

Furniture Design Considerations with Using Smart Display Tables for Customer Interactions

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In the 21st century, with active policy support, the smart hardware industry ushered in rapid development of the Internet of things, big data, and other emerging technologies, which has brought people a more intelligent way of life. Smart product retail experience stores have also emerged as a result. One of the key aspects of the consumer shopping experience is highlighted by the furniture design of the smart display table. This study considers the background of consumer rejuvenation and the diversification of needs, through in-depth examination of user pain points, and output of the design of smart product display table from the user experience perspective. Analytic Hierarchy Process (AHP) and Function Analysis System Technique (FAST) are used to systematically refine the smart display table requirements, synthesize the weights of the sorting factors, quantify the demand contribution value, and transform the requirements into functional design points. The goal is to enhance the user experience, while achieving exterior styling and usage features of the smart display table. This study provides theoretical and practical support for furniture design in the smart hardware industry, emphasizing the role of consumer experience and needs in product design and providing considerations for design research.

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INTRODUCTION

In recent years, with the arrival and popularization of so-called “intelligent life”, the product lines of major hardware terminal brands have comprehensively expanded. Xiong *et al.* (2020) noted the accelerating realization of intelligent interconnection of everything, trying to convey the true meaning of intelligent life. At the same time, with the consumer body increasingly younger, the old brick-and-mortar stores or emerging e-commerce for the increasingly complex needs of consumers cannot be independently satisfied, thus catalyzing the birth of the smart product retail experience stores.

Smart product retail experience stores (“Experience Stores”) provide trials and sales of smart hardware products, of which smart display tables are an important medium. Smart display table plays a vital role in providing a platform for customers to interact and experience. Customers can easily understand and experience different types of electronic products through it.

In recent years, research on smart display tables has focused on optimizing functionality by using sensors, cameras, touchscreens, and other technologies. Researchers are keen to combine data from environmental sensors and product feedback to explore users' preferences, or explore the various human desktop interaction modes, especially the study of sequential, implicit, and explicit interaction modes to control the desktop. The research direction focuses on the technical exploration and intelligent system innovation of the desktop itself. Hu *et al.* (2023) reconstructed an ergonomic three-level structure smart display table, aiming to create a comfortable and energetic desktop environment for people, and at the same time to provide a changeable space for different daily activities. Delgado *et al.* (2021) researched and developed ActPad, a smart desktop platform that supports user interaction with Internet of things (IoT) devices, which is a desktop board that senses capacitive touch inputs in a desktop setting to enhance user portability. Other studies (Berelson *et al.* 2018; Maiti *et al.* 2023) proposed a novel chair design method that protects user privacy and provides a healthier solution for sedentary users. However, there is still a lack of in-depth discussion on the furniture design of the smart display table from the user's perspective, and the design still needs to be improved. It is necessary to use systematic design methods and evaluation indexes to study the interaction and subjective experience of users in using the smart display table, and to design it from the user's needs.

Studies have shown that the Analytic Hierarchy Process (AHP) and the Function Analysis System Technique (FAST) are widely used in solving qualitative problems. These methods have been successful in solving various social problems by building mathematical models and calculating optimal solutions. In practical applications, Maiti and Ucler (2023) proposed a combined method based on Quality Function Deployment (QFD) and AHP, which was applied to the development of evaluation indicators for selecting lifting service providers. In addition, Dinçer *et al.* (2024) combined Geographic Information System (GIS) tools and AHP to provide an integrated solution for balancing energy production, cost factors, and environmental impacts. The AHP was also used by Paker *et al.* (2018) and Chen *et al.* (2024) for the optimization of the acoustic design of electric vehicles and the remediation of cadmium-contaminated soil. In kitchen design, Xu *et al.* (2023) used the entropy method and AHP to calculate weights to provide a scientific basis for renovation and improve the kitchen environment. The results of these analyses show that in furniture product design, determining the weights of the elements at each level through the AHP and using the functional system technology method to transform needs into functional design points is an effective method for scientific decision-making (Wang *et al.* 2020; Yu *et al.* 2023).

This research focuses on the user experience. First, three assumptions are made:

- It is assumed that customers are able to pick up and handle the items on the smart display table.
- It is assumed that the system is able to detect all of these actions.
- It is assumed that the system can determine whether or not the customer is satisfied based on their reaction.

