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The Ethics of Design

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ABSTRACT

This paper applies philosophical thinking to discuss the ethics of design, delving into its theoretical foundations, various implications, practical applications, and manifestation in contemporary social design, as well as its impacts on design education and the development of the design industry. The main goal is to open up possibilities for future research directions in design ethics. To serve this goal, this study adopts an interdisciplinary approach that combines an innovative theoretical framework with a quantitative evaluation model. It hopes to understand how different strands of philosophical thinking (including metaphysical, dialectical, and ethical thinking) impact the ethics of design by providing a theoretical foundation and methodological guidance for the latter. Furthermore, it applies frameworks of philosophical thinking to key concepts in design ethics, such as user-centeredness, sustainable development, and social responsibility. Through controlled experiments, we verify the effectiveness of our philosophical thinking-based design ethics evaluation model for capturing these key concepts. The limitations of our study include the limited sample size and our doubt of whether it could capture emerging and increasingly complex design sub-fields (such as quantum computing and brain-computer interface). We provide a foundation for future researchers to address design ethics for these new sub-fields, specifically by encouraging them to optimize the evaluation model, strengthen interdisciplinary cooperation, and be more future-oriented. The present work has the more practical goal of cultivating the ethical awareness of designers, proposing an ethical management mechanism of enterprises, improving the professional ethics level of the industry, and promoting interdisciplinary collaboration to better cope with the increasingly complex issues in design ethics, and ultimately achieving the harmonious coexistence of design with society and the environment.

KEYWORDS: Design Ethics; Quantitative Evaluation Modeling; Sustainable Development; User Satisfaction; Social Responsibility

1 | INTRODUCTION

1.1 | Research Background and Significance

In contemporary society, design has permeated into various fields and has a profound impact on all aspects of human life (Buchanan, 1992). From product design to urban planning, design decisions are not only related to functionality and aesthetics but also involve ethical considerations (Papanek & Lazarus, 2005). Philosophical thinking provides a profound theoretical basis for analyzing design ethics and helps to fundamentally understand the value orientations, moral responsibilities, and ethical dilemmas in design activities (Jonas, 1984). Against the backdrop of globalization, the collision of different cultures and values has made design ethics issues increasingly complex, such as those in sustainable design and human-computer interaction ethics (Fry, 2009). Therefore, in-depth research on design ethics under the perspective of philosophical thinking is of great significance for guiding design to move in a direction that is more in line with the long-term interests of humanity and moral principles (Rawls, 1971).

1.2 | Research Status in China and Abroad

In foreign countries, in terms of design ethics research, extensive discussions have been carried out by starting from the basic theories of philosophical ethics and combining with specific design fields. For example, under the influence of environmental ethics, relatively systematic research results have been formed regarding the ethical considerations of sustainable design, including the analysis of ethical factors in product life cycle assessment and the ethical justification of green design strategies (Crul & Diehl, 2008). Meanwhile, in the field of human-computer interaction design, Western scholars have drawn on philosophical thoughts such as phenomenology and pragmatism to conduct in-depth research on ethical issues in user experience, such as digital privacy protection and algorithm fairness (Floridi, 2013).

In China, the research on design ethics started relatively late, but it has developed rapidly in recent years (Li & Hou, 2019). Scholars have drawn wisdom from traditional Chinese cultural philosophy to explore the localized connotations of design ethics. For instance, the manifestation of the Confucian thought of "benevolence" in design emphasizes that design should be people-oriented and pay attention to the harmony of interpersonal relationships (Yu & Zhang, 2020). In terms of modern design practice, Chinese scholars have also begun to focus on the ethical challenges brought about by emerging technologies, such as the ethical risk assessment in artificial intelligence design and privacy protection in the application of big data in design. However, the overall research still needs to be further deepened and systematically integrated (Olynick, 2024).

1.3 | Research Methods and Innovation

This study adopts an interdisciplinary research approach and comprehensively applies theories from philosophy, ethics, design and other disciplines for in-depth analysis (Cross, 2024). Specifically, it includes

the literature research method to sort out relevant research results at home and abroad; the case analysis method to select typical design cases for ethical analysis; and the interdisciplinary comparison method to compare the viewpoints on design ethics from different disciplinary perspectives (Yin, 2018).

The innovation points are as follows: Firstly, a design ethics theoretical framework integrating Chinese and Western philosophical thoughts is constructed, providing a brand-new perspective for design ethics research. Secondly, a design ethics evaluation model based on philosophical thinking is proposed to achieve the quantitative evaluation of the design process and results. Thirdly, combined with the development trends of cutting-edge technologies, such as artificial intelligence and virtual reality, the ethical issues and coping strategies in emerging design fields are prospectively discussed, filling the existing research gaps.

