*Retraction*

# Retracted: Industrial Design Capability Evaluation System under Cloud Service Model

## Scientific Programming

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope

(2) Discrepancies in the description of the research reported

(3) Discrepancies between the availability of data and the research described

(4) Inappropriate citations

(5) Incoherent, meaningless and/or irrelevant content included in the article

(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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[1] S. Yi, "Industrial Design Capability Evaluation System under Cloud Service Model," *Scientific Programming*, vol. 2022, Article ID 7610040, 9 pages, 2022.

*Research Article*

# Industrial Design Capability Evaluation System under Cloud Service Model

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This study focuses on the problem that the multiobjective optimization decision-making process of the design scheme under the cloud service model fails to fully consider the needs of users' diversity, due to the lack of research on quantitative modeling and evaluation methods of designers' ability. It affects the reasonable matching between complex design tasks and design ability and hinders the socialized aggregation of design ability. Based on the competency model, facing the industrial designers in the cloud manufacturing model, our paper constructs the design capability evaluation system from the perspectives of Yuan Shengren capability, industry technology competency, design task competency, and learning capability competency and discusses the design capability evaluation method based on a network analysis method. Through the design capability evaluation of the industrial design cloud service platform, feasibility and scientificity of the method in this paper are verified. This paper proposes a design scheme optimization decision-making method combining quality function configuration and rough set theory. Based on the analysis of the cloud service model, this method introduces the design decision-making process model of user participation and fuzzy evaluation mechanism to carry out cluster analysis and the intelligent transformation of user requirements. A design scheme evaluation index system oriented to user requirements is established, and the importance of design scheme evaluation indexes in the process of networked collaborative design is accurately quantified. Following the principle of combining scientificity and systematicness, a third-order decision-making model for design scheme optimization under the cloud service model is proposed. The model is solved by combining the rough set theory and rough approximation ideal solution.

## 1. Introduction

With the rapid development of economic globalization and informatization, new technologies such as cloud service, cloud manufacturing, cloud computing, Internet of things, big data, and virtualization are gradually integrated with the design service industry. Cloud service has become a new innovative service model, which has great practical significance for realizing the agglomeration and integration of resources and the transformation and upgrading of the manufacturing industry [1–3].

It plays an essential role in accelerating the progress of GDP, enhancing economic structure, and releasing the employment burden. Many of the cloud service platforms are suffering from the lack of the abilities of development and research, coordination of the industrial chain, and functional management. Hence, up-to-date approaches and modes are essential to incorporate the social resources and upgrade the enterprises' effectiveness.

The history of industrialized industry informatization is 20 years old. Throughout the past two decades, several famous industrial technologies and platforms have been researched and developed including computer-integrated manufacturing (CIM), agile manufacturing (AM), dynamic alliance (DA), networked manufacturing (NM), industrial product service system (IPS2), concurrent cngineering (CE), application service provider (ASP), global manufacturing, virtual manufacturing (VM), and manufacturing grid (MGrid) [4].

Nevertheless, the informatization of the engineering industry has arisen to a bottleneck due to the insufficiency of the cloud service platform's application of information and the deficiency of the wide and deep practice of the above-mentioned modes. Due to the deficiency of common

standards, open design, and provisions without recognizing intelligent embedded access of original physical engineering resources, services ability, and service encapsulation, a widespread development and application of the above-mentioned engineering modes are delayed [5].

To sum up, in the collaborative design mode, design capability is the evaluation of fixed personnel in the enterprise, and its capability and experience have relatively certain evaluation results. In the cloud manufacturing mode, the design capabilities are scattered in social groups, the individual differences of participants are large, and the participation process has complex dynamics. The existing approaches are difficult to evaluate effectively, and the relevant research mainly focuses on the fields of human resource management, lack of professional evaluation techniques for the product design, failure to fully consider the dynamic evolution of design capability, and wide-area collaboration requirements. According to the cloud manufacturing mode and industrial design industry characteristics, this paper explores the designer's ability evaluation method based on the competency model and network analysis method, which is of great significance to ensure the quality of the cloud manufacturing service and improve the manufacturing service level.

In this paper, the optimization decision-making method of the design scheme based on user multiobjective requirements under the cloud service mode is proposed. This combines the existing multiobjective evaluation techniques and cloud service mode. A three-level evaluation model of design scheme optimization decision-making based on quality function configuration and rough set theory is systematically constructed. Starting from meeting user needs, this approach introduces the process mode of user participation in optimization decision-making and fuzzy evaluation mechanism by using the interactive environment of industrial design cloud service platform with open sharing and service innovation. This is of confident significance to enrich the multiobjective optimization decision-making method system under the cloud service mode and provide technical support for users' personalized design services.

