



УДК 7.05

SUSTAINABILITY STRATEGIES IN HOME APPLIANCE DESIGN

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In the view of sustainable design, the factors affecting the sustainable design of household appliances are discussed. The role playing of each factor is interpreted from the five aspects of resources, environment, requirement, trend and consciousness. The multi-factor driving strategy of resources as supporting force, environment as pushing force, requirement as source power, trend as guiding force, and consciousness as design vitality is pointed out, and the internal connection of integration and complementarity among the five factors is revealed. It aims to explore the impact of sustainable design from a multi-dimensional perspective and provide valuable strategic guidance for the design transformation of the home appliance industry.

Key words: *sustainability, home appliances, multi-factor analysis, design strategy*

INTRODUCTION

With the acceleration of global population growth and urbanization, the demand for home appliances continues to rise. However, the rapid growth in demand has created serious environmental and social challenges. Reducing the negative impact of home appliance products on the environment through sustainable design methods has become one of the important issues that the home appliance industry needs to solve. However, the sustainable design of household appliances is affected by many factors, which jointly determine the degree of environmental impact and sustainability of products.

Based on TOE theory, Mustafa collected data and pointed out the significant impact of technological capabilities, system flexibility, software infrastructure, human resource capabilities and market pressures on the sustainable development of Industry 4.0 [1]. Xia used the Delphi method to establish the AHP dimension for statistical analysis and summarized the five key indicators of green manufacturing design concept, environmental impact assessment, ecological efficiency, ecological innovation and pollution emission that can promote the sustainable development of enterprise product design [2]. In addition, the factors affecting the sustainable design of home appliances need to be deeply discussed their multi-dimensional and



systematic, through understanding and analyzing the specific performance and interaction of each influencing factor, grasp the key links in the design process of home appliances products, find potential improvement space and optimization strategies, and then promote the development of home appliances industry towards a more environmentally friendly, economic and social sustainable direction.

PURPOSE

Guided by the concept of sustainable design, it is of great significance to explore the factors of sustainable design of household appliances. Different factors interact with each other to influence the direction of sustainable innovation of home appliances. Based on the influencing factors, this paper analyzes in detail the effect of each factor on the sustainable design of home appliances, systemizes the representative factors in the sustainable design activities of home appliances, explores the roles and tasks of each factor in the design, and puts forward the strategy and method with a comprehensive design perspective.

RESULTS AND DISCUSSION

Through the research of market trends, case samples and user behavior, it is realized that the factors affecting the sustainable design of home appliances include policy environment, development strategy, market environment, user requirement, scientific and technological innovation, environmental awareness and aesthetic trend. These factors affect the design and research of home appliance products from a micro point of view, and reflect the comprehensive influence of resources, environment, requirements, trend and consciousness on a more macro level.

Resources are the supporting force of design. By analogy, human beings need food for survival, and resources can be likened to food for design, which is the basis and premise to support design. Resources not only include raw materials, energy, water and other tangible materials in production and manufacturing, but also include the rational management and utilization of non-material resources such as manpower, capital and technology. The research of resource factors can help design, develop and integrate superior resources, avoid waste and under-utilization, improve production efficiency and achieve sustainable design goals. Its research value lies in supporting the realization of the functions and technologies of household appliances, and assisting the production and successful listing of products.

The environment is the driving force of the design. In the context of sustainability, environmental factors are mainly reflected in two dimensions. First, environmental factors involve the life cycle of home appliances, including the environmental impact of raw material acquisition, manufacturing, transportation, use and treatment, reducing waste and pollutant emissions, and reducing energy consumption and environmental damage, which essentially belong to the scope of nature. Second, the atmosphere and space of home appliance design means obtaining favorable environmental conditions for integrating and promoting product design, avoiding the difficulties that affect and hinder product design. Its research value lies in promoting the existence and development of design in a favorable, harmonious, and sustainable atmosphere.



Requirements are the source of design. Requirements guide product design, function determination and form formation. As an uncertain factor, requirements are constantly changing in the process without a constant rule, and it requires a lot of information collection and insight mining to grasp its essence. At the same time, as the driving force of product design, requirements are the core part of the front end of the product life cycle, and are the information feedback generated by the interaction between users, markets and other contact points and products in the interaction process. Its research value lies in that as the source of design, it constantly generates new impetus.