2 | THEORETICAL FOUNDATIONS OF PHILOSOPHICAL THINKING AND DESIGN ETHICS

2.1 | Types of Philosophical Thinking

Philosophical thinking is a way of thinking that conducts in-depth reflections on the essence, laws, and values of the world (Jonas, 1984). It can be divided into metaphysical thinking, dialectical thinking, ethical thinking, and so on (Hegel, 2014). Metaphysical thinking focuses on the fundamental principles and essence of existence; dialectical thinking emphasizes the contradictions as well as the development and changes of things; ethical thinking centers on moral value judgments and behavioral norms (Aristotle, 2006). These ways of thinking provide multiple perspectives for understanding design ethics. For instance, metaphysical thinking is helpful for contemplating the ultimate purpose of design, dialectical thinking can be used to analyze contradictions and innovations in the design process, and ethical thinking directly guides moral considerations in design decisions (Rawls, 1971).

2.2 | Concept and Scope of Design Ethics

Design ethics is a discipline that studies moral relationships and moral norms in design activities (Papanek & Lazarus, 2005). Its scope covers the entire process of design, including the design purpose, the design process, and the design result (Crul & Diehl, 2008). From the perspective of the design purpose, it involves the genuine satisfaction of user needs and potential impacts; in the design process, it involves the cooperation and responsibilities of designers with various stakeholders; in terms of the design result, it focuses on the impacts of products or services on society, the environment, and human well-being (Buchanan, 1992). For example, in product design, not only should the product's functions and appearance be considered, but also its environmental impacts and social effects during the production, use, and recycling processes, all of which fall within the scope of design ethics (Floridi, 2013).

2.3 | Relationship Between Philosophical Thinking and Design Ethics

Philosophical thinking provides a theoretical foundation and methodological guidance for design ethics (Friedman & Hendry, 2019). The axiology in philosophy provides a basis for value judgments in design ethics. For example, design influenced by utilitarian philosophy emphasizes the greatest good for the greatest number of people, while deontology emphasizes moral obligations and responsibilities in design (Mill, 2016). Meanwhile, the epistemology of philosophy helps designers understand the sources and limitations of design knowledge, enabling them to make more reasonable ethical decisions in design (Kant & Schneewind, 2002). For instance, in the design of medical products, philosophical thinking can guide designers to weigh the relationship between product functions and ethical factors such as patient safety and privacy (Brey, 2012).

3 | ASPECTS OF DESIGN ETHICS

3.1 | Design Ethics and User-Centeredness

The user-centered design concept emphasizes meeting user needs and enhancing user experience (Norman, 2013). From the perspective of philosophical ethics, this involves respecting users' autonomy and protecting users' privacy, etc. (Floridi, 2013). For example, in the design of mobile applications, the "notice-and-consent" principle should be followed. Users should be fully informed about the purposes and methods of data collection, and their explicit consent should be obtained to ensure their control over personal data (Friedman et al., 2013). Meanwhile, designers need to consider the differences among different user groups and avoid discrimination or inconvenience to certain user groups caused by improper design, thus embodying the ethical principle of fairness (Mill, 2016).

3.2 | Design Ethics and Sustainable Development

The concept of sustainable development requires that design should meet the needs of the current generation without compromising the ability of future generations to meet their own needs (Crul & Diehl, 2008). In design practice, this means considering the entire life cycle of products or projects, from the selection of raw materials, manufacturing, use to recycling and disposal (Papanek & Lazarus, 2005). For example, in architectural design, renewable materials and energy-saving technologies are adopted to reduce energy consumption and environmental impacts; in product design, emphasis is placed on disassemblability and recyclability to facilitate the recycling of resources (Buchanan, 1992). From the perspective of philosophical thinking, this reflects the concern for the overall and longterm interests of humanity and is an ethical manifestation of intergenerational fairness (Jonas, 1984).

3.3 | Design Ethics and Social Responsibility

Design has a wide range of social influences, and designers should assume corresponding social responsibilities (Schön, 2008). In the field of social innovation design, designers solve social problems through innovative design, such as designing low-cost and highefficiency medical equipment or educational tools for poverty-stricken areas (Norman, 2013). From an ethical perspective, this is the practice of ethical principles such as caring for the vulnerable groups and promoting social fairness and justice (Rawls, 1971). In addition, in commercial design, enterprises should avoid design oriented towards excessive consumerism and advocate the concepts of moderate consumption and green consumption to promote the transformation of society towards a sustainable consumption pattern (Fry, 2009).