In the research process, this paper ranks the weights of the elements of each level of the smart display table and obtains the weight ranking of the design elements of each level. In the course of the study, by processing the AHP and FAST calculations results, the combined weights and rankings of the design factors are explicitly determined. In the calculation results of the criteria level, it was found that P1 (enhancement of user

experience) ranked the highest, followed by P3 (functionality and utility), and lastly P2 (aesthetically pleasing styling). Calculations for the sub-criteria level showed that shared interaction and separate areas for interpretation were the top considerations for smart display table design. In addition, placing more samples and ergonomic design are key to enhancing the consumer experience. This is followed by harmonizing with the store environment, providing display areas, hiding energized wiring, and technological styling to improve product marketability. Based on this, three main design strategies were developed: multi-coordination, eco-friendliness, and sharing. The final output is a set of furniture design strategies that are superior in user experience, styling design, and functional use. On the one hand, this study provides users with the innovative design of smart product display tables, which can reduce the resource consumption of experience stores, help users to improve their sense of use, and enhance consumer awareness and shopping experience. On the other hand, this study deepens the development and direction of intelligent furniture. In addition to the construction and enhancement of technology and economy, this study also provides new ideas to improve the user experience of a smart display table.

EXPERIMENTAL

Market Research: Summary and Analysis of Field Research Issues

Product experience is the most important part of the store. Customers are concerned about the hardware carrier to provide experience services, that is, smart display table and other related service equipment design and display. The smart display table contains many contents, such as product advertising space, prototype placement, product information description labeling, and so on. The smart display table is intuitive for attracting customers, and a good experience can enhance the customer's desire to buy. Product selection, display arrangement, information design, service frequency, and other aspects are important factors in the design of smart display tables.

This study chose Nanjing and Shanghai cities in China for field research, identifying three research stores, with their surrounding environment and product research, as shown in Fig. 1.

The results of the study show that smart product experience stores are committed to delivering brand images through smart display tables and continuously enhancing the interaction between users and smart devices. In terms of site selection, they are mostly chosen in busy commercial areas, shopping streets, department stores, and shopping centers (Zerguine *et al.* 2022). In terms of mode design, the smart display table focuses on fun, with the goal of appealing to the main consumer group, incorporating more personalized elements and a lively atmosphere. As a carrier of user experience the smart display table needs to fit with the mainstream selling products and be designed according to the selling products (Seva *et al.* 2007). However, in the smart display table product selection, most of the current experience store display options are not effectively planned, usually selecting the latest models or flagship machines for display. Products are intrinsically linked to each other, for example, in the field of cell phones, the simultaneous display of cell phones, cell phone films, cell phone cases, and other products can promote the relevant consumer choice.