## 2. Related Work

With the research and application of technologies and models such as cloud manufacturing, cloud design, and cloud platform, the social design with individual participation is rising day by day [1, 2]. To realize the wide-area dynamic aggregation and reconstruction of design capability resources for complex tasks and encapsulate individual design capability as a platform service capability, an objective, fast, and accurate design capability evaluation method is needed. The traditional design theory regards the design capability as the internal capability of the enterprise.

Zhang et al. [3] divided the evaluation index system into five categories: basic capability, professional capability, ability to combine customers and suppliers, management change capability, and innovation management capability. In [6], a cloud service platform is developed for the whole industrial chain of industrial design and realized the distributed heterogeneous and dynamic intelligent matching of resources under the cloud service mode. Ustinova et al. [7] believes that human resources are the core resources of complex product manufacturing enterprises. Effective scheduling and allocation play an important role in improving product development quality and efficiency, controlling schedule cost, and reducing new product development risk.

Cañizares et al. [8] found that there is certain path dependence between design capability upgrading and design pattern evolution. In terms of application, Verma et al. [9] established a capability set for evaluating public participation in the environmental design or planning based on the capability element method. Xie et al. [10] established a capability model using five-level classification variables. Zhou et al. [11] evaluated individual ability by analyzing the relationship between skills. Nusem et al. [12] used psychological tests to establish the relationship between personality factors and ability.

The studies [13–15] evaluated the ability level of employers based on the fuzzy set theory and establishes an ability evaluation model for specific fields. Zhao et al. [16] combined the hesitation fuzzy phrase set. Wang et al. [17] built an integrated goal-oriented evaluation system based on an improved data envelopment analysis method. Cong et al. [18] built a technology product evaluation model based on a fuzzy analytic hierarchy process. Huang et al. [4] proposed a sensory evaluation model based on the fuzzy language and developed the corresponding software prototype.

Tao et al. [5] analyzed the cloud service mode (architecture and management, transaction mode and service, task optimization and decision-making, and task reorganization and resource matching) and the optimization decision-making of the design scheme (evaluation system, evaluation mode, and decision-making method). However, some studies fail to fully consider the diversified and different needs of users for evaluation indicators; the decision-making process is subjective and uncertain, and there is a lack of in-depth thinking on the process mode and evaluation mechanism of multiobjective evaluation in the emerging technology field of cloud services.

Combined with quality function allocation and rough set theory, a multimethod integrated evaluation and optimization model is constructed. The process mode of user participation in design decisions is introduced, the evaluation index optimization system of the design scheme under cloud service mode is established, and the rough ideal solution is used to solve the model. Combined with a case, the effectiveness and feasibility of the evaluation method are compared and verified. The existing methods and models are difficult to evaluate effectively, and the relevant research mainly focuses on the fields of human resource management, lack of professional evaluation method for the product design, and failure to fully consider the dynamic evolution of design capability and wide-area collaboration requirements. According to the cloud manufacturing mode and industrial design industry characteristics, our paper explores the designer's ability evaluation method based on the competency model and network analysis approach, which is of great

significance to ensure the quality of the cloud manufacturing service and improve the manufacturing service level.

## 3. Cloud Services

*3.1. Cloud Service Mode.* Cloud service is a new model of knowledge-based networked intelligent design. It integrates the existing networked design model with cloud computing, Internet of things, semantic web, high-performance computing, and other technologies, virtualizes and serves the design resources and design capabilities, and uniformly and centrally manages and operates these resources and capabilities through the cloud service platform, to provide ubiquitous services. Design cloud services are available at any time and paid on-demand to realize the sharing and collaboration of design resources and design capabilities in the whole design life cycle process.

*3.2. Cloud Service Platform.* The cloud service platform consists of two parts: the front end (web page) and the back end (website logic). Through the cooperation between the front end and the back end of the platform, combined with the corresponding access technology and virtualization technology, a new service-oriented network design mode is formed. Taking the cloud service mode as the application background, information services are gathered through the construction of an interactive environment of open sharing and service innovation. Industrial design-related resources such as product design and various design knowledge bases provide effective resource support for group evaluation, multiobjective evaluation, dynamic evaluation, combination evaluation, and process evaluation.

## 4. Optimization Decision of the Design Scheme

*4.1. Optimal Decision Method.* A fuzzy evaluation mechanism is introduced into optimization decision-making, and a decision-making method combining quality function allocation and rough set theory is proposed. Rough set theory is a mathematical tool for studying uncertain problems. Through the analysis and processing of incomplete information, we can find implicit knowledge and reveal the potential laws. This method plays an important role in realizing the optimization decision of the design scheme under the cloud service mode. The optimization decision process introduces the user participation design decision process in the optimization decision process as shown in Figure 1. Users participate in the whole process of demand release, team formation, and design activities under the cloud service mode. Based on the optimization decision-making method, constructing a design scheme evaluation index system under the cloud service mode, analyzing the evaluation index weight, processing the incomplete information, and obtaining the optimal scheme ranking of multiattribute decision-making problems were performed. Users evaluate the optimal design scheme in the form of scoring or praise, which is of great significance to accurately grasp the user's psychological dynamics and improve the accuracy of evaluation results.

