

IKEA and MUJI: A Cross-Cultural Product Organic Design Dialogue

Name: Yi Yang

Student number: 2233138

Professional Doctorate: Art & Design

The study provides an in-depth analysis of IKEA and MUJI's practices in organic design, emphasising the use of natural elements in design and environmental friendliness. By examining the innovative products of these two brands, it reveals modern trends in minimalist furniture design, providing new perspectives and inspiration for the future development of organic design.

1 Introduction

In an era of material abundance, people are increasingly pursuing the appearance and symbolic meaning of design, and sustainable and organic design has become the key to solving resource depletion and environmental challenges. In particular, IKEA and MUJI have led the trend of sustainable design with their in-depth understanding and application of organic concepts, demonstrating how to find a balance between ecological protection, economy and design ethics.

In particular, IKEA and MUJI, two well-known brands originating from Sweden and Japan respectively, have played an active role in promoting this design concept. By exploring the product designs of IKEA and MUJI, we can further understand how sustainable and organic design concepts are applied in practice, and how these concepts are accepted and promoted globally.

2 Theoretical Foundations

2.1 The concept of organic design

"Organic design theory, refers to the development of morphological structures for design according to the way in which organic matter grows, valuing the interconnected and inseparable unity of the constituent parts. This kind of holistic design has been described as "living art". "(Kim, G.S. and Lee, S.I., 2014.)

2.2 The use of "less is more" design theory in IKEA and MUJI

The "less is more" design philosophy emphasises the search for deeper meaning in the expression of simplicity. "It's not just about formal simplicity, but about rich content in limited design elements. Through simple lines and forms, this design contemplates the relationship between environment, space, and materials, striving to achieve a perfect blend of form and function, as well as an expression of inner beauty." (Yu, C. 2020.)

IKEA's design philosophy is heavily influenced by the minimalism of "less is more", "Minimalism is more than just a simplification of appearance, it is a way of reflecting the essence and high quality of an object in a clear and concise way by eliminating non-essential elements. IKEA incorporates this philosophy into its product design, reflected in its Scandinavian design style, a style centred on simplicity, practicality and aesthetics, and informed by the idea of democratic design, which aims to improve the quality of life for a wide range of consumers." (Başak, R. 2021)

Muji, originating from Japan where resources are limited, is committed to sustainability and efficient use of resources. The design always focuses on environmentally friendly and recycled products, avoids over-packaging and emphasises practicality and ease of

use. "This design strategy avoids excessive embellishment and decoration and defines the function and form of the product through strict criteria, so that the merchandise presents a simple and elegant appearance and a uniform packaging style. By minimising the consumption of resources, MUJI achieves a balance between high quality and reasonable prices, and demonstrates the design philosophy of "less is more" - the pursuit of simplicity rather than simplicity." (Liberti, R., 2012) MUJI's green design is reflected in the selection of materials, production monitoring and simplified packaging, which demonstrates the depth of its "less is more" design philosophy.

2.3 Characteristics of IKEA and MUJI design

IKEA has always been committed to providing quality products at affordable prices, and this has been the driving force behind its development. However, "in addition to low price and high quality, IKEA considers three other factors in product development, namely practicality, aesthetics and sustainability. Products that are able to strike a balance between these five dimensions are considered to be democratically designed products." (IKEA home.2024) From the Billy range of all-in-one storage solutions, to the Malm bedroom furniture, every combination of the range is a reflection of democratic design.

IKEA's mug design, with its distinctive tightened shape and small handle, sells 25 million units a year. The original intention was material saving and space efficiency, not purely aesthetic, demonstrating IKEA's commitment to environmental and organic design in detail.



Figure 1, VÄRDERA (1996) by IKEA

IKEA's Billy bookshelf, with over 60 million sold worldwide since the 1970s, is renowned for its cost-effectiveness and versatility. Measuring 202cm high, 80cm wide and 28cm deep, it can be transformed into multi-purpose furniture. The price has been reduced by 30 per cent while maintaining design stability over time, reflecting its functionality and convertibility and demonstrating IKEA's commitment to sustainable and environmentally friendly design principles.



Figure 2, Billy bookshelf (1970) by IKEA

Muji emphasises minimalist design, eschewing extraneous ornamentation in favour of practicality and essentiality. "The brand advocates a rational, nontheistic philosophy, always oriented to user needs, and searching for the definition of "best". Its design philosophy - the pursuit of simple, adaptable products designed to meet the needs of a wide range of user groups - is a dedication to simplicity and practicality that has enabled MUJI to realise the extraordinary in its search for the ordinary." (About MUJI .2024) MUJI, a brand offering more than 1,000 items, aims to provide products that fit the lifestyles of consumers around the world who seek a simple and comfortable life. The brand is loved for its universally recognised understanding of "comfort" across age and cultural divides.

For example, Muji has collaborated with UR on innovative products such as portable kitchens and birch flooring, which are the first manifestation of UR's product development." These designs are both practical and flexible, such as the Portable Kitchen that requires only a wall to install, uses heat-resistant and durable materials, and serves all countertop functions." (Morita, Y. and Kim, Y. 2021)



Figure 3, kitchen(2012) by MUJI&UR

The MUJI hotel is based on the concept of "anti-luxury, anti-humble", with the walls of the hotel wrapped in bamboo, and dotted with graphite-coloured slate tiles left over from the renovation of the neighbouring old town. The entire space has a simple, natural "MUJI-style" feel, while eliminating the need for elaborate decorations.