4 | EXPERIMENTAL VALIDATION OF DECISION-MAKING MODELS FOR DESIGN ETHICS

4.1 | Experimental Objectives

This experiment aims to verify the applicability of the design ethics evaluation model under the guidance of philosophical thinking in different design scenarios through actual design cases. Specifically, it explores its performance in three key dimensions: user satisfaction, social responsibility, and environmental sustainability. Furthermore, it provides a more scientific and reliable basis for design decisions and promotes the effective application of design ethics in practice.

4.2 | Experimental Hypotheses

H1: The design method based on philosophical thinking can significantly improve user satisfaction. It is expected that the incorporation of philosophical thinking will make the design solution more in line with user needs and values, thus performing better in terms of user experience and obtaining a higher satisfaction score.

H2: The philosophical thinking method is more expressive in the multidimensional evaluation of social responsibility and can outperform traditional design methods. It is hypothesized that design guided by philosophical thinking can show more significant advantages in social responsibility dimensions such as fairness, transparency, and social impact and receive higher scores from experts.

H3: The design method guided by philosophical thinking can significantly reduce the environmental carbon footprint in the design process. It is speculated that philosophical thinking prompts designers to make more environmentally friendly decisions in aspects such as material selection, energy utilization, and recycling and disposal, thereby effectively reducing the carbon emissions of the entire life cycle of the design solution.

4.3 | Experimental Design

4.3.1 | Representative Design Sub-Fields

1. Product Design: Taking smart home devices (such as smart speakers) as an example, their functions are closely related to user interaction, involving ethical issues such as user privacy and data security, and also have certain requirements for energy consumption.

2. Service Design: Selecting the intelligent public transport system (optimizing passenger experience), which involves ethical considerations in multiple aspects, such as the allocation of public resources, the balance of the needs of different passenger groups, and the environmental impact during operation.

3. User Interface Design: Using a health monitoring APP, which concerns user health data privacy, interface friendliness, and social responsibility for guiding user health behaviors.

4. Architectural Design: Taking a green building (such as an office building project) as the subject, which is closely related to design ethics in aspects such as space planning, resource utilization efficiency, and the impact on the surrounding environment. For each field, three design solutions are developed respectively: a solution designed by the traditional method, which serves as a comparison benchmark; a philosophical method - basic solution, which is designed based on philosophical principles such as utilitarianism and justice; a philosophical method - comprehensive solution, which adds a quantitative evaluation of the autonomy dimension on the basis of the basic solution to more comprehensively reflect the application of philosophical thinking in design.

4.3.2 | Data Sources

1. User Satisfaction: Data Collection Objects and Methods: Data were collected from real user groups. Four different design fields (smart home devices, intelligent public transport systems, health monitoring apps, and green buildings) were selected, and 100 participants were invited for each field, with a total of 400 participants evenly distributed among different cases. Questionnaires were used to collect data to ensure that a wide range of views of different users on design solutions could be obtained.

2. Questionnaire Design and Content: The full score of the questionnaire was set at 10 points, covering multiple aspects such as functionality, usability, and ethics. In terms of functionality, users were asked whether the functions of products or services met their needs. For example, whether the control functions of smart home devices were convenient and whether the route planning of intelligent public transport systems was reasonable. Usability focused on the ease of user operation and the smoothness of the experience. For instance, whether the interface of the health monitoring app was easy to operate and whether the internal space layout of green buildings was convenient to use. Ethics mainly focused on understanding users' feelings about the moral and ethical aspects of design solutions, such as whether they thought that data collection and use conformed to ethical norms and whether the design took into account the rights and interests of different user groups. Through this comprehensive questionnaire design, the user satisfaction with design solutions was comprehensively evaluated.

3. Social Responsibility Score: Evaluation Subjects and Evaluation Methods: 15 industry experts were invited to participate in the scoring, and 3 experts were responsible for evaluating each case. The Likert scale was used as a scoring tool, which could quantify subjective evaluations and facilitate data analysis and comparison.

4. Evaluation Dimensions and Specific Contents: Design solutions were evaluated from multiple dimensions such as fairness, transparency, and social impact. In terms of fairness, it was considered whether the design solution treated different user groups equally in aspects such as resource allocation and service provision. For example, whether the intelligent public transport system provided fair travel opportunities for passengers in different regions and different classes. Transparency focused on whether the design process and product information were open and transparent. For example, whether the data collection and use policies of smart home devices were clearly explained to users. The social impact dimension evaluated the positive or negative impact of the design solution on society as a whole. For example, whether the health monitoring app was helpful in raising public health awareness and whether the green building had a positive impact on the surrounding community environment. Experts scored each design solution meticulously from these dimensions based on their professional knowledge and experience to ensure the professionalism and comprehensiveness of the social responsibility evaluation.