## 5. Build the Scheme Optimization Model under the Cloud Service Mode

Based on quality function configuration, cluster analysis and the intelligent transformation of user requirements are carried out, and the design scheme evaluation index system oriented to user requirements is established. Combined with the rough analytic hierarchy process, the evaluation index weight of the design scheme is determined to ensure the consistency and accuracy of the complex decision-making information of the decision-maker. The rough approximation ideal solution is used to optimize the design scheme under the cloud service mode.

*5.1. Construction of the Design Scheme Evaluation Index System.* Through the analysis tool of quality function configuration, the house of quality constructs the evaluation index system, and the analysis process is as follows. (1) Demand acquisition: in the cloud service mode, obtain users' explicit preference needs and mine users' implicit preference needs. Collect relevant data about users' needs based on the Internet, combined with the fuzzy demand description method. Build the user demand database. (2) Demand analysis: use the analytic hierarchy process to build the judgment matrix of the user demand and analyze the relevant importance of the user demand. Express the relationship between the user demand and technical characteristics through the framework diagram of the house of quality matrix. Through the above parts, the user demand transformation house of quality as shown in Figure 2 is constructed to complete the effective transformation from the user demand to design the scheme evaluation index. Build the optimization decision evaluation index system of the design scheme based on user needs under the cloud service mode. Equation (1) is used for the relationship matrix between the user demand and evaluation index.where $A$ is the relationship matrix between the user demand and evaluation index.

$$A = \begin{bmatrix} a_{11} & a_{21} & \cdots & a_{i1} & \cdots & a_{m1} \\ a_{12} & a_{22} & \cdots & a_{i2} & \cdots & a_{m2} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ a_{1j} & a_{2j} & \cdots & a_{ij} & \cdots & a_{mj} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ a_{1n} & a_{2n} & \cdots & a_{in} & \cdots & a_{mn} \end{bmatrix}, \quad (1)$$

The weighting matrix of the user demand on the evaluation index can be represented as follows:

$$\overline{A} = \frac{1}{n} \sum_{j=0}^{n} \overline{a}, \quad (2)$$

where $\overline{\mathbf{A}}$ is the weighting matrix of the user demand on the evaluation index and $\overline{a}$ is the result of user demand weighting on the evaluation index.