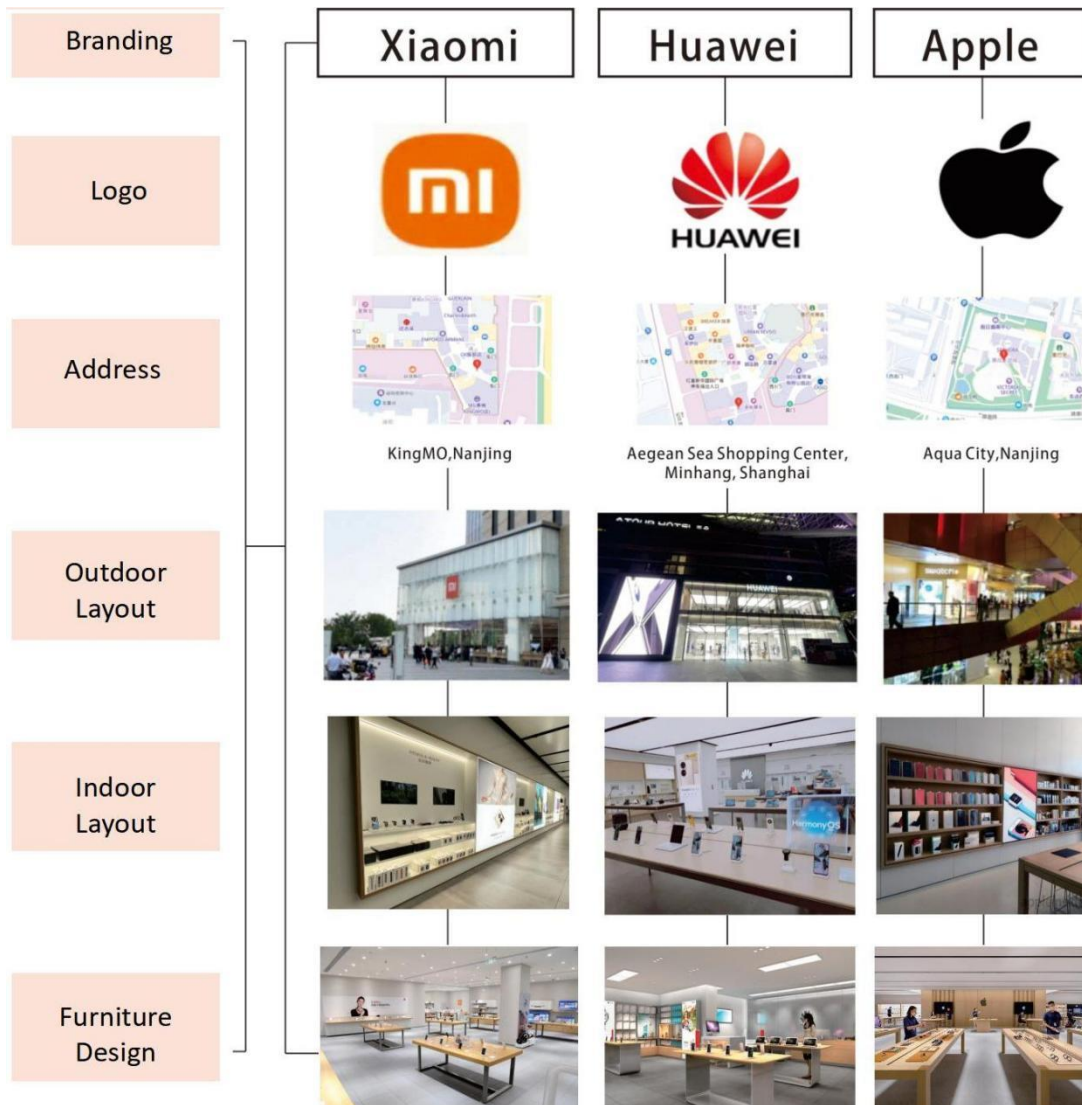


Fig. 1. Smart display table field research summary

In addition, there are the following problems that need to be solved:

1. In terms of exhibition layout, the hardware is currently arranged regularly, but the rectangular table is less friendly to tiny products and customers' standing area, and the social distance is difficult to ensure, while lacking brand characteristics.
2. In terms of information design, booth-related information design needs to be attractive enough to arouse customers' interest in the products on display. Due to the small number of products, the design of the information is particularly important to ensure that it can attract customers' attention even at a distant location.
3. In terms of service frequency, smart hardware requires customers to have independent experience time but does not require store staff to keep watching to avoid causing customer discomfort. Store staff need to skillfully grasp the timing of the service to determine when they need help and when they should not intervene, to improve the customer's experience satisfaction.

User Research: Organization of Qualitative and Quantitative Research

Establishing user research and modeling for smart product display tables requires a user survey and analysis of the experience store. A combination of qualitative and quantitative methods were used to distribute 398 questionnaires and conduct in-depth interviews with 10 users. The survey results show that customers are highly interested in the smart product display table, with more than half of the choices for the options of experience, contact, and interest. During the experience, most customers preferred the freedom to select products, enjoy the comfortable environment, and the convenience of the experience. The results of the study also revealed some issues:

- (1) Customers encountered a wide range of products, difficulty in locating them, and unclear configurations when searching for products. The subsequent design considers setting up product zoning, displaying price points, categorizing, and positioning products, and providing differential comparisons.
- (2) During the experience, the product parameters are complex, the meaning is vague, and the sense of interaction with the furniture is poor. There is a need to streamline product parameters, living embodiment of desktop arrangement, and simplify the use of instructions.
- (3) When viewing the desktop arrangement of products, the environment is noisy, there is a lack of categorization, there is no detailed explanation on the desktop, and it is difficult to seek help from store staff. Improvement measures include designing a clear division of smart display table area, separating the user's use area, and adding functions, such as buttons, to call store staff to enhance the user experience.