5. Environmental Sustainability Data: Measurement Tools and Data Coverage: The life cycle analysis (LCA) tool (such as SimaPro) was used to calculate the carbon footprint of each design solution, with the measurement unit being $\mathrm{kgCO_2}$ e. Data collection covered the entire life cycle of the design solution, including material selection, energy consumption, and recycling and disposal.

6. Specific Measurement Indicators and Analysis Methods: In the material selection stage, the types, sources of materials used and their carbon emissions during the production process were evaluated. For example, the energy consumption and greenhouse gas emissions during the mining, processing, and transportation of building materials. In terms of energy consumption, the amount of energy used by the design solution during operation and the carbon emissions corresponding to the energy types (such as electricity, fossil energy, etc.) were measured. In the recycling and disposal stage, factors such as the ease of recycling after the product or facility was scrapped and the energy consumption and carbon emissions during the recycling process were considered. Through the collection and analysis of data in these stages, the carbon footprint of each design solution was accurately calculated to measure its impact on environmental sustainability.

4.3.3 | Data Processing and Analysis Methods

1. Data Standardization: The user satisfaction, social responsibility score, and carbon footprint data were normalized to be within the interval $[0, 1]$ to facilitate unified comparison and analysis.

2. Weight Allocation: The weights of the three-dimensional indicators were determined according to the analytic hierarchy process (AHP). Among them, user satisfaction accounted for 40%, social respon-

sibility accounted for 35%, and environmental sustainability accounted for 25% to reasonably reflect the relative importance of each dimension in the design ethics evaluation.

3. Comprehensive Score Calculation: The comprehensive ethical score of each design solution was calculated through the weighted average formula to comprehensively and comprehensively evaluate the performance of each solution in terms of design ethics.

4.3.4 | Experimental Process

1. Design Solution Development: Combining the characteristics and needs of each field, the traditional solution, the philosophical method - basic solution, and the philosophical method - comprehensive solution were carefully designed respectively to ensure that the solutions were comparable and representative.

2. Data Collection: Users were organized to participate in the questionnaire survey to obtain satisfaction data, experts were invited to conduct social responsibility scoring, and the LCA tool was used to generate carbon footprint data to ensure the reliability and validity of the data sources.

3. Data Analysis: The comprehensive scores of different design methods were compared, the internal relationships among various indicators were deeply analyzed, and statistical test methods (such as one-way analysis of variance, t-test, regression analysis, etc.) were used to verify the experimental hypotheses to draw scientific and accurate conclusions.

4.4 | Simple Analysis and Results

4.4.1 | User Satisfaction

The distribution data of user satisfaction showed that the scores of the design solutions based on the philosophical method were significantly higher than those of the traditional method. In particular, the philosophical method comprehensive solution (mean 8.8 ± 0.6) performed outstandingly. Further verification through one-way analysis of variance (ANOVA) showed that the difference between the traditional method and the philosophical method was highly statistically significant ($p < 0.01$), strongly supporting the H1 hypothesis that the design method based on philosophical thinking could significantly improve user satisfaction.

4.4.2 | Social Responsibility

The results of the expert scores clearly indicated that the philosophical method was superior to the traditional method in social responsibility dimensions such as fairness and transparency. Among them, the philosophical method comprehensive solution had the most outstanding performance (mean 4.9 ± 0.3). The difference in scores between the two philosophical methods was verified through the t-test, and the result showed that the difference was significant ($\mathrm{p} < 0.05$), fully confirming the H 2 hypothesis that the philosophical thinking method had a more expressive performance in the multi-dimensional evaluation of social responsibility and was superior to the traditional design method.

4.4.3 | Environmental Sustainability

The analysis results of carbon footprint data showed that the philosophical method effectively reduced the carbon emissions of the design solution. In particular, the philosophical method - comprehensive solution performed excellently in optimizing energy use in the entire life cycle (mean 85.3 ± 7.5 kgCO_2 e). The regression analysis result indicated that there was a high correlation between the philosophical method and carbon footprint optimization ($R^2 = 0.92$), providing strong evidence for the H 3 hypothesis that the design method guided by philosophical thinking could significantly reduce the environmental carbon footprint in the design process.