In equation (3), the comprehensive impact of the user demand on the evaluation is represented:
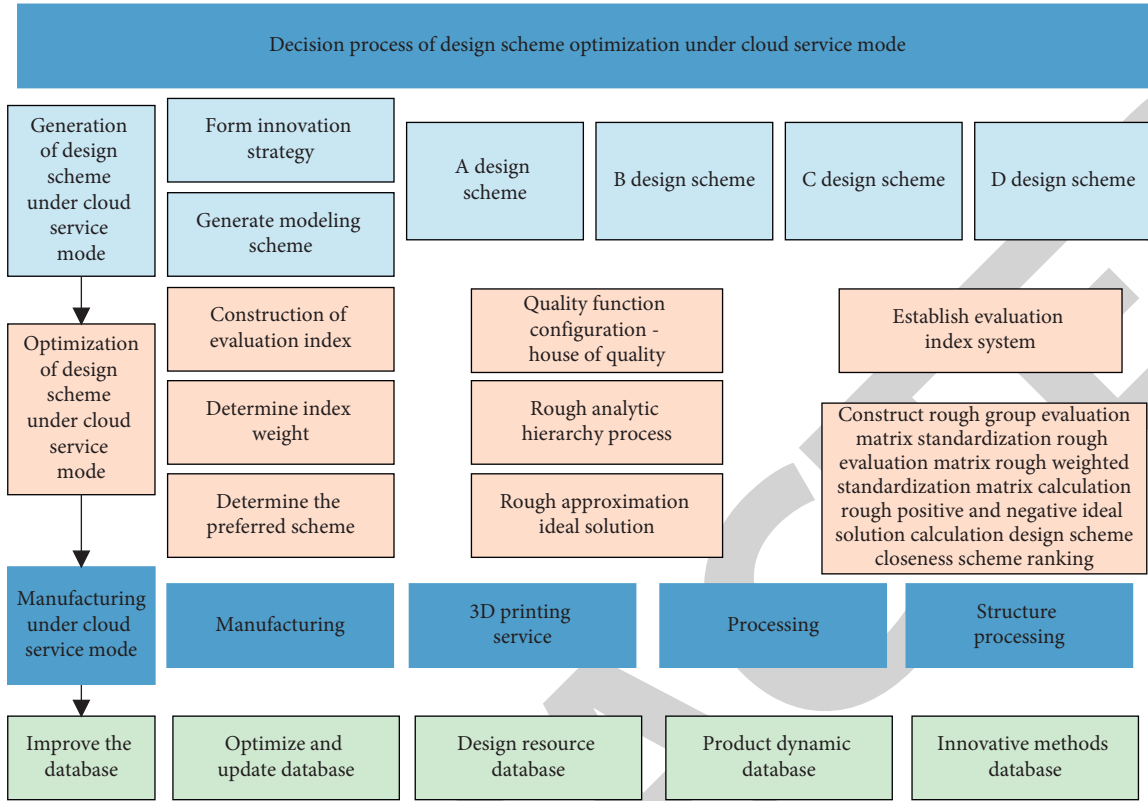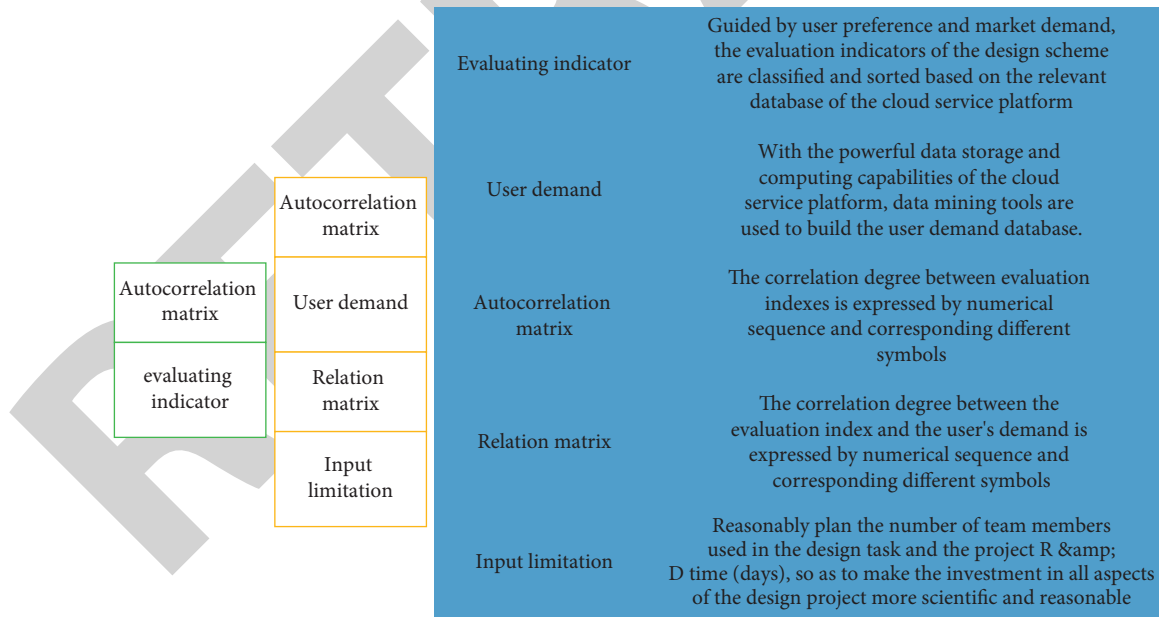
FIGURE 1: Proposed architecture.



FIGURE 2: User demand transformation house of quality.

$$E = \sum_{j=1}^{n} |\overline{\mathbf{A}}|, \tag{3}$$

where $E$ represents the comprehensive impact of user demand on the evaluation index and $|\overline{\mathbf{A}}|$ is the weighted average value of the user demand on the evaluation index.

Through the above analysis, the evaluation index optimization model of the design scheme under the cloud service mode is constructed.

In equation (4), the maximum value of the sum of satisfaction levels of design scheme evaluation indexes based on user needs is represented:

$$S = \max\left[\frac{\left(\sum_{i=1}^{m} t_i^n + k \sum_{j=1}^{n} E_j\right)}{(1+k)}\right], \qquad (4)$$

where $S$ is the maximum value of the sum of satisfaction levels of design scheme evaluation indexes based on user needs, $t_i^n$ is the importance of the $i$-th design scheme evaluation index, $E_j$ is the impact of the $j$-th user demand on the evaluation index, and $K$ is the balance coefficient between the user demand and comprehensive benefits in the optimization of design scheme evaluation indexes.

### 5.2. Determine the Weight of the Evaluation Index.
Based on the rough analytic hierarchy process, the index weight is analyzed.

(1) Construct the evaluation matrix and test the consistency of the matrix.

$$M = \begin{bmatrix} 1 & x_{12}^k & x_{13}^k & \cdots & x_{1m}^k \\ x_{21}^k & 1 & x_{23}^k & \cdots & x_{2m}^k \\ x_{31}^k & x_{32}^k & 1 & \cdots & x_{3m}^k \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ x_{m1}^k & x_{m2}^k & x_{m3}^k & \cdots & 1 \end{bmatrix}, \qquad (5)$$

where $M$ is the paired evaluation matrix and $x_{ij}$ is the importance of the decision-maker $K$ to the relative index $I$ of the evaluation index $J$.

