

Research on Product CMF Design Strategy Based on “Zhouyi” Yin-Yang Philosophy

Chenglong Pu^{1*}, Yongheng Mao¹

¹ School of Art and Design, Zhengzhou University of Light Industry, Zhengzhou, China

Email Address

2312068918@qq.com (Chenglong Pu)

*Correspondence: 2312068918@qq.com

Received: 19 December 2025; Accepted: 7 January 2026; Published: 14 February 2026

Abstract:

This study focuses on the product CMF design based on the Yin-Yang philosophy of “Zhouyi”, and deeply analyzes the existing difficulties such as the lack of cultural connotation of product CMF design, the lack of theoretical methods combined with Yin-Yang philosophy and the lack of applied research. By exploring the systematic theoretical relationship between the construction of yin-yang philosophy and product CMF design elements, the yin-yang harmony design method, yin-yang image extraction method and yin-yang interactive experience method are innovatively proposed, and smart watches, lamps and smart phones are used as practical cases. This research fills the current research gap in the field of the combination of Yin and Yang philosophy and product CMF design, and provides a new set of design theory and method system with Chinese traditional cultural characteristics for the field of product design, which is helpful to improve the cultural connotation and design quality of the product and make the product stand out in the fierce market competition.

Keywords:

Zhouyi, Yin-Yang Philosophy, Product Design, CMF Design Strategy, Cultural Connotation

1. Introduction

With the acceleration of globalization and the continuous upgrading of the consumer market, the product design industry is facing numerous challenges and development opportunities. The competition in the future will also be a competition in design innovation ability. Against the backdrop of the country’s strong advocacy of cultural confidence and the innovation of cultural inheritance, General Secretary Xi’s emphasis on the inheritance and development of fine traditional Chinese culture is like a beacon, guiding China to forge ahead on the road to cultural rejuvenation. It also provides a clear direction and powerful impetus for all industries to tap the value of traditional culture. This macro-policy orientation provides a good environment and opportunity for the product design field to explore the combination of traditional culture with modern design concepts and methods.

As a classic work in ancient China, “Zhouyi” contains profound philosophical thoughts of yin and yang. Among them, the concept of unity of opposites and mutual

transformation of yin and yang expounded by “Taiji generates two instruments, two instruments generate four images, and four images generate eight trigrams” runs through Chinese culture and profoundly affects the field of art design. At present, consumers’ demand for products has shifted from functional practicality to cultural emotional experience. Therefore, taking the Yin-Yang philosophy of Zhouyi as the starting point, this paper explores its application potential in product CMF design, and explores an innovative design road that can not only inherit and carry forward Chinese traditional culture, but also meet the emotional needs of contemporary consumers for product culture, so as to provide a new perspective and method system support for the theoretical research and practical application of product design.

2. Research Status

2.1. The Research Status of Yin and Yang Philosophy in “Zhouyi”

The research on Yin-Yang philosophy in domestic academic circles mostly focuses on philosophical interpretation and historical combing. Zhang Peng [1] proposed that Yin and Yang are the basic ideas of “Zhouyi” throughout everything. It is expressed through the three dimensions of hexagram symbols, divination system and text interpretation, which proves the essential relationship between the two. Chen Wangheng [2] points out that the “beauty of neutralization” derived from the concept of yin and yang is the core category of Chinese traditional aesthetics, which affects all kinds of creation practices from artifacts to architecture. In terms of design application research, Zhu Weicheng [3] summarizes the design connotation of Yin and Yang concept into four dimensions: integrity, balance, naturalness and artistry, which provides a theoretical reference for the modern transformation of traditional philosophy.

From an international perspective, the cross-cultural design value of yin-yang philosophy has gradually become prominent. The study of Wang and Brown [4] found that the successful cases of “opposition balance” in contemporary product design all coincide with the law of “interdependence and mutual transformation” of yin and yang philosophy. This cross-cultural design resonance proves the universality of this theory. Lee’s [5] research combines yin-yang philosophy with sustainable design, and points out that the idea of “circular transformation” provides a cultural perspective for CMF innovation.

