Dynamic Commercial Poster Design Based on AHP in Digital Media

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Abstract. Based on AHP and the design theory of dynamic commercial posters, a set of dynamic commercial posters for Wahaha juice drinks is designed. Firstly, the dynamic commercial poster design system is constructed. Secondly, the key design elements and their hierarchical models of dynamic commercial posters are constructed based on AHP, and the weights of important design elements are calculated to generate the important order of key design elements. Finally, according to the above analysis, we will guide the completion of Wahaha juice beverage dynamic commercial poster design scheme. This paper verifies the applicability of AHP in the commercial dynamic poster through an example, and endows the design process of the commercial dynamic poster with scientificity and comprehensiveness. It makes up for the defect of perceptual dominance with rational methods, and optimizes the promotion and publicity of enterprise products from the perspective of commercial dynamic posters.

Keywords: commercial · visual arts · dynamic posters · AHP

1 Introduction

With the continuous development of digital media and technology, dynamic posters are constantly being applied and innovated in the commercial field. Commercial dynamic posters have clear demands for information transmission, but at present, some designers ignore the accuracy of information in order to strengthen the visual effect. There are also some designers who pay attention to the accurate transmission of information, but make the poster appear dull and unattractive. A successful commercial dynamic poster should not only attract the audience's attention, but also convey ideas, concepts, and cultural information through clever design thinking, so as to better promote the product.

Wahaha juice drink is a drink with the key of "healthy nutrition, delicious vitality". Combining the AHP and the theoretical knowledge of dynamic poster design, this paper proposes a more logical dynamic poster design thinking for Wahaha juice drinks, and builds a more scientific and comprehensive commercial dynamic poster design system. In the early stage of dynamic poster design, the design scheme is obtained through the analysis of key design elements, calculation of weight coefficients, and ranking of importance. The author aims to layer and order the complex key design elements, improve the creative empowerment of commercial dynamic posters, and thus promote better publicity and promotion of brand products.

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2 Dynamic Commercial Posters and AHP

2.1 Dynamic Commercial Posters

Commercial dynamic poster is an advertising form that uses multimedia technology to publicize the theme content such as products, activities and enterprises by using graphics, text, and sounds [1]. It is a common form of expressing a specific commodity, business service or corporate idea with the purpose of attracting consumers to purchase the product or service and promoting the business and product. Both the dynamic commercial poster and the traditional commercial poster need the design of graphic, color, text and other visual elements. However, compared with traditional posters, dynamic commercial posters add the dimension of time. In this dimension, the addition of dynamic effect design and sound effect enhances the comprehensive performance of dynamic posters, and the audience can experience richer audio-visual effects while obtaining information. Moreover, with the development of multimedia information technology and the support of different digital carriers, dynamic posters have a variety of convenient dissemination methods and a wide and efficient dissemination range. In short, dynamic commercial posters have two characteristics: diverse design expressions and interactive design effects [2].

2.2 Overview of AHP

AHP is a multi-criteria decision-making method, which is different from a single qualitative analysis method and quantitative analysis method. It cleverly uses a hierarchical structure to represent complex decision problems [3]. Further, according to the user's subjective judgment and scientific calculation, the priority of the alternative solution is obtained. AHP has been developed since the 1970s and has been widely used in many fields such as ecological environment, mathematics, industrial design, information systems and so on. In the process of commercial dynamic poster design, it can layer and order complex key design elements, and combine subjective and objective factors to determine the weight of key elements, so as to obtain an intuitive evaluation of more logical design ideas.

3 Model Construction of Dynamic Commercial Poster Design System

Design is a comprehensive discipline that can reflect the aesthetics of the collision between sensibility and rationality. Dynamic commercial posters are a combination of graphic design, animation, psychology, advertising, digital technology and other disciplines. Therefore, it is very important to summarize a set of dynamic commercial poster design system with modern design thinking on the basis of good theoretical knowledge and professional skills of dynamic commercial poster design.

Through case analysis and theoretical research, combined with rational logic and perceptual intuition, a dynamic commercial poster design system is constructed, which consists of three main stages: design positioning stage, design analysis stage and design practice stage. See Fig. 1 for details.