(2) Construct the rough group evaluation matrix and calculate the rough value of each index in the matrix by using equation (6):

$$\mathbf{M}^* = \begin{bmatrix} 1 & x_{12}^* & x_{13}^* & \cdots & x_{1m}^* \\ x_{21}^* & 1 & x_{23}^* & \cdots & x_{2m}^* \\ x_{31}^* & x_{32}^* & 1 & \cdots & x_{3m}^* \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ x_{m1}^* & x_{m2}^* & x_{m3}^* & \cdots & 1 \end{bmatrix}, \qquad (6)$$

where $\mathbf{M}^*$ is the rough group evaluation matrix and $x_{ij}^*$ is the importance of the relative index $I$ of the evaluation index $J$.

(3) With the help of the MATLAB software, the eigenvectors of the upper limit matrix and lower limit matrix of rough pairwise evaluation are calculated, and the evaluation index weight is normalized:

$$f_i^- = \frac{w_i^-}{\sum_{i=1}^{m} w_i^-},$$
$$\qquad (7)$$
$$f_i^+ = \frac{w_i^+}{\sum_{i=1}^{m} w_i^+},$$

where $f_i^-$ is the eigenvalue of the lower bound matrix and $f_i^+$ is the eigenvalue of the upper bound matrix.

(4) Calculate the weight of the evaluation index:

$$f = \frac{\left(|f_i^-| + |f_i^+|\right)}{2}. \qquad (8)$$

### 5.3. Design Scheme Optimization.
Based on the rough ideal solution ranking method, the optimization decision of the design scheme is made. The process is as follows:

(1) Construction of the multi-index evaluation matrix is performed:

$$D = \begin{bmatrix} y_{11}^k & y_{12}^k & y_{13}^k & \cdots & y_{1n}^k \\ y_{21}^k & y_{22}^k & y_{23}^k & \cdots & y_{2n}^k \\ y_{31}^k & y_{32}^k & y_{33}^k & \cdots & y_{3n}^k \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ y_{m1}^k & y_{m2}^k & y_{m3}^k & \cdots & y_{mn}^k \end{bmatrix}, \qquad (9)$$

where $y_{pq}^k$ is the evaluation score of scheme $Q$ given by the $k$-th decision-maker for the evaluation index.

(2) Constructing the rough group evaluation matrix is represented by equation (10).

$$D^* = \begin{bmatrix} y_{11}^* & y_{12}^* & y_{13}^* & \cdots & y_{1n}^* \\ y_{21}^* & y_{22}^* & y_{23}^* & \cdots & y_{2n}^* \\ y_{31}^* & y_{32}^* & y_{33}^* & \cdots & y_{3n}^* \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ y_{m1}^* & y_{m2}^* & y_{m3}^* & \cdots & y_{mn}^* \end{bmatrix}, \qquad (10)$$

where $D^*$ is the rough group evaluation matrix and $y_{pq}^*$ represents the evaluation of the design scheme $Q$ given by the evaluation index $P$.

(3) The standardized rough group evaluation matrix is represented by equation (11).

$$y_{pq}'^- = \frac{y_{pq}^-}{\max_{q=1}^{n}\left(y_{pq}^-, y_{pq}^+\right)},$$
$$\qquad (11)$$
$$y_{pq}'^+ = \frac{y_{pq}^+}{\max_{q=1}^{n}\left(y_{pq}^-, y_{pq}^+\right)},$$

where $y_{pq}^-$ and $y_{pq}^+$ are the lower limit and upper limit of profit-making evaluation indicators, respectively.

(4) Calculate the weighted standardized evaluation matrix:

$$W_{pq}^- = f^*\left(\omega_p\right) \times y_{pq}'^-; \quad p = 1, 2, \ldots, m, \; q = 1, 2, \ldots, n,$$
$$W_{pq}^+ = f^*\left(\omega_p\right) \times y_{pq}'^+; \quad p = 1, 2, \ldots, m, \; q = 1, 2, \ldots, n,$$
$$\qquad (12)$$

where: $W_{pq}^-$ and $W_{pq}^+$ are the lower limit and upper limit of the weighted standardized evaluation matrix, respectively.

(5) Calculate the positive ideal solution and negative ideal solution:

$$S^+(p) = \max_{q=1}^{n}\left(W_{pq}^+\right),$$
$$S^-(p) = \min_{q=1}^{n}\left(W_{pq}^-\right), \tag{13}$$

where $S^+(p)$ and $S^-(p)$ are the positive ideal solution and negative ideal solution of the evaluation index, respectively.