Analytic Hierarchy Process: Weighted Comprehensive Ranking of Design Factors

The AHP originated from operations research by Prof. T. L. Saaty in the 1970s to decompose complex goals and factors, reduce quantitative data, and discover and systematically apply the relationships between levels. The method involves quantifying the front-end problems and ideal goals into different factors, mining the correlation between the factors, and expanding them by level, forming an analytical model with a multi-level hierarchical structure, quantifying indicators at each level, ranking the relative importance values and synthetic weights, and avoiding subjective arbitrariness (Han *et al.* 2022).

Table 1. Target, Criterion, and Sub-Criteria Levels to Model the Hierarchy of Demand Steps

| Target Level | Criterion Level | Sub-criteria Level |
|--|------------------------------------|---|
| Conduct design iterations of the smart display table | Enhanced user experience P1 | Provide independent explanation area N1 |
| | | Provide display show area N2 |
| | | Provide shared interaction N3 |
| | Aesthetically pleasing modeling P2 | Energized lines are invisible N4 |
| | | Technological modeling N5 |
| | Practical function P3 | Coordinate with store environment N6 |
| | | Ergonomic N7 |
| | | Place as many samples as possible N8 |

This study integrates research needs for the smart display table, combines and names the reconstruction, and then uses the affinity method to categorize and stratify them. The next level of demand is used to define the upper level of demand, according to the

target level, criterion level, sub-criteria level to establish the demand ladder hierarchical model, as shown in the following Table 1.

Matrix Construction and Computation

To determine whether the priority of contribution value in each level of the above model can be regarded as scientific, through the AHP weight calculation, consistency test, and ranking test, using SPSSAU analysis software to construct the matrix, to practically locate the user's needs, it is necessary to use the sum-product method to solve the weight value (W). Therefore, the experts, without communicating with each other, carry out the scalar method, generally taking 1, 3, 5, 7, and 9 to represent the same, slightly, obviously, strongly, and extremely, respectively, and *vice versa* for the inverse. These numbers are used to distinguish different levels of importance, to construct a comparison matrix between the behavioral needs at the criteria level and the specific indicators at the sub-criteria level, which is more accurate and faster (Naweed *et al.* 2018). The letter a is used to represent the demand indicator importance, the importance ratio of the two indicators, i and j that represents the demand indicator where a relational formula is shown in Eq. 1:

$$a_{ij} = \frac{a_i}{a_j} \quad (1)$$

As shown in Table 2, P1 user experience is more important relative to user entry, so it has 3 points, in contrast, P2 user entry is only 0.333 points for P1 user experience. First, the matrix is constructed and weight calculated of the secondary criteria and sub-criteria three-level indicators, respectively. The matrix construction and weight notation for P1 to P3 of the hardware level are shown in Table 2. After the secondary metrics were calculated the calculation of the tertiary metrics begins, as shown in Table 3 below, there were eight tertiary metrics in the hardware level, from N1 to N8.

Table 2. Judgment Matrix and Weight of Secondary Indicators of Criterion Level

| Smart Display Table | P1 | P2 | P3 | Eigenvector | Weight Value (w) | Order |
|---------------------|-------|-------|-------|-------------|------------------|-------|
| P1 | 1.000 | 3.000 | 2.000 | 1.617 | 53.896% | 1 |
| P2 | 0.333 | 1.000 | 0.500 | 0.491 | 16.378% | 3 |
| P3 | 0.500 | 2.000 | 1.000 | 0.892 | 29.726% | 2 |

Table 3. Judgment Matrix and Weight of 3-Level Indicators of Sub-Criteria Level

| Smart Display Table | N1 | N2 | N3 | N4 | N5 | N6 | N7 | N8 | Eigen Vector | Weight Value (w) |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|------------------|
| N1 | 1.000 | 2.000 | 0.500 | 0.500 | 1.000 | 1.000 | 0.500 | 2.000 | 0.936 | 31.190% |
| N2 | 0.500 | 1.000 | 0.500 | 0.333 | 1.000 | 0.500 | 0.500 | 1.000 | 0.593 | 19.762% |
| N3 | 2.000 | 2.000 | 1.000 | 1.000 | 0.500 | 1.000 | 0.500 | 2.000 | 1.471 | 49.048% |
| N4 | 2.000 | 3.000 | 1.000 | 1.000 | 2.000 | 1.000 | 1.000 | 0.500 | 1.333 | 66.667% |
| N5 | 1.000 | 1.000 | 2.000 | 0.500 | 1.000 | 0.500 | 0.500 | 1.000 | 0.667 | 33.333% |
| N6 | 1.000 | 2.000 | 1.000 | 1.000 | 2.000 | 1.000 | 2.000 | 0.500 | 0.936 | 31.190% |
| N7 | 2.000 | 2.000 | 2.000 | 1.000 | 2.000 | 0.500 | 1.000 | 0.500 | 0.593 | 19.762% |
| N8 | 0.500 | 1.000 | 0.500 | 2.000 | 1.000 | 2.000 | 2.000 | 1.000 | 1.471 | 49.048% |