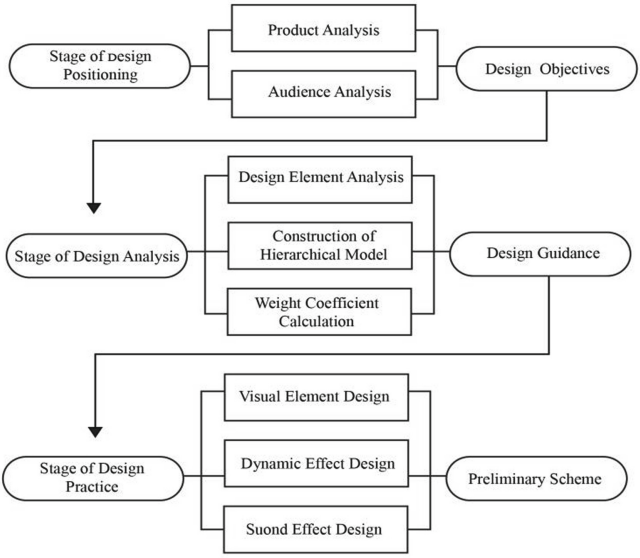

Fig. 1. Model diagram of design system

The stage of design positioning mainly starts from the analysis of the product to be promoted and the audience of the product, combined with the theme and purpose of the advertisement, and fully understands the customer's design needs. The stage of design analysis is the core stage of the dynamic poster design of Wahaha's juice drinks. At this stage, it is necessary to analyze and summarize the various elements in the dynamic poster design based on the theory of dynamic poster design and previous design experience. Organize the interview results, build an AHP hierarchical model of key design elements of Wahaha juice drinks, and calculate the weight coefficient and important ranking of each key element in the python environment to guide the design and implementation of the next stage; In the stage of design practice, the visual elements, dynamic effects and sound effects of the dynamic poster are designed in turn under the guidance of the weight coefficient and importance ranking of the second stage and in combination with the design positioning of the first stage.

4 Stage of Design Positioning

The design demands of enterprises or brands on commercial dynamic posters and the positioning of products themselves determine the design trend. Fully understanding the design demands of enterprises and determining the design positioning according to the characteristics of the products is a necessary condition for the completion of an excellent commercial dynamic poster. The dynamic poster design positioning of Wahaha juice drink is based on product positioning, advertising theme, advertising purpose, audience analysis, etc., as shown in Table 1.

Table 1. Analysis Of Design Positioning

Product Positioning	Fashion leader of high cost-effective medium and high juice content.
Selling Points of Advertising	Medium and high juice content, high cost performance and good aftertaste; Good fruit is a good place of origin, natural color processing and good nutrition; Multi specification packaging, enjoy delicious meals at any time.
Advertising Theme	Good fruit, good juice, good taste.
Advertising Purpose	Highlight product positioning; To create a personality image that conforms to the product tone in the hearts of the target population; Improve the popularity and goodwill of the product among the target population; Attract consumers to buy.
Audience	People of all ages, especially young people aged 12–35 who pay attention to cost-effectiveness and quality and have a need for nutrition and health.

5 Stage of Design Analysis

5.1 Analysis of Key Design Elements

Through literature research and summing up previous design experience, a collection of key elements of commercial dynamic poster design is constructed. Among them, the criterion layer and the sub-criteria layer contain 3 and 9 key design elements respectively. The criteria layer of the hierarchical model mainly contains the visual elements, dynamic effects and sound effects of the Wahaha juice drink dynamic poster. Visual elements include graphic design, typeface design and color matching; Dynamic effects include graphic motion, color alternation and layout motion; The sound effects include background music, mimetic design and character voice, as shown in Table 2.

5.2 Construction of AHP Hierarchy Model

In the collection of key design elements, the importance of each element is different, so the construction and analysis of the hierarchical model of each element can make people design posters more clearly and logically. The AHP hierarchy model of Wahaha juice beverage dynamic commercial poster design is shown in Fig. 2.