(6) Calculate the distance between positive and negative ideal solutions. The comprehensive index value $S_i$ of the target scheme comes from the mean value $\mu$, and the distance from the target scheme to the positive and negative ideal solutions is expressed as

$$d^+(S_i, S^+) = \sqrt{[S_i - S^+(p)]W_i \sum -1[S_i - S^+(p)]},$$
$$d^-(S_i, S^-) \equiv \sqrt{[S_i - S^-(p)]W_i \sum -1[S_i - S^-(p)]}, \tag{14}$$

where $d_q^+$ and $d_q^-$ are the distance between the design scheme and the positive and negative ideal solutions, respectively, and $W_i$ is the weighted evaluation value of the target scheme.

(7) Calculate the closeness:

$$CC = \frac{d^-}{d^- + d^+}, \tag{15}$$

where $CC$ is the closeness between the design scheme and the evaluation index. The closeness is directly proportional to the advantages and disadvantages of the scheme.

## 6. Application Case

Users publish task requirements in the Shenghong cloud platform, and yacht is taken as an example to verify the feasibility and effectiveness of this method.

### 6.1. Construction of the Design Scheme Evaluation Index System

(1) Demand acquisition: with the powerful data storage and computing capabilities of the cloud service platform, SPSS, orange, and other data mining tools are used to build the user demand information of yacht design tasks as shown in Table 1.

(2) Demand analysis: based on the demand database under the cloud service mode, the rough analytic hierarchy process is used to construct the judgment matrix of user demand and analyze its importance.

### 6.2. Determine the Weight of the Evaluation Index. 
Taking the industrial design capability evaluation under the cloud manufacturing mode as an example, the feasibility of the design capability evaluation index system is verified based on the industrial design cloud service platform prototype system. Five designers registered for an industrial design cloud service platform are selected and evaluated by the evaluation method proposed in this paper. Table 2 shows the basic information of the five industrial designers.

Build element groups and their corresponding elements using the SD software, set the influence relationship between elements, and form an ANP-based industrial design capability evaluation network diagram, as shown in Figure 3.

For each objective, 10 industrial design experts were organized to compare each evaluation index one by one by using the Satty's 1–9 scale method. By inputting the determined element weight matrix into the software, the unweighted supermatrix and weighted supermatrix can be established, and the limit supermatrix can be calculated to obtain the weight of each evaluation index. The results obtained are compared with the results calculated by the analytic hierarchy process (AHP), and the design capability diagram of each designer is obtained, as shown in Figure 4.

It can be seen from Figure 4 that the calculation results of the two methods are the same. Designer 2 has the highest design ability level, followed by designer 3 and designer 5. In contrast, the ANP method has a better ability to distinguish, while the AHP does not consider the correlation between a large number of indicators, which is easy to lead to no obvious difference in the evaluation results of similar samples, resulting in difficulties in decision-making. The results show that the application of ANP to evaluate the ability of designers is credible, can accurately reflect the individual-level differences, and provide a decision-making basis for resource scheduling and service organization of cloud manufacturing platforms.

As shown in Figure 5, the designers in cloud manufacturing mode design the industrial capabilities of different competency models. Through the empirical analysis of registered designers of cloud service platforms, we can know that the feasibility and practicability of the method in this paper can be attributed to the iceberg model and competency classification, from Yuan Shengren, industry technical competency A relatively complete industrial design evaluation index system is constructed from the four main aspects of design task competency and learning competency. The ANP evaluation model constructed by the network analysis method has better distinguishing ability than the analytic hierarchy process, and the obtained ability index can accurately reflect the level of design ability.

We analyze the advantages of this scheme in different scenarios, such as aircraft industry manufacturing scenario, automobile manufacturing scenario, and mobile phone assembly line processing scenario. As can be seen from Figure 6, the scheme in this paper has the best energy efficiency and the smallest capacity density, which can be attributed to the introduction of user participation in the optimization decision-making process and fuzzy evaluation mechanism by using the interactive environment of industrial design cloud service platform with open sharing and service innovation. The energy consumption density of other schemes in the field is not good. It can be seen from Figure 6 that these schemes do not have an evaluation mechanism for the schemes.

TABLE 1: User demand information for the yacht design task.

| Level 1 | Level 2 | Demand |
|---------|---------|--------|
| Aesthetic requirements | Aesthetics | Reasonable color matching and combination of technology and art |
| | Epochal | The appearance is beautiful and generous, which has the significance of the spirit of the times |
| | Coordination | Harmonious proportion and scale and perfect shape |
| Innovative demand | Pilot | Unique and novel design concept |
| | Added value | Improve product added value and brand value |
| | Individualization | Unique and customized |

TABLE 2: Basic information of 5 industrial designers.