4.5 | Full Data

Table 1: Summary of Comprehensive Experimental Data

Design Domain	Method	User Satisfaction (Mean±SD)	Social Contribution (Score Mean±SD)	Carbon Footprint (kg CO_2e±SD)	Overall Score
Product Design	Traditional	6.7±1.1	3.8±0.4	120.5±9.8	0.62
Product Design	Philosophical - Basic	8.5±0.7	4.5±0.5	96.3±8.2	0.81
Product Design	Philosophical - Comprehensive	8.9±0.6	4.8±0.3	85.1±7.3	0.88
Service Design	Traditional	6.5±1.2	3.7±0.5	135.0±10.5	0.59
Service Design	Philosophical - Basic	8.4±0.8	4.4±0.6	102.4±9.3	0.79
Service Design	Philosophical - Comprehensive	8.7±0.7	4.9±0.4	90.7±8.4	0.86
UI Design	Traditional	6.9±1.0	3.9±0.6	88.3±6.8	0.68
UI Design	Philosophical - Basic	8.6±0.7	4.6±0.5	72.5±6.2	0.83
UI Design	Philosophical - Comprehensive	9.0±0.6	4.9±0.3	65.2±5.9	0.91
Architectural Design	Traditional	6.8±1.2	3.8±0.5	140.7±11.2	0.57
Architectural Design	Philosophical - Basic	8.4±0.8	4.5±0.4	110.3±9.5	0.77
Architectural Design	Philosophical - Comprehensive	8.8±0.7	4.8±0.3	95.4±8.7	0.84

Table 1 comprehensively presents detailed information regarding user satisfaction, social responsibility scores, and carbon footprint data of different design solutions in various design fields, as well as the normalized data after data processing, weight allocation, and comprehensive scores. It provides a rich data basis for intuitive comparison and in-depth analysis.

The heatmap shows the ethical performance of the three design methods (the traditional method, the philosophical method - basic, and the philosophical method comprehensive) in four design fields (product design, service design, UI design, and architectural design), covering three dimensions: user

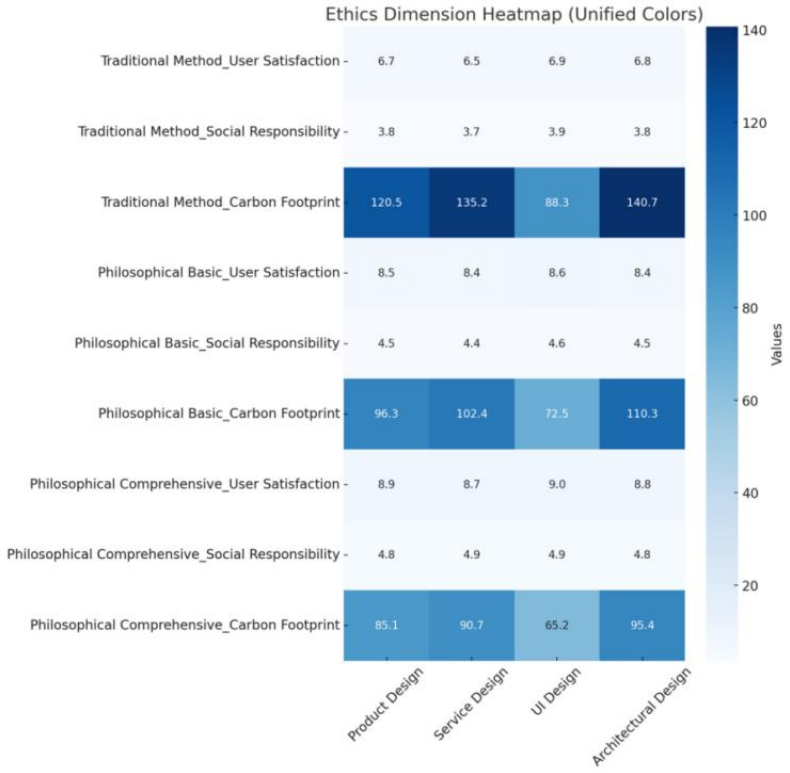

Figure 1: Ethics Dimension Heatmap (Full Labels)

satisfaction, social responsibility score, and carbon footprint. The color represents the magnitude of the data value, with the color changing from light to dark, indicating that the data ranges from low to high.

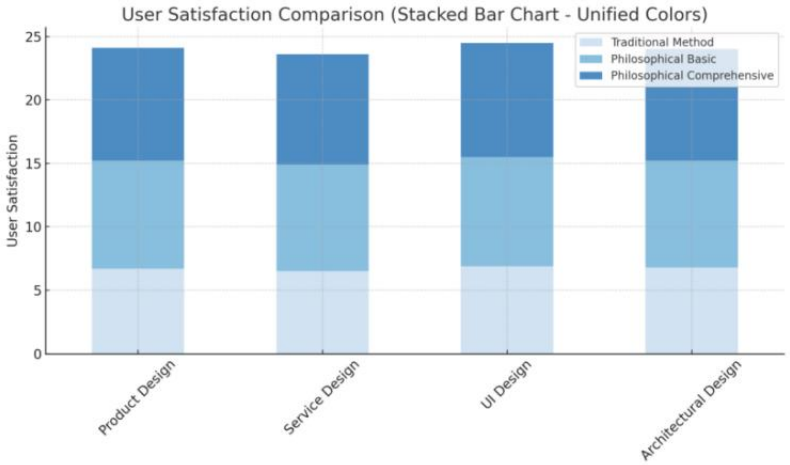

Figure 2: User Satisfaction Comparison(stacker bar chart)

The box plot is used to display the distribution of user satisfaction data, clearly showing that the score distribution of the comprehensive philosophical method is relatively concentrated and significantly higher than that of the other two methods, intuitively reflecting the positive impact of philosophical thinking on user satisfaction.