Consistency Test

After the matrix is constructed, the consistency index CR value needs to be calculated to prove its data compatibility and usability. The CR value is equal to the CI value divided by the RI value. First, the CI value is the consistency index, where the n^{th} order is the index of this judgment matrix, and the total number of them is as shown in Eq. 2. The maximum characteristic root is λ_{\max} , as shown in Eq. 3, where W_i is the eigen-vector (M_i is obtained by multiplying the indicators in each row of the matrix, and then the n^{th} root of M_i is calculated, as shown in Eqs. 4 and 5. Secondly, the RI values (Randomized Consistency Indicator) are obtained against the RI control table.

$$CI = \frac{\text{Maximum characteristic root } \lambda_{\max} - n}{n - 1} \quad (2)$$

$$\lambda_{\max} = \sum \frac{(AW)_i}{nW_i} \quad (3)$$

$$\bar{W} = \sqrt[n]{M_i} \quad (4)$$

$$W_i = \frac{\bar{W}}{\sum_{j=1}^n \bar{W}_j} \quad (5)$$

To prevent logical errors in the construction of the matrix and to be able to confirm the accuracy and compatibility of the data of the matrix model, the consistency test was performed on the collected data, as shown in Table 4. The CR value ($CR = CI/RI$) was used to judge the consistency index. If the data shows $CR < 0.1$, then the test result is passed. On the contrary, if the test result is not passed, then the matrix needs to be adjusted and analyzed again.

Table 4. Randomised Consistency RI Control Table

| Element | Lookup Table | | | | | | | | | | | | | |
|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| n^{th} order | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| RI value | 0.52 | 0.89 | 1.12 | 1.26 | 1.36 | 1.41 | 1.46 | 1.49 | 1.52 | 1.54 | 1.56 | 1.58 | 1.59 | 1.59 |
| n^{th} order | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| RI value | 1.61 | 1.61 | 1.62 | 1.63 | 1.64 | 1.64 | 1.65 | 1.65 | 1.66 | 1.66 | 1.66 | 1.67 | 1.67 | 1.67 |

According to Eq. 2 and Table 5, the maximum eigenroot of the criterion level was 3.300, and the maximum eigenroot of the Sub-criteria level was 7.210. From CI/RI , the CR value was less than 0.1. Thus, the matrix satisfies the consistency test, and the model and the weight values are usable. Its composite weights are calculated as shown in Table 6.

Table 5. Summary of the Results of the Criterion Level Consistency Test

| Hierarchy | Maximum Characteristic Root | CI Value | RI Value | CR Value | Consistency Test Results |
|---------------------|-----------------------------|----------|----------|----------|--------------------------|
| Criterion Level | 3.300 | 0.150 | 0.520 | 0.288 | pass |
| Sub-Criteria Levels | 7.210 | 0.035 | 1.360 | 0.026 | pass |

Table 6. Composite Weight Calculation

| Secondary Indicators | Secondary Weights | Tertiary Indicators | Tertiary Weights | Composite Weight | Ranking |
|------------------------------------|-------------------|---|------------------|------------------|---------|
| Enhanced user experience P1 | 53.896% | Provide independent explanation area N1 | 31.190% | 0.1681 | 2 |
| | | Provide display exhibition area N2 | 19.762% | 0.1065 | 5 |
| | | Provide shared interaction N3 | 49.048% | 0.2643 | 1 |
| Aesthetically pleasing modeling P2 | 16.378% | Invisible energized lines N4 | 66.667% | 0.1091 | 4 |
| | | Technological modeling N5 | 33.333% | 0.054 | 7 |
| Practical function P3 | 29.726% | Coordinate with store environment N6 | 31.190% | 0.083 | 6 |
| | | Ergonomic N7 | 19.762% | 0.052 | 8 |
| | | Place as many samples as possible N8 | 49.048% | 0.1310 | 3 |

Function Analysis System Technique: Demand Transformation of Functional Design Points

The functional system technology method according to linear logic to the user’s needs on the product and the conversion of basic functions, the use of processes or technical requirements will be stripped level by level to form a modular matrix sub-functional chain, and then the product’s constraints are integrated to build a comprehensive product functionality, the scientific expansion of functionality, and subsequent product design (Geary *et al.* 2022).