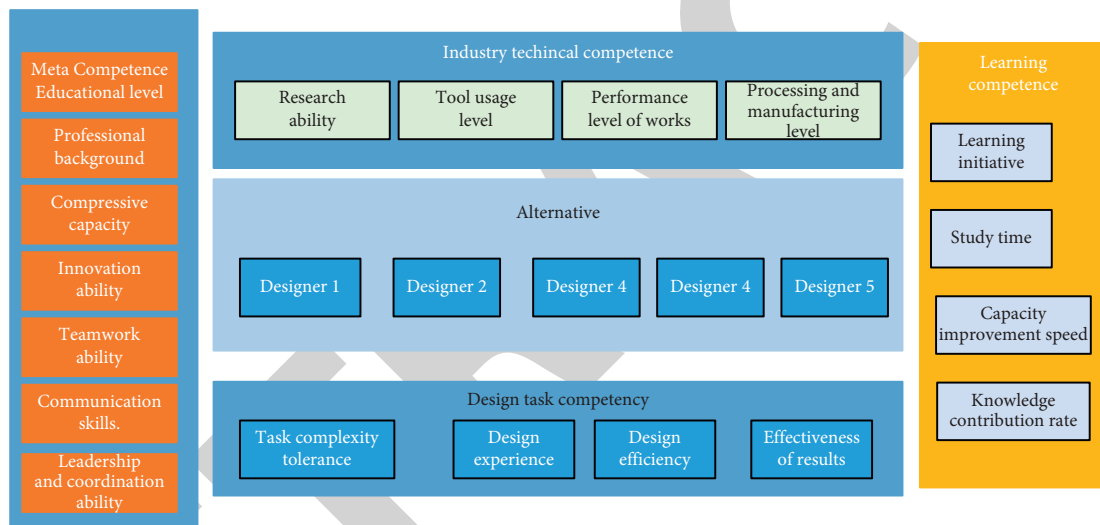| | Educational level | Professional background | Number of works | Design experience/year |
|---|---|---|---|---|
| Designer 1 | Undergraduate | Product design | 0 | 1 |
| Designer 2 | Master | Industrial design | 1 | 3 |
| Designer 3 | Doctor | Product design | 0 | 1.5 |
| Designer 4 | Undergraduate | Industrial design | 0 | 2 |
| Designer 5 | Master | Art design | 0 | 0.5 |



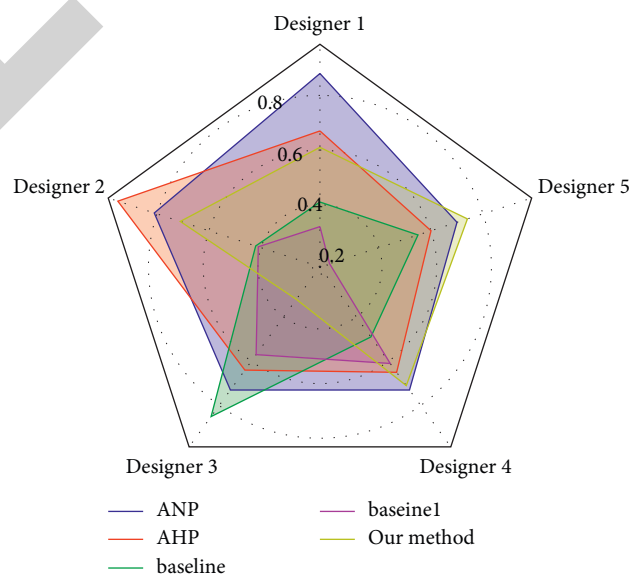FIGURE 3: The network architecture of industrial design capability evaluation based on ANP.
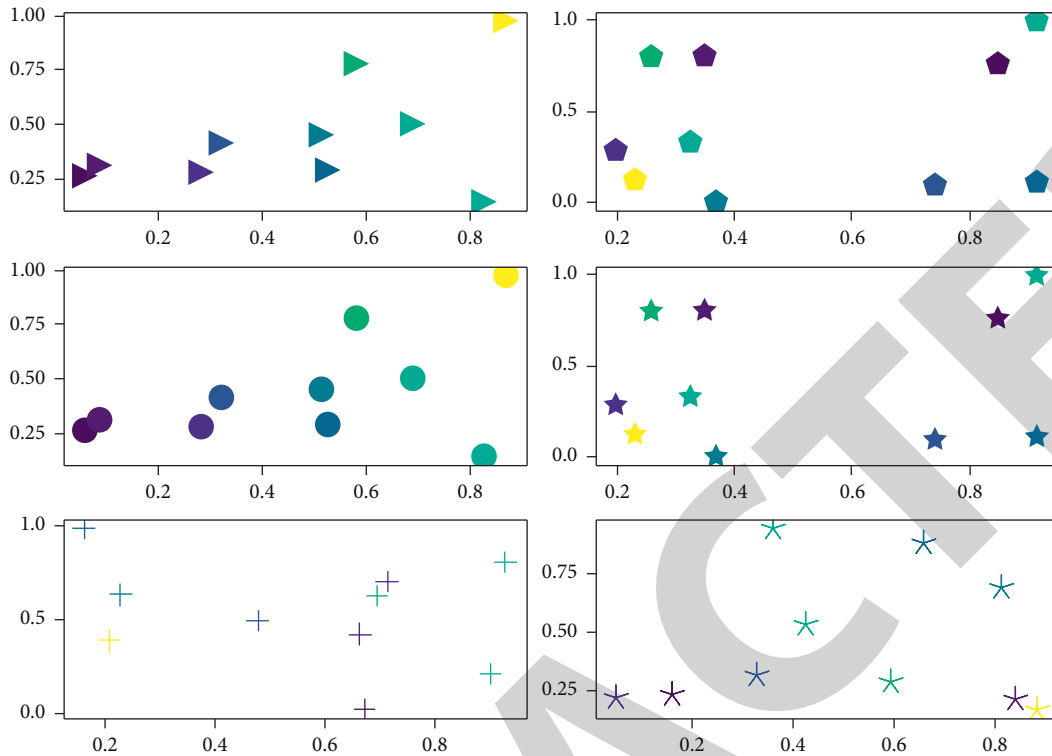