2.2. Research status of product CMF design strategy

2.2.1. Trend analysis of publications

From the perspective of time, 2004-2013 is the exploration period of CMF research, and the amount of literature is small and fluctuating; the attention of 2013-2016 has increased ; 2017-2020 entered a period of rapid development; in 2021-2024, the heat will continue but the growth will stabilize, and the research will be further refined and expanded in a new direction. Huang Mingfu [6] believes that CMF research has transformed from “technical level” to “cultural level” after 2021, and the integration of traditional cultural elements has become a new research hotspot, which is highly consistent with the direction of “yin-yang philosophy + CMF” focused in this study. From the overall literature output, it can be seen that the CMF design topic is developing continuously, and has become a hot research topic in the academic community in the past period of time.

2.2.2. Analysis of related research status

Product CMF design strategy plays an extremely important role in today's product design field. With the continuous improvement of consumers' requirements for product appearance, texture and experience, CMF design has become a key factor to enhance product competitiveness. It is not only related to the visual, tactile and other sensory experience of the product, but also closely related to brand building, user demand satisfaction and sustainable development. At present, the research on CMF design strategy is diversified, which has a significant impact on industry application, design principles and methods, brand building, user experience and other aspects.

In terms of industry application, Zhao Xiaotong and Gao Junjie [7] believe that CMF is the key support for excellent product design ; smith [8] points out that the "color-material-process" collaborative logic of CMF design in different fields has commonalities; in terms of research on design principles and methods, Zuo Hengfeng [9] summarizes the subjective experience dimension of material texture and gives examples for application ; Chen Junjie [10] analyzed and studied the color matching of mobile phones through semantic analysis, and obtained the most popular mobile phone CMF design case and its color matching design and emotional elements. In terms of the impact on brand building, Yuan Chen [11] proposed CMF design to promote university-industry collaboration; in terms of the combination with user experience, Li Sanxin [12] expounds the trend of experience design and subdivision design in CMF, which expands a broader development space for CMF design.

In general, the research on product CMF design strategy has made significant progress in many aspects.

2.3. Research status of product CMF design strategy based on "Zhouyi" yin-yang philosophy

At present, the research on the philosophy of yin and yang in the product CMF design strategy is still in the exploratory stage. Although some literature studies have begun to pay attention to the combination of traditional cultural philosophy and modern design, there are relatively few studies on the integration of "Zhouyi" yin-yang philosophy and product CMF design strategy. At present, there are only two articles by Li Ze [13] and Jin Wenyu [14]. They put forward the idea of the unity of opposites of yin and yang philosophy, which can provide ideas for CMF design, such as the contrast and harmony of color yin and yang, the fusion of material yin and yang attributes, but the views mostly stay at the theoretical level, lack of systematic practical cases and in-depth analysis. Through the comparison of international cases, Zhang, L. and Li, H. [15] pointed out that although China's related research has the advantage of cultural foundation, it lacks a systematic method in the translation logic of "philosophical connotation-CMF elements." This conclusion is highly consistent with the current situation of domestic research. This paper introduces a new theoretical perspective for CMF strategy research through the Yin-Yang philosophy of "Zhouyi".

3. Analysis of the Existing Dilemma of Product CMF Design Based on the "Zhouyi" Yin and Yang Philosophy

3.1. The lack of cultural connotation in product CMF design

In the practice of modern product CMF design, the lack of cultural connotation has become a significant problem. With the advancement of globalization, the products on the market are dazzling, but most products are designed to focus too much on the fashion of appearance and the practicality of function, while ignoring the deep excavation and integration of cultural elements. Taking consumer electronics products as an example, many brand CMF designs follow the popular trend, and the color matching, material selection and surface treatment process are similar, which leads to the lack of uniqueness and cultural recognition of product vision and touch. It is difficult for consumers to establish deep emotional connection with products, and it is impossible to produce cultural identity and sense of belonging. Products are easy to be replaced in market competition, and it is difficult to form lasting brand loyalty.

3.2. The theory and method of combining Zhouyi's yin-yang philosophy with product CMF design are insufficient.

Although the Yin-Yang philosophy of “Zhouyi” has high ideological value and design guidance potential, it faces theoretical and methodological difficulties in combination with product CMF design. In theory, there is a lack of systematic and in-depth research on how the philosophy of yin and yang accurately guides all aspects of CMF design. The internal logic of the abstract concept of yin and yang and product color, material and surface treatment is not clearly defined. For example, in color design, there is a lack of clear theoretical basis for determining the color combination that reflects the balance and transformation of yin and yang; in terms of methodology, the existing design methods are difficult to transform the philosophy of yin and yang into the actual design process. Designers lack effective tools and steps to integrate the concept of yin and yang throughout the whole process of CMF design, which leads to the fact that the philosophy of yin and yang in product design mostly stays in the conceptual attempt stage, and it is difficult to form a mature and replicable design mode.