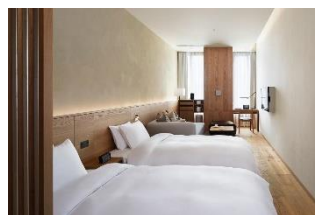


Figure 4, Hotel Tokyo (2012) by MUJI

3 Research Methodology

In this study, through a case study approach, we have taken iconic furniture products under the IKEA and MUJI brands, aiming to provide insights into how these two design giants have been able to achieve their unique design philosophies, use of materials, functional considerations, and aesthetic pursuits through their unique design philosophies, use of materials, and aesthetic pursuits. Firstly, representative furniture products from each brand are selected not only for their wide market recognition, but

also because they embody the core design philosophy of the respective brands. Subsequently, starting from the design features, the design strategy of IKEA furniture is explored with pragmatism at its core, focusing on user experience and ease of assembly, while MUJI emphasises minimalist aesthetics as well as its advocacy of natural materials and fine craftsmanship. In terms of material selection, the study will analyse how IKEA achieves its cost control and environmental goals through innovative use of materials, while MUJI focuses more on the use of natural materials and pursues harmonious coexistence with nature. In terms of functionality, the study will assess the utility and multifunctionality of IKEA and MUJI furniture, and this study aims to reveal how IKEA and MUJI promote cross-cultural design integration and innovation within the global design field.

4 IKEA design and MUJI design features and case studies

4.1 IKEA design characteristics

IKEA stands for Scandinavian style and is known for its simplicity, practicality, fine craftsmanship and pure colours, aiming to provide beautifully designed and functional home furnishings, ensuring that they are affordable and accessible to a wider range of people. The structure, colours and materials of IKEA products are analysed below.

Colour: "In the 20th century, IKEA's home design colours shifted from the yellows, greens, blues and oranges of the 1960s to the harmony of natural wood colours and warm colours in the 1970s, and to the introduction of purple and red colours under the influence of multiculturalism in the 1980s, which enriched the visual style. Overall, IKEA prefers bright shades, with darker colours used only for accents." (Wanyu, Z. and Guoqing, Y. 2024)

Materials: "In the IKEA decorative range, the materials selected include malleable wood, biocomposites such as "Liquid wood", bioplastics, mineral composites such as "Corian", and textiles made from recycled PET bottles. and textiles made from recycled PET bottles." (Karlsson, I.2012) These materials combine sustainability, aesthetics and practicality and reflect IKEA's commitment to innovation and eco-friendly design.

The design structure: incorporating origami and jigsaw puzzles, the combination of folding, modularity and flat design. The combination of folding, modularity and flatness emphasises the 'IKEA' character of the product, and this approach reduces the size of the product, saves raw materials and facilitates transport. This approach reduces the size of the product, saves raw materials and facilitates transport.

KALLAX: This minimalist shelf elegantly displays books, art and decorative objects in a symmetrical and organised design that emphasises the objects rather than the shelf itself. The modular design allows for the addition of doors to flexibly adapt to different tastes, spaces and needs. Its smooth surfaces and rounded corners demonstrate a sense of high quality, and the space can be customised with accessories and boxes to personalise it. The modular mix of 100% recycled materials demonstrates organic

design practices, emphasising the harmony between design and nature by optimising the use of resources and supporting the circular economy.

Materials: Includes chipboard, fibreboard and acrylic paint, with an interior filled with 100% recycled honeycomb paper structure and plastic sealed edges for enhanced durability.



Figure 5, KALLAX (2020) by IKEA

4.2 MUJI design characteristics

MUJI does not advocate individuality, it pursues the spirit of "people-oriented", and seeks to design simple, elegant, high-quality and useful products.

Colour: MUJI's furniture design is based on natural colours, reflecting Japanese Zen Buddhism's preference for the colours of nature. Wooden furniture retains the original colours of the wood, while textiles tend to use black and white and low-saturation neutral tones to create a comfortable feel.

Materials: Using natural raw materials, retaining the natural texture, reflecting the beauty of simplicity and harmony, focusing on environmental protection, advocating the harmonious coexistence of man and nature, inspired by the culture of wabi-sabi.

Design structure: "MUJI furniture follows Kenya Hara's minimalist design philosophy and demonstrates the wabi-sabi aesthetic of returning to the basics. The use of traditional mortise and tenon joints and the "Shikou" technique highlights the natural characteristics of the materials and improves durability. The "contrast of roundness" in the design reflects the philosophy of "everything grows"." (Jiajing, Z., Xiaoxing, Y. and Wenwen, P. 2019)

Oak Wide 2 Shelf - Add On: Oak Wide 2 Shelf - Add On: Features a modular design with a flat package for simple connections. It can be used vertically or horizontally and can even be stacked to form room dividers. The design is simple and symbolises harmony with nature. 100% oak material, fresh and comfortable, with a choice of combinations to suit your needs.