FIGURE 4: Designer's design capability.

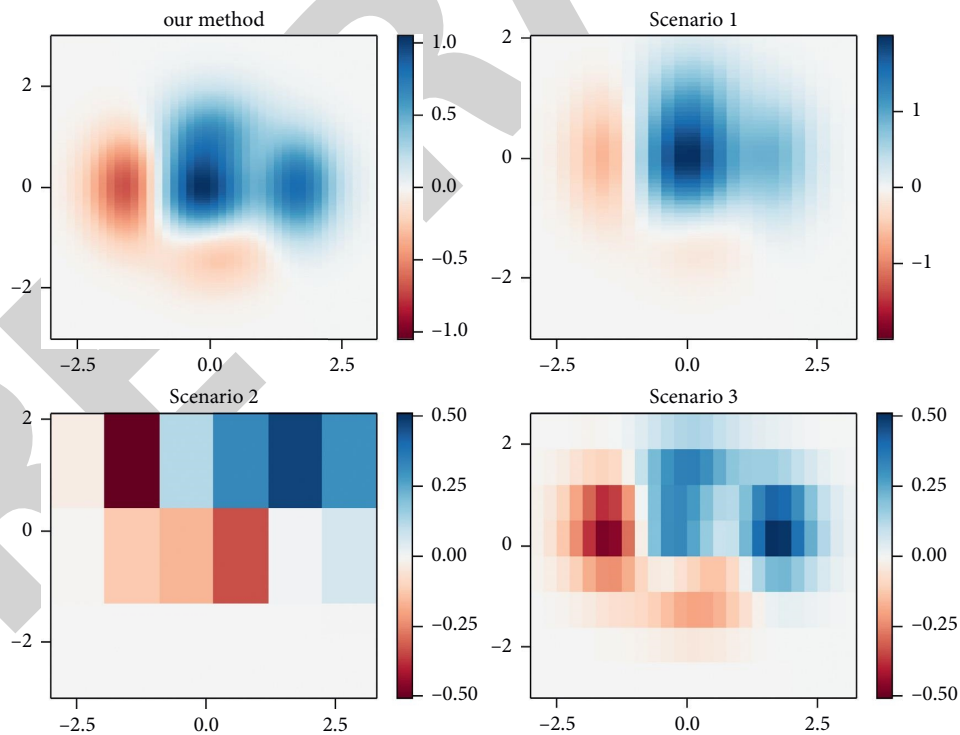FIGURE 5: Different industrial manufacturing capacities.



FIGURE 6: Design energy consumption under different scenarios.

## 7. Conclusion

In this paper, the optimization decision-making method of the design scheme based on user multiobjective requirements under the cloud service mode is proposed. By combining the existing multiobjective evaluation methods and cloud service mode, a three-level evaluation model of design scheme optimization decision-making based on quality function configuration and rough set theory is systematically constructed, and a set of systematic,

hierarchical, and reasonable scheme is designed as evaluation index system based on user needs. Starting from meeting user needs, this method introduces the process mode of user participation in optimization decision-making and fuzzy evaluation mechanism by using the interactive environment of the industrial design cloud service platform with open sharing and service innovation. It is of certain significance to enrich the method system of multiobjective optimization decision-making under the cloud service mode and provide technical support for users' personalized design services. In the future research, we will focus on reflecting users' personalized needs into the innovation process of designing the cloud service platform and combining the cloud service mode with 3D printing personalized customization and exploring multiobjective evaluation technology under the cloud service mode.

## Data Availability

The datasets used during the current study are available from the corresponding author on reasonable request.

## Conflicts of Interest

The author declares that he has no conflicts of interest.

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