Before using the FAST method for function derivation, the abstract “black box” model was used to derive the basic functions required by the user. The black box model in the establishment of the system and product design work in the application of more is based on the input-output relationship established, through the material flow, energy flow, and information flow of input and output to reflect the cause-and-effect relationship between factors (Zerguine *et al.* 2024). The “Tree” model is a left-right attack through the design goal of “how to think” and the assumed highest function of “for what purpose”, inquiring “how to achieve”. The “tree” model asks “how to achieve” the basic function. It peels off level by level to obtain the modularized sub-functional chain and constructs the key derivation path of the complete functional chain. Combined with the comprehensive weighting results in Table 7, the derivation process is shown in Fig. 2.

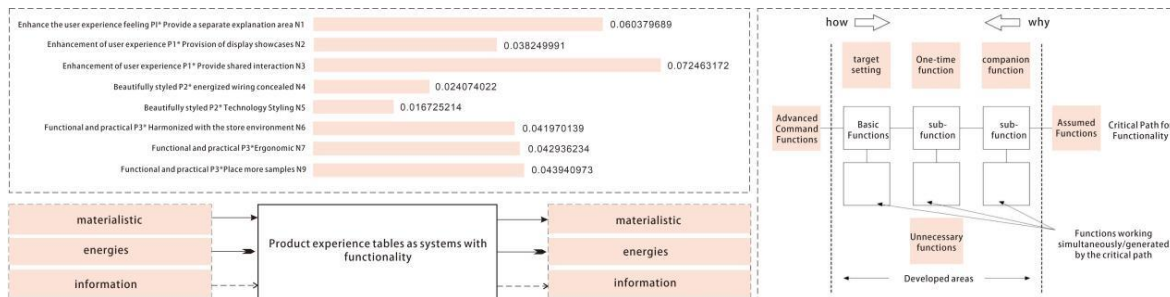


Fig. 2. Derivation of the "black box" model and the "tree" model

Integrating the total function output from the black box model and the function chain after the function tree model, the six main functional design points of multi-scenario use, rationalized information expression, sharing and interaction, practicality and aesthetics, user-friendliness, eco-friendliness, and practicality and aesthetics are obtained, and the dimensions involved in them are counted.

DESIGN VERIFICATION

If the weights of secondary indicators P and tertiary indicators N are multiplied at different stages of the criterion level, one obtains the comprehensive weights and then ranks them, where the specific ranking can be found as follows: $(P1*N3) > (P1*N1) > (P3*N8) > (P2*N4) > (P1*N2) > (P3*N6) > (P2*N5) > (P3*N7)$, as shown in Table 6.

Integrating the total function output from the black box model and the functional chain after the disassembly of the functional tree model, one acquires six main functional design points: multi-scenario use, rationalized information expression, sharing and interaction, practical and aesthetic design, humanized operation, eco-friendliness and practicality and aesthetics. Based on the weight of the comprehensive requirements and the current situation of these links, three main design principles are put forward for the condensation of the smart display table that needs to be added: Coordination, eco-friendliness, and sharing. The composition of the design points and principles are shown in Fig. 3.