Material: 100% oak veneer

Dimensions: 79.5 x 28.5 x 81.5 cm



Figure 6, Oak Wide 2 Shelf - Add On (2019) by MUJI

5 Comparison of furniture designers and products of IKEA design and MUJI design

5.1 ikea designer simon lahtinen

Simo Lahtinen, born in 1989 in Helsinki, is an interdisciplinary product designer who maintains a balance between function and vision in his work with a background in architecture, user-centred design, meaningful product creation and a love of Scandinavian aesthetics.

Simon lahtinen's "Element NO.1" for IKEA can be understood as a simple round table top with rectangular legs cleverly interspersed in a structure that can be assembled and disassembled more easily without the need for nails, screws and spanners. Explore the initial combination of minimalist basic shapes with variability. This has turned out to be the easiest way to modularise furniture products. It reduces the constraints of production, reduces the use of wood, and is a low-carbon design.



Figure 7, Element NO.1 (2018) by Simon lahtinen

5.2 MUJI Designer

Fumie Shibata's designs, such as the 9h Capsule Hostel and MUJI's "Lazy Sofa", demonstrate the qualities of warmth and comfort. The capsule hotels are designed to provide customers with a comfortable nine-hour rest experience, emphasising that the choice is not based on price, but on the appropriateness of the place. The "Comfort Sofa" is padded with 0.5mm microfoam to accommodate a variety of sitting and lying postures and ensure total body comfort, reflecting a design philosophy that takes the user's feelings into account. Shibata's attempts to create products that are not limited to the traditional form of furniture, but are also popular among consumers, demonstrate MUJI's unique positioning between furniture and groceries.

"I had in mind that the furniture that best demonstrates the characteristics of Muji should be somewhere between furniture and groceries, in a form that is not limited to chairs, cushions and pillows, but rather an item that is in between the three. Fumie

Shibata then tried to make this product, and it was really loved by many people when it was first launched. (Lin, Z., 2008)



Figure 8, Lazy sofa (2012) by Simon lahtinen

6 Combination of organic design

In IKEA and MUJI furniture design, technological innovation and design concepts have led to the application of more new materials. With the globalisation of the economy, market demands have become more diverse. Scandinavian organic furniture design not only inherits the classic Scandinavian design style, but also highlights those design concepts that are crucial and easily overlooked in modern design ethics.

In the designs of MUJI and IKEA, the cold climate background of Scandinavia has prompted an emphasis on the cosy design of indoor social spaces. This organic design philosophy emphasises the promotion of real-life human interaction and is reflected in simple, natural and user-friendly furniture layouts that aim to enhance human connection.

The design philosophies of MUJI and IKEA embody humanism by combining innovative materials and traditional technologies with a focus on social justice and caring for the underprivileged. This organic design philosophy emphasises the close connection between design and social responsibility, demonstrating the pursuit of living in harmony with society.

In the organic design of MUJI and IKEA, the designers delve into the harmonious coexistence of man and nature, and promote environmental awareness and low-carbon lifestyles through design. These design philosophies not only respond to the global issues of ecological balance and environmental protection, but also advocate the use of sustainable and recycled materials. In this way, MUJI and IKEA demonstrate their commitment to the conservation of natural resources and lead consumers towards a more environmentally friendly lifestyle.

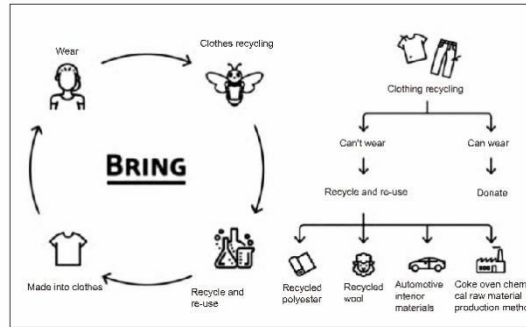


Figure 8, recycling chart (2012) by Myself

7 Summary

An in-depth analysis of IKEA's and MUJI's organic design concepts and practices provides insights into how these two brands have contributed to sustainable development and cross-cultural dialogue in furniture design through their innovative design and material choices. Their designs not only reflect respect for and protection of natural resources, but also demonstrate a deep understanding of humanistic concerns, and by enhancing the functionality, aesthetics, and environmental friendliness of their products, they are leading global consumers towards a more eco-friendly and human-centred way of life. This continuous exploration and practice of organic design not only provides valuable insights and inspirations for the global design community, but also sets an example for the modern society in pursuit of sustainable development. As technology advances and social awareness continues to grow, the organic design concepts promoted by IKEA and MUJI will continue to lead furniture design towards a greener, healthier and more humane future.

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Figure 6, Oak Wide 2 Shelf - Add On (2019) by MUJI

Figure 7, Element NO.1 (2018) by Simon lahtinen

Figure 8, Lazy sofa (2012) by Simon lahtinen

**Research on smart desk design and its symbiotic
experience based on ground theory: an innovative
exploration of interdisciplinary teamwork**

Name: Yi Yang

Student number: 2233138

Professional Doctorate: Art & Design

1 Introduction

The study of smart desk design and its symbiotic experience based on ground theory is a forward-looking and innovative project, which is particularly important in today's fast-moving work environment. As technology advances and work styles evolve, so does the demand for office furniture, especially for intelligent solutions that improve productivity, promote well-being and enhance the user experience. In this context, the design of smart desks is not just a question of product innovation, it is also about how to create a more humane and intelligent working environment through the interaction between technology and people.