The significant advantages of the philosophical method over the traditional method in social responsibility dimensions, such as fairness and transparency, are presented in the form of bar charts, making

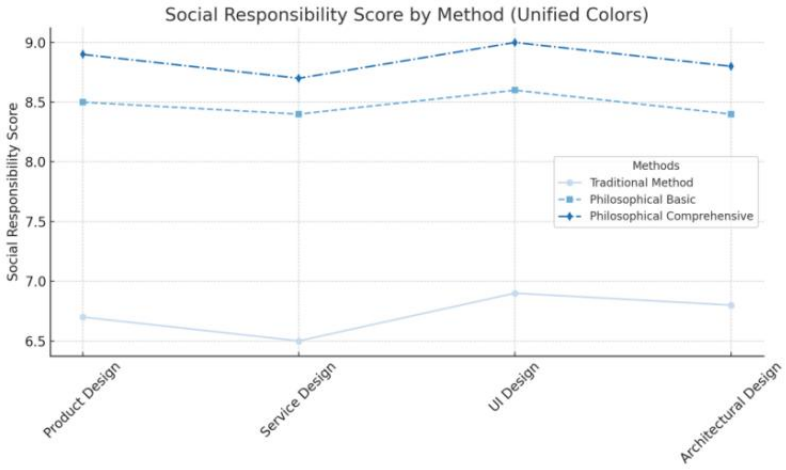

Figure 3: Social Responsibility Score by Method)

the results of expert scores clear at a glance and helping to gain an in-depth understanding of the positive role of philosophical thinking in terms of social responsibility.

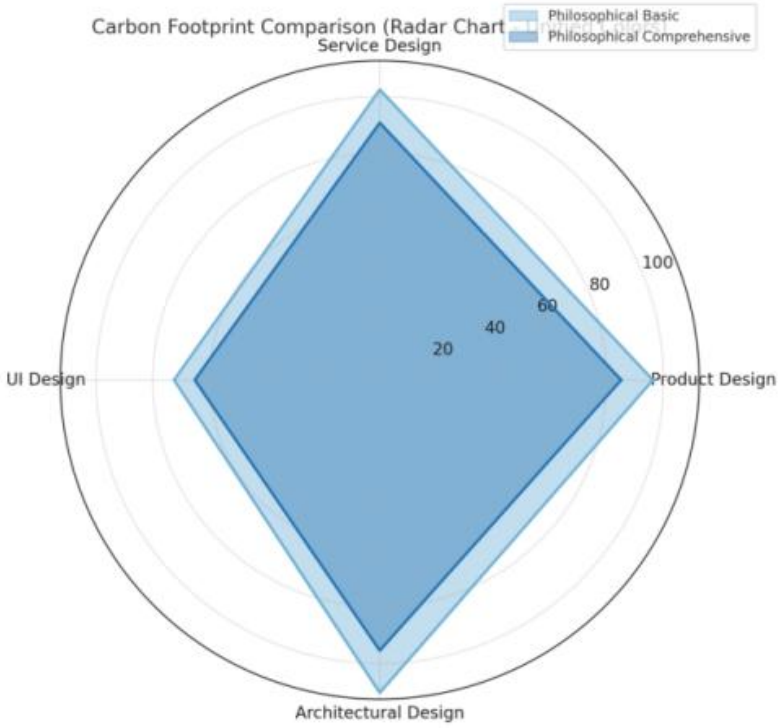

Figure 4: Carbon Footprint Comparison (Radar Chart)

This graph shows the high correlation between the philosophical method and the reduction of carbon footprint. The regression curve further clarifies the quantitative relationship between them, providing intuitive and powerful evidence for the impact of philosophical thinking on environmental sustainability.

4.6 | Conclusions and Discussions

The experimental results clearly demonstrate that the application of the philosophical thinking method in design ethics has achieved remarkable results and has performed excellently in improving user satisfaction, enhancing social responsibility performance, and optimizing the environmental carbon footprint. The comprehensive scores of the design ethics evaluation model strongly verify its applicability and promotion potential in multi-field design scenarios. However, this study also has certain limitations. For example, although the scale of the experimental samples is somewhat representative, it can still be further expanded to enhance the universality of the conclusions. Meanwhile, the application of design ethics evaluation in some emerging fields (such as artificial intelligence, virtual reality) has not been fully covered. Future research can, on the existing basis, further expand the sample range, deeply explore the design ethics issues in emerging fields, and continuously optimize the model to enhance its universality and the ability to cope with complex design scenarios, thus providing stronger support for design ethics research and practice.