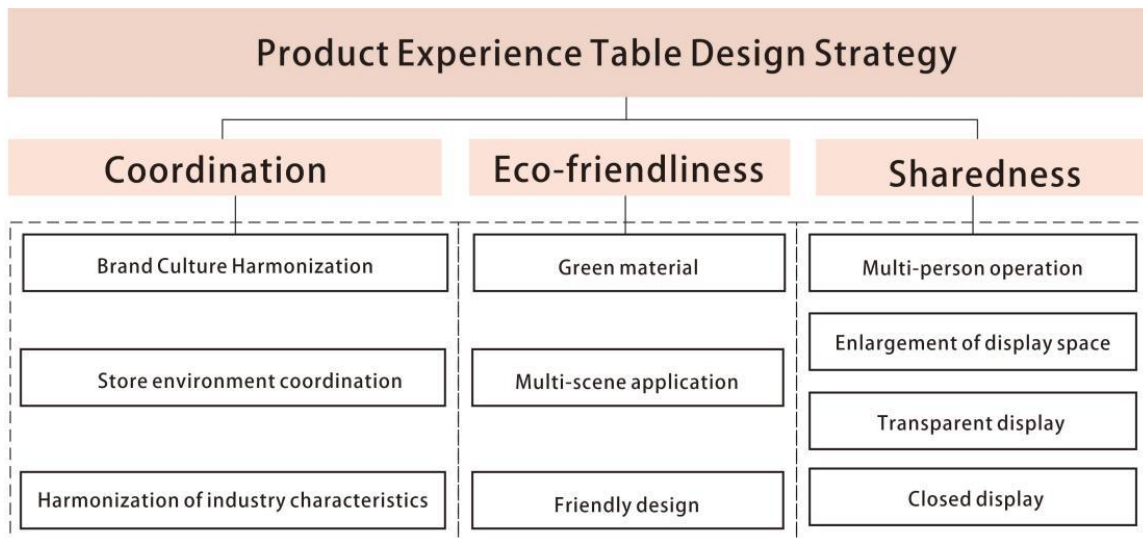


Fig. 3. Smart display table design points and principles

Coordination

Coordination is manifested in the fact that furniture products need to be coordinated with brand culture, store environment, and industry characteristics (Zhou *et al.* 2022). At present, the hardware furnishings in the store of each brand are chaotic and the partition is not obvious, which cannot reflect the brand tone and culture. Therefore, to provide consumer satisfaction value, the store hardware service facilities, and products, *etc.* need to be applied to brand consistency.

Eco-friendly

Eco-friendliness is manifested in the use of green materials in furniture products. It should give customers a friendly feeling and have the capability of multi-scene use. Green hardware products in the material are to be considered safe, recyclable, non-toxic, and harmless raw materials, and the material texture should be gentle. A friendly feeling, is modeling to avoid sharp edges and corners, and the functional partition of the theme of the color tone selection is in line with the brand characteristics. The store hardware equipment and the environment, people, and furniture products are coordinated (Yu *et al.* 2022).

Shareability

Sharedness is manifested in the enlargement of the operation area of the smart display table. The display space and scenario-based display are expanded. In the design, the shape needs to be changed to provide desktop utilization and shorten the waiting time for customers to begin the experience, but also can be expanded or added above the ordinary smart display table display screen, so that more consumers can understand the specific parameters and prices through the screen (Yu *et al.* 2022).

Design Strategy

The smart display table is an important bridge for service users to experience the product, and it is also the area with the largest footprint of the whole experience store space. As the core equipment of the experience store, its functional structure includes consumer trial prototype, one-on-one trial explanation, large screen sharing experience operation, intelligent display of commodity information, guiding the customer to place an order online, *etc.*, and providing self-help, exclusively one-on-one as well as through a shared screen. Considering the above functions meets the principles of coordination, eco-friendliness and sharing. The design of the smart display table includes the structure of panel, exclusive service small table board, sharing screen, embedded electronic information screen, and charging port, communication module, invisible power supply system.

After processing the results of the AHP and FAST calculations, a clear composite weighting and ranking of the design factors was arrived at. In the base layer calculation, it was observed that $P1 > P3 > P2$, which represent enhanced user experience > functionality and practicality > aesthetic styling, respectively. Meanwhile, in the sub-baseline layer calculations, it was found that providing shared interaction and offering a separate explanation area were the main factors in designing the product display table. Based on these data results, we developed three main design strategies: multi-coordination, eco-friendliness, and sharing.