3.3. The application research and mining of yin and yang philosophy in product CMF design are insufficient

The application of yin-yang philosophy in product CMF design is in its infancy, and the depth and breadth of connotation mining are insufficient. The existing research only briefly mentions the potential value of Yin-Yang philosophy in product design, and does not deeply explore its application methods and strategies in different product types, consumer groups, and market environments. For example, due to the differences in functions, scenarios, and needs of home and electronic products, the application focus and methods of Yin-Yang philosophy in its CMF design should be different, but there is a lack of targeted research in China. Through case comparison, Wang, Y. and Brown, A. [16] found that household products are suitable for “material yin-yang contrast” to convey a sense of natural harmony, and electronic products are suitable for “color yin-yang gradient” to reflect a sense of science and technology and dynamic balance. In addition, the existing research focuses on the application of yin and yang elements at the visual level, such as color contrast and morphological symmetry, and lacks the exploration of yin and yang experience at the tactile level, such as the influence of soft and hard materials and the thickness of the process on the user's tactile perception. This is inconsistent with Li Sanxin's view that “CMF experience design needs to take into account multi-sensory collaboration”, which

limits the comprehensiveness and depth of the application of yin and yang philosophy in product CMF design.

4. The Construction of Product CMF Design Strategy Based on the Yin and Yang Philosophy of “Zhouyi”

4.1. The theoretical association construction of “Zhouyi” yin-yang philosophy and product CMF design

The “Zhouyi” philosophy of yin and yang believes that the opposition and dependence of yin and yang is the basic force that constitutes everything, and the balance and transformation of yin and yang is the internal driving force for the development of things. This idea can establish a systematic relationship with the product CMF design elements.

In terms of color, bright and lively warm colors (red, yellow, etc.) are classified as yang, conveying warm and active emotions; the deep and introverted cold tones (black, blue, etc.) are classified as yin, expressing quiet and introverted characteristics. The balance and transformation of yin and yang can be reflected through the matching of main and auxiliary colors (such as large area of yin and small area of yang embellishment) or color gradient transition, so as to create a product appearance with rich levels and strong visual impact.

In terms of material, hard, smooth and shiny materials (metal, glass, etc.) are regarded as yang, with a hard and modern texture; soft, rough, matte materials (wood, fabric, etc.) are regarded as yin, transmitting warmth and natural touch. According to the product function and positioning, reasonable combination of Yin and Yang materials, such as high-end electronic products shell metal material (Yang) reflects the sense of science and technology and firmness, handheld or decorative parts with leather material (Yin) to enhance comfort and affinity, to achieve functional and aesthetic complementarity.

For the surface treatment process, smooth and reflective treatment (mirror polishing, etc.) is regarded as positive, showing exquisite and modern effects; the rough and matte treatment (sanding, etc.) is regarded as yin, creating a simple and retro texture. Different treatment processes are skillfully used to form light, shadow and texture changes between yin and yang on the surface of the product. For example, in furniture design, the desktop is polished with mirror (yang) to highlight the smoothness and smoothness, and the table legs are treated with sanding (yin) to reflect the stability and refinement, so that the product as a whole reflects the harmony and unity of yin and yang philosophy. Lee [17] mentioned that the yin-yang combination of surface treatment can also be combined with sustainable concepts, such as the combination of “anodic oxidation (yang) + natural oxidation (yin)”, which can form a unique yin-yang texture contrast while reducing the use of chemical reagents. This idea of combining philosophical ideas with sustainable design has also been confirmed by Wheeler [18] in the study of brand design, which points out that the balanced combination of opposite elements can better convey the brand’s pluralistic value proposition.