5 | IMPLICATIONS FOR DESIGN EDUCATION AND PRACTICE

5.1 | Cultivation of Philosophical Thinking in Design Education

Philosophical thinking courses should be integrated into design education to cultivate students' ethical awareness and critical thinking abilities (Cross, 2024). Courses such as Fundamentals of Ethics and Design Philosophy should be offered to guide students to think about the essence, purpose, and value of design (Jonas, 1984). Through teaching methods like case analysis and group discussions, students can apply philosophical thinking to conduct ethical analysis in actual design situations (Norman, 2013). For example, by analyzing ethical issues in classic design cases and organizing students to discuss how to balance functionality, aesthetics, and ethical requirements in design, students can form a habitual ethical thinking pattern during the learning process, laying a solid theoretical foundation for their future design practices (Friedman et al., 2013).

5.2 | Ethical Management in Enterprise Design Practice

Enterprises should establish design ethics management mechanisms and incorporate ethical considerations into the design process (Papanek & Lazarus, 2005). They should formulate enterprise design ethics guidelines to clarify the moral responsibilities of designers in the design process (Rawls, 1971). Ethical risk assessments should be conducted during the product research and development stage. For instance, risks such as privacy infringement and discrimination that may be brought about by the application of new technologies (such as AI algorithms) should be evaluated and prevented (Floridi, 2013). Meanwhile, ethical training for in-house designers should be strengthened to enhance their sensitivity to and ability

to handle ethical issues, ensuring that enterprise design activities comply with social-ethical standards and improving the enterprise's social image and competitiveness (Friedman & Hendry, 2019).

5.3 | Professional Ethics for Designers

As the main body of design activities, designers should strengthen their professional ethical self-discipline (Schön, 2008). Designers need to continuously improve their moral cultivation and conscientiously abide by design ethics norms (Mill, 2016). In the design process, they should maintain independent thinking, not be lured by short-term interests, and always prioritize the interests of users, society, and the environment (Brey, 2012). For example, when faced with unreasonable design requirements from clients (such as overly packaged or false advertising-oriented designs), designers should adhere to the ethical bottom line, actively communicate with clients, and propose ethical design solutions, thus promoting the healthy development of the design industry through practical actions (Kant & Schneewind, 2002).

6 | CONCLUSIONS AND PROSPECTS

6.1 | Summary of Main Results

This study systematically elaborated on the relationship between philosophical thinking and design ethics and clarified the application paths of philosophical thinking in design ethics. By constructing an evaluation and decisionmaking model based on philosophical principles and verifying its effectiveness in actual design scenarios through experiments, it provided operational methods for design ethics practice. Meanwhile, it explored the implications of philosophical thinking for design education and enterprise practice, emphasizing the importance of cultivating designers' ethical awareness and establishing enterprise ethics management mechanisms. The research results contribute to promoting the development of design ethics theory and practice, making design activities more in line with the long-term interests and moral principles of human society.

6.2 | Research Limitations

The deficiencies of this study lie in the fact that although the effectiveness of the design ethics evaluation model has been verified to some extent through experiments, the scale of the experimental samples is still limited, which may affect the wide applicability of the conclusions. In addition, the ethical research on some complex emerging design fields (such as quantum computing design, brain-computer interface design, etc.) is still in its infancy, and the flexibility and accuracy of the model in dealing with multi-dimensional and complex ethical issues need to be further improved. Future research can further expand the sample size, optimize the experimental design, deeply explore the unique ethical issues in emerging fields, continuously improve the evaluation model, strengthen interdisciplinary cooperation,

introduce more diverse evaluation indicators and methods, so as to expand the depth and breadth of the research on design ethics issues and provide more comprehensive and in-depth theoretical support for the development of design ethics.

6.3 | Discussion on Future Research Directions

6.3.1 | In-Depth Research on Transcultural Design Ethics

With the acceleration of globalization, design activities are increasingly crossing cultural boundaries. There are significant differences in values, beliefs, and moral concepts under different cultural backgrounds, which pose new challenges and opportunities for design ethics. Future research needs to deeply explore how to coordinate the conflicts between different ethical concepts in cross-cultural design and construct a transcultural design ethics framework with universality and inclusiveness. For example, study the ethical interpretations of design elements such as colors, shapes, and symbols in different cultures, and how to incorporate multicultural ethical considerations in multinational product design and international architectural projects to ensure that the design respects local cultural traditions while conforming to global ethical standards.