Partnership or teamwork plays a crucial role in this innovation process. Through interdisciplinary collaboration, designers, engineers, psychologists, and user experience experts can work together in the design and development of smart desks, each contributing their unique perspectives and expertise to the project from their own specialised perspective. This diverse teamwork ensures that the design process takes into account the actual needs and experience of the user, resulting in the development of smart desks that are ergonomically correct and able to enhance work efficiency and comfort through intelligent features.

In addition, close collaboration between partners helps to accelerate the innovation process, so that concepts can be turned into real products on the market faster. By sharing resources, knowledge and technology, teams can effectively address challenges encountered during the R&D process and reduce duplication of efforts, while enhancing the competitiveness of their projects. In the process, ground theory, as a research methodology, can help teams gain a deeper understanding of user needs and behaviours, guiding the design direction and ensuring that the final product can truly meet user expectations and provide a unique symbiotic experience.

2 Project Objectives

2.1 Challenges

With the rapid development of Internet technology and the widespread availability of e-commerce platforms, consumers are faced with more choices than ever before when selecting office furniture. This change poses a notable challenge: designs that are too uniform cannot satisfy all home styles and individual needs. This study endeavours to explore the complexity of user experience behind this phenomenon and to address ergonomic issues by examining the functionality and materiality of the office and its elements, particularly the desk.

2.1.1 Reasons for the complexity of user experience

The complexity of user experience stems from several main sources. Firstly, "individual differences lead to significant differences in users' needs and preferences for office furniture. These differences may be based on the user's body size, work habits, health condition or personal aesthetics. Secondly, technological advances and lifestyle changes are constantly placing new demands on office furniture, such as the increasing demand for desks that help reduce health problems associated with sedentary behaviour." (Aryal, A., Becerik-Gerber, B., Anselmo, F., Roll, S.C. and Lucas, G.M.,

2019.) In addition, the design and selection of office furniture is also influenced by socio-cultural factors, and different cultural backgrounds and social environments shape different expectations of office space and furniture.

2.1.2 Links between UX complexity and social context and culture

The complexity of user experience is closely linked to the social environment and culture. In a diverse society, people's lifestyles, work habits and aesthetic preferences are influenced by various cultural factors, resulting in diverse office furniture needs. For example, "some cultures may place greater value on the openness and flexibility of office space, while others may place greater emphasis on privacy and personal space. In addition, societal concerns about health and well-being influence expectations for office furniture, such as the need for desks that promote alternating sit-stand work." (Zhang, X., Zheng, P., Peng, T., He, Q., Lee, C.K. and Tang, R., 2022)

To address these challenges and needs, this study will explore both functionality and materiality. "In terms of functionality, the study will look at how office furniture design can meet ergonomic needs and increase productivity while reducing negative impacts on users' health. In terms of materiality, the study will examine how different materials affect the durability, environmental impact, and user perception and experience of office furniture." (Dun, X. and Liu, Y., 2020) Through these two dimensions, the research aims to develop office furniture solutions that are ergonomically sound, yet able to incorporate diverse home styles and meet individual needs.

In summary, "the complexity of the user experience requires office furniture design to take into account not only the basic needs of functionality and ergonomics, but also the influence of socio-cultural factors. By taking these factors into account, the diverse needs of users can be better met, creating a more comfortable, healthy, and personalised office environment." (Qiu, K. and lang Yang, M., 2010)

2.2 Long-term and short-term goals

2.2.1 Objectives

The main goal of your research is to explore and develop new methods and processes for smart desk design that should be based on a deep understanding of the diversity of user needs, changes in the social environment, and cultural differences, with the aim of facilitating a symbiotic experience between users and smart desks. This includes understanding and incorporating the user's home style and individual needs, especially in the context of Chinese culture, and how design can meet the diverse and individual needs of the user while promoting emotional connection and long-term use.

2.2.2 Aims

Identify sources of user experience complexity: Identify and analyse the factors that influence the complexity of smart desk user experience, including personal preferences, work habits, home environment, etc., through qualitative and quantitative research methods.

Study how social environment and culture influence design: Explore the impact of changes in the social environment (e.g., shrinking living space, popularity of

teleworking) and cultural differences (e.g., aesthetic preferences, work values) on the design needs of smart desks.

Develop design methods for symbiotic user experiences: Based on user participation design practices, develop design methods and tools that can promote symbiosis between users and smart desks, e.g., collecting user feedback through user journals and co-creation workshops.

Designing Adaptable and Flexible Smart Desks: Develop smart desk designs that are highly adaptable and flexible, capable of accommodating different home styles and work demands, as well as supporting personalisation and upgrades.

Evaluate the impact of design on user experience: Evaluate the effectiveness of different design options to improve the user symbiosis experience and meet complex user needs through prototype testing and long-term follow-up studies.

By setting these big and small goals, your research will provide insights into the complexity of user experience in smart desk design and the reasons behind it, as well as how socio-environmental and cultural factors shape design requirements and solutions. This will help develop smart desking products that are more innovative and responsive to user needs.