Trends are the guiding force of design. Technology, market and social trends have a profound impact on the sustainable design of home appliances. Technology trends such as energy-saving technology, intelligent technology, etc., put forward new requirements for product design and function; Market trends such as the rise of sustainable consumption and green lifestyles, resulting in changes in product perception and demand; Social trends such as promotion of environmental protection awareness have put forward higher requirements for the environmental protection and social responsibility of products. Design trends are future-oriented predictions that provide a deep understanding of what's hot in society, what's new in the industry, and what's changing in other fields, examine the connections between different parts, and help discover new concepts. Trend analysis can influence the formulation of strategy and the grasp of future development, shorten the cycle of innovative design, and occupy the core competitive position in the market. Its research value lies in leading and guiding the direction and goal of the future development of products.

Consciousness is the life force of design. The awareness and cognition level of consumers and enterprises on sustainable development is crucial to the sustainable design of household appliances. Awareness plays a role in shaping corporate image, promoting sustainable development and enhancing consumer recognition in sustainable design. Consumers are increasingly concerned about the environmental protection, energy efficiency and social responsibility of products, and companies are increasingly aware of the importance of sustainable development for brand image and market competitiveness. Therefore, it is of great significance to improve the sustainable awareness of the public and enterprises, promote the transformation of sustainable consumption and production modes, and achieve long-term market development and social responsibility for promoting the development of the sustainable design of home appliances.

The strategy of sustainable design of household appliances will be based on the effect of their respective forces, and the five dimensions of resources, environment, requirement, trend and consciousness will be the core. The effects of the five dimensions on the design are unified and balanced, and at the same time, different design values will be reflected in their respective dimensions.

These five factors form a complex network of interactions. The effective use of resources is closely related to environmental protection and is influenced by demand and design trends. Environmental factors directly affect the formation of market demand and industrial trends, and are closely related to the sustainable



consciousness of enterprises. This interrelationship forces companies to design products that not only meet market demands, but also take into account resource efficiency and environmental viability, while constantly tracking and adapting to changing trends to guide consumers towards a more environmentally friendly and sustainable lifestyle.

CONCLUSIONS

This paper discusses five key factors affecting sustainable design, and expounds the main forces and roles of home appliance design in a sustainable environment. Resources, environment, requirements, trends and consciousness map from different levels that design activities are influenced by multiple factors. However, attempts to explain the sustainable design of household appliances from a comprehensive perspective still need more in-depth research and analysis, to comprehensively evaluate the aspects of sustainable design in future studies, so as to guide the development of design activities more scientifically and effectively.

REFERENCES

1. Mustafa S., Rana S., Naveed M. M. Identifying factors influencing Industry 4.0 adoption for sustainability. *Journal of Manufacturing Technology Management*. 2023. Vol.35, №2. P. 336-359.
2. Xia, L. T., Lin, X. M. Critical factors in the sustainable development of product design for eco-innovation and green manufacturing. *Journal of Environmental Protection and Ecology*. 2022. Vol. 23, №4. P. 1536-1542.

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СТРАТЕГІЯ СТАЛОГО РОЗВИТКУ В ДИЗАЙНІ ПОБУТОВОЇ ТЕХНІКИ

З погляду сталого дизайну обговорюються фактори, що впливають на екологічний дизайн побутової техніки. Роль кожного фактора інтерпретується з п'яти аспектів ресурсів, середовища, вимог, тенденцій і свідомості. Відзначається багатофакторна рушійна стратегія ресурсів як підтримуючої сили, навколишнього середовища як штовхальної сили, вимог як джерела сили, тенденції як керівної сили та свідомості як життєздатності проекту, а також розкривається внутрішній зв'язок інтеграції та взаємодоповнюваності між п'ятьма факторами. Він спрямований на дослідження впливу сталого дизайну з багатовимірної точки зору та надання цінних стратегічних вказівок для трансформації дизайну в галузі побутової техніки.

Ключові слова: стійкість, побутова техніка, багатофакторний аналіз, стратегія дизайну