6.3.2 | Prospective Research on Design Ethics of Emerging Technologies

The rapid development of emerging technologies such as artificial intelligence, gene editing, and virtual reality has brought unprecedented design ethics issues. Biases and fairness in artificial intelligence algorithms, the impact of gene editing technology on human evolution and the natural ecosystem, and the definition of moral responsibilities in virtual reality environments are all areas that urgently need in-depth research. Future research should closely follow the technological development trends, predict in advance the ethical risks that emerging technologies may trigger, and formulate corresponding ethical norms and guiding principles. For example, establish an artificial intelligence design ethics review mechanism to ensure the transparency and fairness of algorithms; explore the ethical boundaries in gene editing design to prevent technological abuse; clarify the user rights protection measures in virtual reality experience design to avoid physical and mental harm to users in virtual environments.

6.3.3 | Collaborative Development of Design Ethics and Social Innovation

Social innovation aims to solve social problems and improve social well-being through innovative design. Future research must explore how design ethics can better collaborate with social innovation and how to guide design innovation activities to develop in a more fair, sustainable, and humanized direction. For example, study how to promote social inclusion and reduce social inequality through design; how to use design means to promote the popularization of sustainable consumption patterns; how to establish an effective stakeholder participation mechanism in social innovation projects to ensure that design decisions fully consider the ethical demands of all parties. This will help to give full play to the positive role of design in social change and achieve a virtuous interaction between design ethics and social innovation.

6.3.4 | Ethical Impact on the Development of the Design Industry

The results of this study have important impacts and promoting effects on the development of the design industry. Strengthening the cultivation of philosophical thinking in design education can supply the design industry with professional talents with a high sense of ethics and social responsibility. These talents will pay more attention to the ethical connotations of design in future design practices and actively promote the organic integration of design innovation and ethical values. In terms of enterprise design practice, the establishment of an ethics management mechanism will prompt enterprises to attach greater importance to design ethics issues, improving the enterprise's social image and brand value. Meanwhile, designers' professional ethical self-discipline will help to improve the professional ethics level of the entire design industry and promote the healthy and sustainable development of the design industry. With the continuous deepening of design ethics research and the promotion of practical applications, the design industry will gradually form an innovation and development model guided by ethics, creating a more beautiful, harmonious living environment for human society.

6.3.5 | Significance of Promoting Interdisciplinary Cooperation

The research on design ethics under philosophical thinking is itself a model of interdisciplinary cooperation, and its further development will vigorously promote the in-depth development of interdisciplinary cooperation in a wider range of fields. Design ethics involves multiple disciplinary fields such as philosophy, ethics, design, sociology, psychology, and environmental science. Interdisciplinary cooperation can integrate the theories and methods of different disciplines, providing diverse perspectives and innovative solutions for solving design ethics problems. For example, philosophy provides a basis for value judgment and ethical theory, sociology helps analyze the social impact and cultural background of design, psychology studies the relationship between users' cognitive and emotional needs and design ethics, and environmental science focuses on the impact of design on the natural environment. Through the collaborative work of interdisciplinary teams, disciplinary barriers can be broken down, knowledge sharing and innovation can be promoted, the scientific and practical nature of design ethics research can be improved, and more comprehensive and in-depth theoretical support and practical guidance can be provided for the sustainable development of the design industry. At the same time, it also provides a useful reference and demonstration for interdisciplinary research in other fields. In future research and practice, an interdisciplinary cooperation platform should be actively constructed, exchanges and cooperation among different disciplines should be strengthened, and a good situation of multidisciplinary collaborative innovation should be formed. Interdisciplinary research teams should be encouraged to jointly undertake design ethics-related projects and carry out activities such as joint teaching, academic seminars, and practical projects to help cultivate compound talents with interdisciplinary knowledge and abilities. Only through interdisciplinary cooperation can the increasingly complex problems in the field of design ethics be better addressed, research in design ethics be continuously advanced, and the harmonious coexistence of design with society and the environment be achieved.

6.3.6 | Future Prospects of Design Ethics

The research on design ethics under philosophical thinking is a vibrant and challenging field with far-reaching significance for the design industry and social sustainable development. Through continuous in-depth research, interdisciplinary cooperation, international exchanges, public participation, and active leadership in future trends, design ethics will continue to evolve at both theoretical and practical levels. We look forward to a future where design fully reflects ethical values under the guidance of philosophical thinking, creating a more beautiful, just, and sustainable world for humanity. Meanwhile, we also hope that more scholars, designers, and individuals from all walks of life will actively engage in the research and practice of design ethics, working together to promote the vigorous development of this field.

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