5.3 Weight Coefficient Calculations

1) Judging Rectangle Construction: Judging rectangle construction is the information base of AHP model. Suppose that each vector element in the judgment matrix is a_{ij} and $a_{ij} > 0$, a_{ij} represents the importance of the index a_i to a_j, after reverse comparison, the result is $\frac{1}{a_{ij}}$ (i, j = 1, 2,….n), where n is the order of the judgment matrix. Taking Wahaha dynamic commercial poster design as the target layer, the judgment matrix of

Table 2. Collection of Key Design Elements

Criterion Layer	Subcriteria Layer	Content of Subcriteria Layer
Visual Elements B_1	Graphic design C_1	Outstanding aesthetic and creativity
	typeface design C_2	Font selection and typesetting are aesthetic
	color matching C_3	Color application conforms to product style positioning
Dynamic Effect B_2	graphic motion C_4	Displacement, shape change and property change
	color alternation C_5	Contrast change of hue, purity and brightness
	layout motion C_6	Form visual flow according to certain order
Sound Effect B_3	background music C_7	Environment sound required by the picture
	mimetic design C_8	Simulate the desired sound effect with onomatopoeia props
	character voice C_9	Conform to the characteristics and styles of the characters in the poster

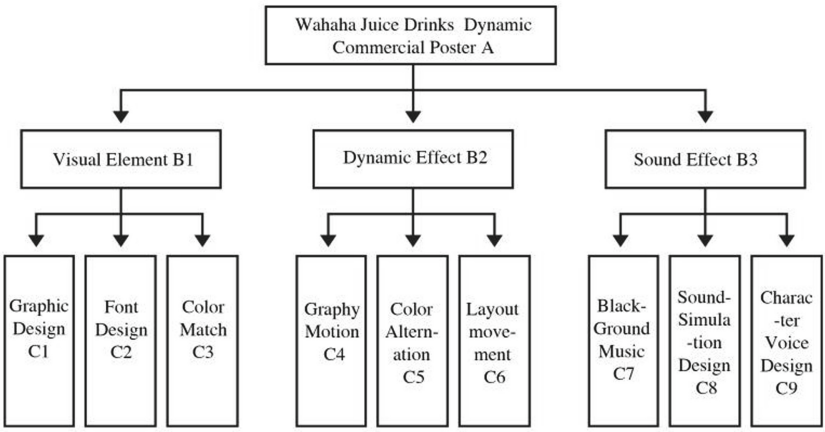

Fig. 2. AHP hierarchy model.

corresponding levels is constructed according to the relative importance of the key design elements: visual elements, dynamic effects and sound effects in the design process. The choice of different scales will have different effects on the construction of judgment matrix. The 1–9 scale is superior to other scales in terms of order preservation, uniformity, perceptibility and memorability of the judgment matrix, and is more suitable for the importance ranking analysis under a single criterion [4]. Therefore, the evaluation scale of this judgment matrix is 1–9, as shown in Table 2.

Table 3. 1–9 Evaluation Scale.

Scale	Degree of Importance
1	Equally important
3	Slightly important
5	Obviously important
7	Strongly important
9	Absolutely important
2, 4, 6, 8	Intermediate value
Reciprocal of scale	Reverse comparison

Table 4. Judgment Matrix of Target Layer

A	B1	B2	B3	W
B1	1	1/2	4	0.33
B2	2	1	5	0.57
B3	1/4	1/5	1	0.1

Table 5. Judgment Matrix of Criterion Layer

B1	C1	C2	C3	W
C1	1	3	2	0.54
C2	1/3	1	1/2	0.16
C3	1/2	2	1	0.3

Taking Shenyang Jianzhu University as the research scope, face-to-face interviews as the research form, and the dynamic poster design of "Wahaha" juice drinks as the evaluation object, 20 students majoring in visual communication design, 10 students majoring in industrial design, and 10 non-design majors are selected. Classmates, 20 netizens aged 12–35, 5 industry sales staff and 3 design teachers are the subjects, citing scale and quantification, and constructing the judgment matrix of indicators at various levels, see Table 4–7.