These design strategies provided guidance to form a systematic product design program. First of all, curved shapes were used as the main shape and combined them with logs to bring consumers a soft, ecological, and energetic shopping experience, avoiding the impact that may be caused by the use of too many hard lines in the public area, and conforming to the principle of eco-friendliness (Kim *et al.* 2019). Meanwhile, the curved panel design not only maximizes the use of space but also adopts a stylish design to meet the needs of multi-scenario use, in line with the principle of shareability. The lower part is equipped with a flexibly adjustable small table panel, which can be easily stowed into the main table, thus realizing a higher degree of space utilization efficiency. The design of the upper shared screen adopts curved lines in transition, and the fixed piles are mainly straight

lines, making the connection with the desktop natural and smooth (Chen *et al.* 2022). In terms of material selection, logs were specifically chosen with good texture and green color to ensure that the products are beautiful, environmentally friendly, and durable, and do not emit harmful Volatile Organic Compounds (VOCs), which helps to maintain good indoor air quality. This material is particularly suitable for making all kinds of furniture, especially tables. In terms of color matching, the original wood color was used as the main color and silver or white stainless steel as the frame, supplemented by date red or dark grey edge color to ensure the overall color coherence and in line with the principle of harmonization. The design solution reflects the pursuit of sustainable development and user experience, not only focusing on practicality but also pursuing a balance between aesthetics and humanization, providing users with a more intelligent, comfortable, and pleasant experience.

DISCUSSION

With the development of social economy and social civilization, high-quality, high-service smart products have become the immediate consumer goods for people's work and life and have contributed to the continuous development of the smart hardware industry and the expansion of the market scale. The smart display table is the main body of the current smart experience store. Therefore, how to iterate and innovate its design, and how to upgrade from the perspective of user experience has become a problem that must be solved. Thus, this study has a certain degree of foresight and relevance. The research starts from the overall smart product target consumer population and store research, and it digs into the consumer experience needs, with the help of AHP and FAST, which helps to determine the priority of the design requirements, effectively characterize user behavior, quantify the contribution value of the requirements, make clear the functional master-slave relationship, and put forward a more scientific and practical design strategy for the smart display table.

This work enhances the scientific nature of product design and provides theoretical support for tableware design in smart product retail experience stores. However, the study only covers a limited number of offline brick-and-mortar stores, which is not enough to have strong generalizability. The influence of different user genders, age, and shopping categories on smart display tables remains unclear. The impact of different postures (sitting, bending, walking) of users when trying out smart products on the display table experience needs to be studied. Future work should focus on establishing a comprehensive product evaluation system to ensure continuous design optimization. Although some factors have been addressed in this paper, others still need to be studied in depth, and more breakthroughs in these aspects are expected in future research.

CONCLUSIONS

1. Through market research and user study, qualitative and quantitative analysis methods were used to coalesce the pain points of product usage. Four aspects were summarized from (1) product selection, (2) exhibition arrangement, (3) information design, and (4) service frequency. Through questionnaires and in-depth interviews, user needs were further summarized as time-saving, familiarity, appropriate distance, product

comprehensiveness, socialization and leisure. Hierarchical analysis and functional system development were used to analyze , and they were mainly summarized into the four aspects of (1) professionalism, (2) convenience, (3) human touch, and (4) diversity.

2. The results of AHP and FAST calculations were processed to clearly determine the comprehensive weights and rankings of the design factors. The calculation results of the criterion level were $P1 > P3 > P2$. This ranking corresponded to Enhanced User Experience > Functionality and Practicality > Aesthetically Pleasing Modeling, respectively. In the calculation of the sub-criteria, it was concluded that the provision of shared interaction and the provision of an independent explanation area were the primary factors in the design of the smart display table. In addition, as the core furniture in smart product retail experience stores, placing as many samples as possible and ergonomic product design are the prerequisites for enhancing the consumer experience. This was followed by harmonizing with the store environment, providing a display showcase area, invisibility of energized wiring, and technological styling, which made the product more competitive in the market. Finally, three main design strategies were derived: multi-coordination, eco-friendliness, and sharing.
3. Based on the design strategy, a systematic product design program was produced. The overall shape is mainly curved, reflecting the human-machine friendly relationship while combining with the log material to give consumers a soft, ecological, and energetic feeling when shopping, in line with the principle of eco-friendliness. The curved panels utilize the space as much as possible and use modular design to meet the multi-scenario use. This is in line with the principle of sharing. The chosen material for the desktop was ecofriendly, green logs. It is not only characterized by aesthetics, environmental friendliness, and durability, but also does not release harmful volatile organic compounds, which helps to maintain good indoor air quality. In terms of color matching, the surface of the panel is dominated by the original color of wood. The table body is constructed with silver-white stainless steel as the frame structure, and the tabletop corners are accented with date red or dark gray. This makes the overall color coordination of the table beautiful.

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