We can set the big goal as exploring and realising smart desk designs that not only satisfy functional needs, but also deeply understand and respond to the emotional and socio-cultural needs of the user, thus facilitating a symbiotic experience between the user and the product. Sub-objectives include (1) delving deeper into users' daily habits, emotional connections, and personalised needs for smart desks; (2) exploring ways to incorporate the complexity of user experience into the design process, including the influence of the social environment and cultural context; and (3) innovating design methodologies that promote collaborative work between teams or partnerships to jointly realise smart desk designs that meet users' needs and expectations. These objectives are in line with the shared vision and mission of the team or partnership, as they emphasise the concept of user-centred design and promote interdisciplinary collaboration in the common pursuit of creating products that meet the functional needs of users as well as being deeply attuned to their emotional and cultural expectations, which is important for enhancing user satisfaction, strengthening product market competitiveness, and promoting sustainable development.

3 Methods and Strategies

3.1 Innovative technologies

Achievement of project objectives, including innovative technologies or processes. Before achieving the Symbiotic Experience Research and Design for Smart Home Smart Desk long-term and short-term goals, add a number of new innovative technologies to the list. To improve the ergonomic quality of the design and to meet individual needs while ensuring sustainability and environmental friendliness. Firstly, by introducing height-adjustable mechanical and electronic systems, our desks allow users to freely adjust the height and tilt of the desktop according to their individual height, sitting position and working habits, thus providing a more comfortable and healthier working experience. Secondly, integrated health monitoring sensors, such as

sitting posture detection and activity reminders, help users develop healthy work habits and effectively reduce the negative effects caused by prolonged sitting. In addition, we have used smart interfaces (e.g. touchscreen control panels or voice control) and integrated systems to enable intelligent management of the office environment, allowing for automatic adjustment of light, temperature, etc., as well as seamless connectivity with other smart office devices. Finally, special attention has been paid to the choice of materials, using renewable, recyclable and low environmental impact materials such as bamboo, recycled plastics and bio-based plastics to reduce the carbon footprint of our products and to drive the development of office furniture in a more environmentally friendly and sustainable direction. The integration of these innovative technologies not only aims to optimise the office environment and enhance productivity and comfort, but also demonstrates our commitment to environmental protection.

3.2 Innovation process

In our smart desk design project, a series of innovative processes were adopted to ensure a highly customised and sustainable product. Firstly, by adopting a ground theory approach, we dug deeper into the complexity of user needs and experiences, and directly involved users in the design process through interviews, observations and user experience testing. This not only enhances the accuracy and relevance of the design, but also ensures that the final product meets the individual needs of the user. Next, 3D printing and CNC machining technologies are used to create rapid prototypes, and an iterative approach is used to continually optimise the design through physical testing and collecting user feedback. In addition, we focus on data-driven design decisions to optimise design and enhance functionality by collecting and analysing user usage data such as preference settings, frequency of use and health monitoring data. Finally, in order to reduce our environmental impact, we have established partnerships with eco-friendly material suppliers and adopted energy-saving production technologies and optimised logistics solutions to ensure the sustainability of the entire production process. The combination of these innovative processes not only enhances the functionality and user experience of the desks, but also pushes the entire office furniture industry in the direction of being more environmentally friendly and sustainable.

4. Timetable and phases

The implementation of the project will be divided into four main phases, each with its own specific objectives and expected outcomes, which together contribute to the achievement of the overall project objectives.

Phase 1: Requirements Analysis and Conceptual Design

Objective: To gain an in-depth understanding of the needs and preferences of the target user group, and to define the design direction and key features.

Expected Results: Complete user requirements report, clarify design concepts and preliminary specifications.

Contribution to the overall project: Provide a solid foundation for the project to ensure that the design direction and functionality settings can truly meet user needs.

Phase II: Prototyping and User Testing

Objective: Develop functional prototypes based on the conceptual design and collect feedback through user testing.

Expected results: Produce a preliminary prototype and test it, collect and analyse user feedback to provide data support for further design improvement.

Contribution to the overall project: Verify the feasibility of the design concept, identify areas for improvement, and ensure that the product design is closer to the actual needs of users.

Phase III: Design Iteration and Technology Development

Objective: Iterate and improve the prototype based on feedback from user testing, while developing necessary technical solutions.

Expected results: Complete multiple rounds of design iterations, finalise the product design solution, and complete technical development and integration.

Contribution to the overall project: Ensure that the product design is optimised in terms of functionality, ergonomics and user experience to improve the product's market competitiveness.

Phase 4: Production Preparation and Marketing

Objective: Prepare the production process and develop a marketing plan.

Expected results: Establish the production supply chain, complete the marketing strategy and sales preparation.

Contribution to the overall project: Ensure that the product can be successfully put into production and reach the market to achieve the business objectives of the project.

Through this series of carefully planned phases, the project will not only be able to develop an innovative product that meets the needs of the user, but will also lay a solid foundation for successful marketing of the product. Completion of each stage is an important step towards the final goal, ensuring that the project can be progressed efficiently and successfully.