2) Consistency Detection of Judging Rectangle: The consistency test is mainly to avoid errors caused by the subjectivity of decision makers. Therefore, CR is defined as an index to test the consistency of the judgment matrix. Generally speaking, as long as the CR index is within a certain range, it can be considered that the judgment matrix is within an acceptable range due to the subjective influence of the decision maker. To a certain extent, the judgment matrix is available. And the smaller the CR index, the better

Table 6. Judgment Matrix of Criterion Layer

B2	C4	C5	C6	W
C4	1	3	5	0.63
C5	1/3	1	3	0.26
C6	1/5	1/3	1	0.11

Table 7. Judgment Matrix of Criterion Layer

B3	C7	C8	C9	W
C7	1	3	7	0.59
C8	1/2	1	5	0.33
C9	1/7	1/5	1	0.08

Table 8. Eigenvalue Calculation and Consistency Test Resultss

	A	B1	B2	B3
RI	0.520	0.520	0.520	0.520
$\boldsymbol{\lambda_{max}}$	3.025	3.009	3.039	3.014
CR	0.024	0.009	0.037	0.014

the consistency of the judgment matrix and the higher the usability [5]. The calculation method of the CR indicator is as follows:

$$CR = \frac{\lambda_{max} - n}{(n-1)RI} \leq 0.1 \tag{1}$$

λ_{max} is the maximum eigenvalue of the matrix, n is the order of the matrix, and RI is the average random consistency index. The calculation of the eigenvalue of the judgment matrix is a complicated process. In order to avoid the deviation caused by manual calculation, the maximum eigenvalue of the judgment matrix is calculated in the code written under the python 3.7 environment. Through code operation, the maximum eigenvalues and consistency ratio analysis results of a, B1, B2 and B3 are respectively obtained. See Table 9. The judgment matrix of each level is less than 0.1, which meets the standards of consistency inspection.

3) Calculation Results and Analysis of Weight Coefficient.

The calculation of weight coefficient is the key step to get the importance ranking of key design elements. In the following, the geometric average method is selected for weight calculation. The calculation results and important order of the weight values of key elements are shown in the following Table 9:

Table 9. Weight Calculation Results and Importance Ranking of Key Elements

i → j	B1	B2	B3	C1	C2	C3	C4	C5	C6	C7	C8	C9
A	0.33	0.57	0.10	0.18	0.05	0.10	0.36	0.15	0.06	0.06	0.03	0.01
B1				0.54	0.16	0.3						
B2							0.63	0.26	0.11			
B3										0.59	0.33	0.08
sort				2	7	4	1	3	5	6	8	9

According to the ranking of the importance of key design elements calculated by weight, it can be intuitively seen that Wahaha juice drink dynamic poster is the most important in the formation of graphic dynamic effect and shape, followed by the environmental atmosphere rendered by color matching and dynamic effect. Dynamic changes in layout can be weakened, and the weight of sound effect design is small. Background music and mimetic design can be appropriately added according to the needs of the poster.

6 Stage of Design Practice

Make a series of dynamic posters with three flavors of apple, mango and grape. Guided by the weight calculation results of key elements and the ranking of importance, the poster screen information is first divided into three levels. The first level is the main graphics and the main title. With mango, apple and grape as the main graphics, the straws are inserted directly into the fruit for drinking, highlighting the freshness and health of the raw materials. The main graphic is deformed according to a certain trajectory on the timeline to form a dynamic cycle. The second level is supplementary explanatory text and auxiliary graphics, and the third level is the overall visual tone and impression including background and sound effects.

Finally, a set of dynamic posters were designed for Wahaha's three flavors of fruit juice drinks: apple, mango and grape. The static pictures are shown in Fig. 3. Taking mango flavor as an example, the dynamic picture shows the effect of the dynamic cycle from the beginning of the timeline to the occurrence of the event, and then to the end of the timeline, as shown in Fig. 4.

Fig. 3. Static cut-off point presentation of Wahaha juice drink dynamic poster.

Fig. 4. Dynamic picture presentation of mango flavor juice.

7 Conclusion

Based on the AHP hierarchical model, a commercial dynamic poster design system is established. It is divided into three stages from the three key design elements of the visual element, dynamic element and sound effect element, and together with 9 sub-criteria layers, the design hierarchy model of the dynamic poster is formed. Through the analysis and calculation of the hierarchical model, a complete set of "Wahaha" dynamic poster design scheme was generated under the guidance of weight value and weight importance ranking. The whole design system starts from positioning, to analysis and practice, and each link is carried on from top to bottom. It guides the whole design process with clear logic, verifies the applicability of AHP in commercial dynamic posters with examples, and provides new ideas for commercial dynamic poster design.

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