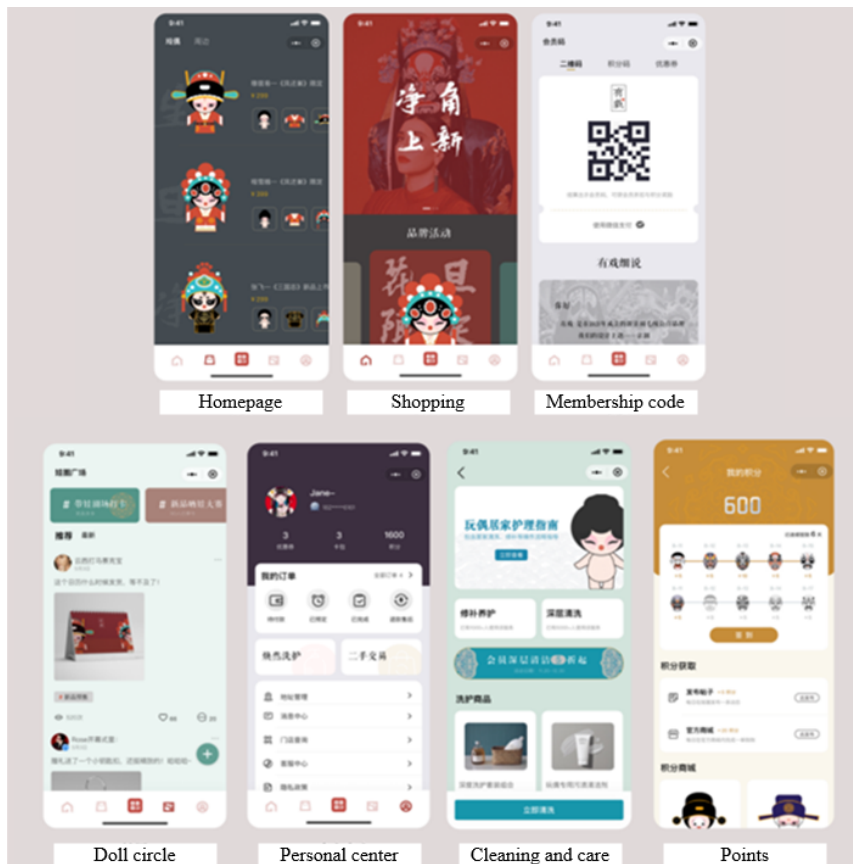


Figure 9. Interface design of the Peking opera plush toy brand service platform

7 Conclusion

This paper mainly explores how to apply service thinking and extension design methods to plush toy brand design, addressing the contradiction between current user needs and plush toy brand design. Initially, the author analyzed

the current status of plush toy brand design and target user needs through brand service touchpoints, summarizing the contradictions between them. Using extension theory, these contradictions are modeled and algorithms to solve design problems are explored. Combining extension thinking, extension analysis, and extension transformation from extension theory, the fuzzy and jumping process of plush toy brand design is described as a structured brand design algorithm model. The model includes the following steps: (1) defining the objectives and conditions of the contradiction problem; (2) conducting extension analysis of the target object; (3) generating creative solutions through extension transformation. Applying this design method to the example of plush toy brand design, the final “有戏” national trend creative scheme is generated, proving the feasibility of the method. This provides guiding suggestions for the brand transformation of Chinese plush toy enterprises, creating brand value and assets.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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