5 Expected results and impact

Symbiotic Furniture Experience Design is an advanced design concept that centres on creating smart desks that can co-exist harmoniously with the user's lifestyle, living environment and social culture. This kind of design is not only satisfied with practicality and aesthetics, but also pays deeper attention to how to promote positive interactions between people and the natural environment and technology through smart desk design, as well as how to reflect and incorporate the user's personality and cultural values. Symbiosis Smart Desk Experience Design focuses on the functionality, environmental adaptability and durability of smart desks, while adopting sustainable materials and production methods that seek to meet the needs of current users while taking into account their responsibility and impact on the future environment. Through this holistic and integrated design approach, Symbiosis Smart Desk Experience Design aims to create smart desks that deliver a highly personalised and satisfying user experience, while promoting ecological balance and social sustainability.

6 Summary

With the rapid development of smart technology and the constant changes in the working environment, the design of smart office furniture has become the key to improve work efficiency and user experience. The aim of this paper is to explore smart desk design and its symbiotic experience based on ground theory in order to optimise the interaction between users and smart office environments. Through in-depth analyses of user needs, work habits and technology trends, we propose a novel smart desk design solution that aims to enhance user productivity and satisfaction. This study adopts a qualitative research methodology, collecting data through interviews, observations and user tests, and systematically analysing and interpreting the data using ground theory in order to establish design principles and functional requirements. The results of the study show that the smart desk can automatically adjust to the user's individual needs, optimise working posture, reduce strain, and enhance work efficiency and collaboration through an integrated intelligent system. In addition, by enhancing the symbiotic experience between users and the smart office environment, this study provides new perspectives and practical guidance for smart office furniture design. In summary, the key contribution of this study is to propose a smart desk design solution that meets individual needs and optimises work efficiency through in-depth analysis of users' needs and work habits, combined with the latest technology trends. The realisation of this solution cannot be achieved without the close cooperation and joint efforts among team members.

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Desktop revolution: the design, development and dissemination of smart desks in modern work environments

Name: Yi Yang

Student number: 2233138

Professional Doctorate: Art & Design

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1 Introduction

In this study, we delve into a grounded theory-based smart desk design and its symbiotic experience research project, an innovative project designed to address the growing needs and challenges in modern office environments. “With the acceleration of digital transformation and the rise of a new generation of workforce, traditional office furniture can no longer fully meet users’ needs for efficiency, comfort, and personalization. Therefore, it is important to design and develop smart office furniture that can adapt to changing work habits and technological environments. Office furniture has become an urgent problem in the industry” (Vandoorne-Feys, A., Nicoara, G.G., Carasel, I.S., Karpiak, M., Kocheski, N., Malheiro, B., Ribeiro, C., Justo, J., F. Silva, M., Ferreira, P. and Guedes, P., 2021)

The main goal is to use design thinking and grounded theory methods to develop a smart desk that responds to user needs, improves work efficiency and creates a comfortable working environment. By gaining an in-depth understanding of the working habits, health needs and individual preferences of the target user group, the project aims to design a smart desk that is both practical and innovative, thereby driving the development of the office furniture industry.

In terms of expected results, the project not only expects to provide a highly adaptable and ergonomically designed smart desk, but also to further enhance the user's work experience by integrating the latest digital technologies, such as health monitoring systems and smart interfaces. In addition, the project explores the application of new materials and manufacturing technologies to promote environmentally friendly and sustainable practices. Through these innovative designs and technological applications, this project aims to provide users with a healthier, more efficient and comfortable working environment, while also bringing new development opportunities to the office furniture industry.

The smart desk design and its symbiotic experience research project based on grounded theory not only demonstrates the importance of design thinking in solving complex problems and promoting product innovation, but also, through its expected results, is expected to have a profound impact on the modern office environment and furniture industry. Social and industry impacts.

2 Innovation project background

“The background of the innovative project is rooted in a series of challenges currently faced by the office furniture industry, the most significant of which is the inability of office furniture to meet the rapid changes in the modern work environment and the new workplace requirements of the new generation of workforce (especially Generation Y). Looking forward to it. With the rapid advancement of technology and the evolution of work styles, traditional desk design has been unable to adapt to users’ needs for health,

comfort and personalization." (Liu, L.L. and Zhang, L., 2014) Therefore, design one.

A smart desk that not only meets ergonomic principles but also integrates smart technology to improve work efficiency and comfort has become the core goal of this project. The innovation lies in the multi-dimensional consideration and method application of the project.

The project uses design thinking and grounded theory, which means that the design process is highly dependent on an in-depth understanding of users and continuous feedback to ensure that the final product can truly solve users' actual problems. First, personalized interaction enhances the user experience of the smart desk. The desk is designed to learn and adapt to the individual user's preferences for the indoor environment, resulting in a more comfortable and productive workspace. It can also provide feedback and recommendations for behavior change, promote effective use of building systems and increase overall satisfaction. Desk design and its elements are then studied, implicitly addressing the ergonomic aspects of desk design. Preferences for desk designs with different ergonomic features such as leg type, storage elements and arrangement were studied. The study didn't explicitly delve into ergonomic measurements or adjustments, but it did explore how different design elements are selected, which can indirectly impact ergonomic comfort. Functionality was explored based on the design elements of the table, such as the type of legs (rods, boards, square supports), the type of storage (drawers, cabinets) and their arrangement. The study provides insight into which design elements are more likely to be favored, thereby indirectly affecting desk functionality. Secondly, in view of China's important role in the production and export of smart office desks, the adoption of green materials and practices is imperative to improve cost efficiency, competitive advantage and reduce environmental impact; 3. Material selection: desk structure, decoration, The selection of auxiliary materials is crucial. This includes consideration of its longevity, recyclability and reusability. Encourage the use of recycled materials and new environmentally friendly materials to improve material utilization and reduce costs.