4.2. Product CMF design strategy formulation based on “Zhouyi” yin-yang philosophy

4.2.1. Yin and Yang harmony design method

Based on the core idea of yin and yang balance, the product CMF design focuses on the harmony and matching of color, material and surface treatment to achieve overall harmonious beauty. Taking the smart watch as an example, in terms of color, the main body of the dial is deep black (yin) to reflect the calm and restrained, and the scale, pointer and functional buttons are dotted with gold (yang). The bright gold shines in contrast to the dark black and contrasts with each other, visually striking and solemn. Smith [19] studies have confirmed that black gold has excellent visual comfort and recognition. In terms of material, the case is made of stainless steel (positive) to ensure strong durability and delicate texture, and the strap is made of soft fluorine rubber (negative). When worn, the wrist is fitted to improve comfort and achieve a balance between function and experience. In terms of surface treatment, the case is finely drawn (negative) to form a delicate texture to reduce metal reflection and increase texture richness. The dial glass is made of high-hardness and high-transparency sapphire crystal material. After slight arc polishing (positive), it presents unique light and shadow effects under different light conditions, and strengthens the balance between yin and yang and visual perception. This method makes the smart watch unique in appearance, and finds a balance between function and aesthetics, and improves the overall quality and user experience.

4.2.2. Yin and Yang image extraction method

The classical images of “Zhouyi” philosophy of yin and yang (Taiji diagram, yin and yang fish, etc.) are excavated, and their morphological, color and texture features are transformed into product CMF design inspiration. Taking the design of lamps and lanterns as an example, the inspiration is obtained from the shape and color distribution of Taiji diagram. The lampshade adopts a double-layer design, with the outer transparent glass and the inner white frosted glass. When the lamp is on, the light and shadow effect projected by the inner glass can be seen through the outer glass, so as to simulate the black and white blending of Taiji diagram. This design technique is consistent with the idea of using black and white lotus pattern to symbolize the balance of yin and yang in the “Yin-Yang-A Tale of Balance [20] project”, reflecting the modern visual transformation logic of oriental philosophical images. In terms of color, the light adopts an adjustable design, which can gradually switch between cold white (yang) and warm yellow (yin), symbolizing the balance of yin and yang transformation. Based on the shape of Yin and Yang fish curve, the bracket is made of metal material and polished to present a smooth glossy sense (Yang), which echoes the soft light and shadow (Yin) of the lampshade, making the lamp become an artwork with both lighting function and cultural connotation, bringing users a unique aesthetic experience, inheriting and carrying forward the Yin and Yang philosophy and culture of “Zhouyi”.

4.2.3. Yin and Yang interactive experience method

From the perspective of user experience, the concept of interaction and transformation of yin and yang philosophy is integrated into product CMF design. Taking smart phones as an example, in terms of color, the theme color of mobile phone wallpaper and interface can be automatically adjusted according to the use time and ambient light. During the day or when the light is sufficient (sunny), the interface uses bright and fresh colors (light blue, light green, etc.); at night or when the light is dark (shade), it automatically switches to warm and soft colors (dark red, deep purple, etc.), reflecting the concept of yin and yang transforming with the environment,

providing a comfortable and humanized visual experience. In terms of material and surface treatment, the back shell of the mobile phone adopts special temperature-varying material. When the user uses the mobile phone for a long time to get hot (positive), the back shell changes from smooth texture (positive) to sand texture (negative) with fine texture, increasing the hand-held friction to prevent slipping, and bringing a novel tactile sensation. The side key adopts pressure sensing design, gently presses (yin) to perform conventional volume adjustment function, presses (yang) hard to quickly start specific fast functions (emergency call, photographing, etc.), reflects the interaction between yin and yang, enhances the interaction between users and products and the convenience of operation, so that smart phones can better adapt to different scenarios and needs, and enhance users' sense of participation and satisfaction.

5. Conclusions

This study systematically analyzes the existing difficulties in the cultural connotation, theoretical methods and applied research of product CMF design based on the Yin-Yang philosophy of “Zhouyi”, and then constructs the theoretical relationship between the two. It innovatively proposes three strategies: Yin-Yang harmony design method, Yin-Yang image extraction method, and Yin-Yang interactive experience method, and takes smart watches, lamps, and smartphones as cases to verify; this achievement fills the gap in related fields, provides a theoretical method system with Chinese traditional cultural characteristics for product design, and helps to enhance product cultural connotation, design quality and market competitiveness. At the same time, the research comprehensively constructs the theoretical relationship between the two systems for the first time, concretizes abstract philosophy into the design link, breaks through the limitations of traditional CMF design, provides a new paradigm for interdisciplinary research, enriches the theory and method library of product design discipline, promotes the cross-integration of multiple disciplines, promotes the transformation of product design to cultural emotional experience, and enhances the added value and aesthetic value of product culture.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

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