The unique value of the project is that it provides a completely new solution. "To address long-term challenges in the office furniture industry. By integrating smart technology and ergonomic design, smart desks can not only improve users' working experience, but also promote health and productivity. In addition, the project's sustainable development The concept also sets new standards for the industry and promotes environmentally friendly and sustainable practices" (Malone, T.W., 2012).

The design and development of smart desks not only brings technological and design innovations to the office furniture industry, but may also change people's expectations for and use of the office environment. As more and more companies and individuals realize the importance of a healthy office, smart desks are expected to become a popular product on the market, thus driving the entire industry to develop in a healthier, smarter and more sustainable direction.

3 Various stages of project development

3.1 Requirements analysis and conceptual design

In grounded theory, hypothesis generation is rooted in inductive quantitative analysis and theory building. It involves formulating descriptions of social behaviors that reveal underlying patterns. This process requires conceptualizing findings from the empirical data and integrating these concepts into the developing theory through theoretical coding. Hypotheses can then be expressed quantitatively or qualitatively depending on the nature of the data and the researcher's method. The core of grounded theory is the inductive process of data collection and analysis, which is the methodological fulcrum for systematically generating hypotheses. The technique of a grounded theorist is to abstract concepts by setting aside the details of the data, to lift the concepts above the data, and to integrate them into a theory that explains the underlying social patterns behind behavior in a substantive domain. The results of a grounded theory study are not reports of facts, but rather relationships between concepts regarding probabilistic statements, yielding a set of conceptual hypotheses developed from experience. data. "

(Holton, J.A. 2008)

Methodology aims to systematically collect and analyze data to discover patterns, concepts, and theories within it, especially when the researcher does not yet have preconceived hypotheses about the research area. Zagan theory emphasizes that theory should be generated directly from data rather than pre-constructing a theory and then trying to verify it. With the rapid development of information technology, Zagan theory has also been applied to research on user experience (UX) design and human-computer interaction (HCI). It helps understand user needs and interaction patterns to guide the design of technology products and services. (Chandana, B.H., Shaik, N. and Chitralingappa, P., 2023) Users have higher requirements for functionality when using furniture, such as comfort, operability, human-machine experience, etc. "In terms of products, office furniture provides users with comfort "from the inside out." For example, modular desks with free combination functions allow users to freely combine them in a way that suits them." (Tuncel, D.B. and Kayan, H.Z. , 2018) Even if the appearance of office furniture does not surprise consumers at first glance, companies can still achieve corporate brand building and consumer loyalty through innovation in the internal structure and improvement of comfort. Contribute to consumers' pursuit and love.

3.2 Prototyping and user testing

In the research project of smart desk design and its symbiotic experience based on grounded theory, prototype design and user testing are core links, and they directly affect the direction and final form of product design. By using advanced technology and tools to prototype, and then gathering feedback through carefully designed user testing, the project team is able to ensure that the product is designed to meet the actual needs of users while being innovative and practical.

Prototyping techniques and tools

The prototyping stage mainly utilizes 3D printing and computer numerical control (CNC) processing technologies. These technologies allow design ideas to be

materialized quickly and accurately, allowing designers to produce physical prototypes in a shorter period of time to test their design concepts. In addition, using software tools such as CAD (computer-aided design) and CAM (computer-aided manufacturing) software, the design can be further optimized to ensure the accuracy and functionality of the prototype. The application of these technologies and tools enables the design team to quickly iterate design plans, adjust and optimize product design in a timely manner.

Design and implementation of user testing

User testing is a critical aspect, and its design and implementation require careful planning. First, determine the goals and indicators of the test, such as testing the user's response to the comfort, ease of use, functionality, etc. of the desk. Then, select an appropriate user group to test with, which usually includes users typical of your target market. When implementing testing, various methods such as questionnaires, interviews, and actual use tests are used to collect user feedback and suggestions.

Design iteration improvement guided by user feedback

Feedback collected after user testing is critical for iterative improvements in product design. The design team needs to summarize and analyze user feedback to identify features that users are satisfied with and areas for improvement. For example, if users report that the desk height adjustment function is not intuitive and easy to use, the design team may need to reconsider the design of the control interface to make it more user-friendly. For another example, if the user has concerns about the stability of the desk, the design and material selection of the table legs may need to be reconsidered to improve the stability of the product.

By continuously making iterative improvements to the design based on user feedback, the product can be gradually optimized to make it more in line with user needs and expectations. This process not only improves the market competitiveness of the product, but also enhances users' recognition and loyalty to the brand. In addition, this user-centered design method helps cultivate the user thinking of the team and promotes the development of more innovative products oriented to user needs.

3.3 Design iteration and technology development

In a smart desk design project, the design iteration and technology development stages are key to ensuring that the product meets market needs and user expectations. This process begins with an in-depth analysis of the feedback collected during the user testing phase, guiding the design team to identify and adjust design elements that need improvement. For example, in response to user complaints about the complexity of the desk height adjustment function, the design team may optimize the interface design to make it more intuitive and easier to use. Each round of design iteration is accompanied by the production and testing of new prototypes to ensure that improvements can truly respond to users' actual needs and experiences.

During the iteration process, the technical challenges faced by the team included improving product reliability, user experience, and striking a balance between functionality and cost-effectiveness. In the face of these challenges, the adoption of innovative technological solutions has become the key to breakthroughs, such as by

introducing advanced sensor technology to enhance the accuracy of health monitoring functions, or using new lightweight materials to improve the mobility and stability of desks.

The key to the technology development stage is to efficiently integrate new technologies into product design, aiming to improve the overall functionality and user interaction experience of the product. This often requires close collaboration among interdisciplinary teams of engineers, designers, and user experience experts. For example, when integrating health monitoring sensors into a desk, it is not only necessary to ensure the accuracy and reliability of the technology, but also how to cleverly integrate it into the desk design so as not to affect the aesthetics or user comfort. Similarly, the user interface design of smart desks needs to be simple and intuitive to accommodate user diversity and ensure that every user can easily access and utilize smart functions. In addition, as the functions of smart desks continue to be enriched, the seamless integration of software and hardware has become particularly critical. This involves not only hardware design, but also software development and optimization to ensure efficient collaboration between software and hardware.

By continuously exploring and solving challenges in the design iteration and technology development process, the project team not only ensures that the smart desk is at the forefront of technology, but more importantly, enables it to truly respond to user needs and provide a healthier, more comfortable and more efficient environment. working environment. This not only promotes technological innovation and design innovation in the office furniture industry, but also accumulates valuable experience for future product design and development.

3.4 Production preparation and marketing

As the smart desk design project progresses, it is particularly critical to enter the stage of production preparation and market promotion. This stage aims to ensure that the product is produced smoothly and meets quality standards by ensuring the producibility of the design, establishing an efficient supply chain and optimizing the production process. At the same time, through clear market positioning, combined with online and offline promotion strategies, and an in-depth understanding of the target market, the smart desk project aims to attract professionals and companies that pay attention to health and efficiency, ensuring that the product successfully reaches target consumers and is promoted in the market. Be successful in the market. The entire process requires not only meticulous production management and cost control, but also effective delivery of the product's unique value proposition to drive market acceptance and achieve market success, thereby bringing innovation and change to the office furniture industry.

4 The art of communicating projects to diverse audiences

4.1 Communicate to professional audiences

Industry conferences and professional exhibitions provide ideal platforms, allowing project teams to demonstrate the innovative features and practical applications of smart desks directly to industry experts and potential partners. Through physical displays,

demonstrations and interactive experiences, participants can intuitively understand the advantages and functions of the products, thereby promoting communication and cooperation within the industry. Secondly, professional journals and online forums are also effective channels for conveying project information to professional audiences. Writing and publishing detailed case studies, technical analyzes and project reports not only showcases the project's technical innovation and R&D results, but also increases the project's visibility and influence. In addition, regular seminars and webinars, inviting industry experts for in-depth discussions and feedback, are also an effective approach. These activities not only help gather opinions and suggestions from industry experts, but also enhance communication and collaboration with partners. Through these carefully selected methods and channels, the smart desk design project can effectively convey its value and potential to professional audiences, establish the project's recognition within the industry, and lay a solid foundation for future development and cooperation.

4.2 Communicate to a lay audience

"It is the easiest way to share your design projects through social networks. The drawback is that the communication effect is not easy to predict. Therefore, it is a good way to spread through multiple social media at the same time. Weibo and WeChat, which have the largest coverage, are It is a good choice. If you frequently go to Facebook, Twitter and Google+, many people will see it. At the same time, you can also share it on Weibo, Pinterest and LinkedIn. When distributing it on media such as WeChat and Twitter, it is best to recommend it to a big influencer or contribute to them. This is the fastest way." (Chen, Z. 2014)

5 Conclusion

The smart desk design project embodies the perfect integration of technological innovation and user-centered design concepts, aiming to provide healthier, more efficient and comfortable solutions for the modern work environment. From preliminary design to production preparation to market promotion, every step reflects thoughtful attention to detail and a deep understanding of user needs. Through iterative design and technology development, the project successfully overcame multiple technical challenges to integrate features such as advanced health monitoring, height-adjustable performance and smart interfaces to create a smart desk that is both practical and innovative.

In the process of communicating the project value to the market and professional audiences, the project team adopted a variety of strategies and channels to effectively enhance the project's visibility and appeal. By participating in industry conferences, using professional journals and online forums, the design concepts and technical advantages of smart desks have been widely recognized and praised.

In short, the smart desk design project not only heralds the future trend of the office furniture industry, but also provides valuable practical experience on how to meet user

needs through innovative design. The successful implementation of the project demonstrates the power of interdisciplinary collaboration and proves the importance of user-centered design thinking in modern product development. With the advancement of the project and market feedback, smart desks are expected to bring substantial changes to individuals and enterprises in terms of improving work efficiency, promoting health, and enhancing user experience.

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