

Exploration of Factors Influencing the Effectiveness of Online Recruitment Service Ratings

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Abstract: Background information & problem statement: Online recruitment has brought great benefits to both enterprises and candidates in terms of reducing recruitment costs, expanding the scope of recruitment advertisements, publishing recruitment information quickly, and effectively interacting in the recruitment process, as well as promoting the flow of talent and economic development in the region. As a result, online recruitment has become the first choice for businesses and candidates. However, there are still problems in the practical application of online recruitment, such as excessive amount of information, low pass rate, and unsatisfactory recruitment effect, which is not conducive to the implementation of enterprise human resource management. Motivation: This study studies the influencing factors of online recruitment and the measures to improve the effectiveness of online recruitment, so as to provide theoretical guidance and reference for enterprises to take effective countermeasures. Research method: This study aims to assist in improving the service functions of online recruitment platforms through the Analytic Hierarchy Process (AHP) to meet more user needs. By understanding the demand orientation of job seekers, the study provides a more suitable evaluation of recruitment effectiveness and serves as a reference for improving the quality of recruitment services on various online platforms. Findings & conclusion: Through the relationship matrix, online recruitment platforms can understand whether the services they provide can meet the real needs of users, so as to serve as a basis for understanding more user-friendly needs, as shown in Figure 3. As can be seen from the figure, the top five in the total points ranking are value-added services, design beautification, platform management, dispute resolution and reasonable compensation. Therefore, under the premise of limited resources, enterprises can give priority to increasing value-added services, optimizing the system interface, strengthening the privacy review management of the platform, timely handling of disputes between applicants and enterprises, and improving the claim system. Enterprises can consider projects with low total points such as strengthening customer service training, improving training skills, and simplifying platform operations when they have spare resources to invest capital.

Keywords: Online recruitment, Service effectiveness, Recruitment service optimization measures, Service evaluation, Analytic Hierarchy Process (AHP).

1. Introduction

In recent years, the rapid development of internet technology and the increasing number of internet users have led to a growing number of job seekers using online recruitment platforms. The potential and profitability of the online recruitment market have garnered widespread attention. However, there are still many areas for improvement in online recruitment platforms as they provide information services and continue to develop. These areas include low content quality, incomplete service systems, weak in-depth service awareness, and untimely updates of recruitment information. This study aims to assist in improving the service functions of online recruitment platforms through the Analytic Hierarchy Process (AHP) to meet more user needs. By understanding the demand orientation of job seekers, the study provides a more suitable evaluation of recruitment effectiveness and serves as a reference for improving the quality of recruitment services on various online platforms.

2. Literature Review

2.1. Online Recruitment

From a macro perspective, Hausdor et al. (2004) pointed out that online recruitment serves as a recruitment channel for companies, allowing them to post job vacancies and provide job application channels for job seekers. Klaus Moser (2005)

summarized that online recruitment is a method where recruiting entities use the internet to attract job seekers to submit resumes and apply for positions. From a micro perspective, Veger et al. (2006) believed that online recruitment involves recruiting entities using online media to publish recruitment information, attract job seekers to submit resumes, and screen job applications. The recruitment information includes the basic details of the vacant positions and the basic requirements for the desired candidates. Lee (2011) defined online recruitment as activities where recruiting entities use online electronic devices and network platform media to publish recruitment information, attract job seekers to submit resumes, and select the most suitable candidates for the job through resume screening. Currently, the online recruitment ecosystem consists of online recruitment platforms, companies, and job seekers. Their interactive relationship is illustrated in Figure 1. Based on the relationship among these three parties, corresponding optimization suggestions can be proposed to enhance the effectiveness of online recruitment.

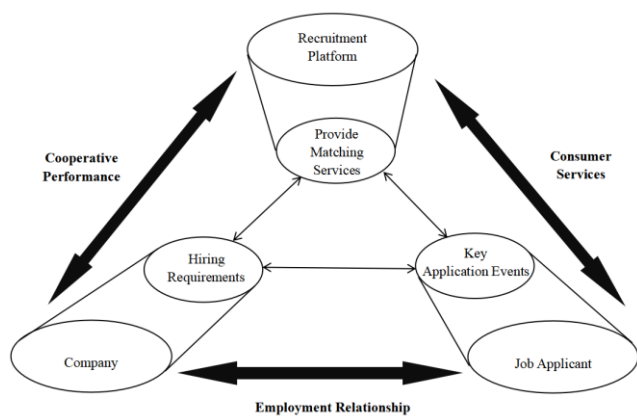


Figure 1. Online Recruitment Three-Party Interaction Diagram

2.2. Recruitment Effectiveness

Matthias & Rüdiger Kabst (2014) compared the attractiveness of traditional print recruitment ads and recruitment websites to job seekers. Their research concluded that recruitment websites are significantly more attractive to job seekers than print ads, which directly impacts recruitment effectiveness. Archana (2013) explored the use of social networks to improve recruitment effectiveness by posting job information on social networking sites frequently used by job seekers. This approach effectively reaches target candidates and facilitates direct communication, thereby enhancing the precision and effectiveness of recruitment. Keep & James (2015) found that many companies overlook the importance of recruitment, leading to talent acquisition that contradicts their development needs. They also emphasized the necessity of utilizing modern internet technologies in building, innovating, and continuously optimizing recruitment systems to achieve effective recruitment. Mahbub (2015) suggested that companies should establish a recruitment system that suits their development and aligns with current market conditions, enabling them to quickly and accurately recruit suitable employees. Chan & Kuok (2016) discussed recruitment issues in the hospitality and tourism industry, recommending that companies consider their characteristics and operational status when recruiting. They should highlight talent needs in the recruitment system and adopt modern recruitment concepts and methods. Valentina (2017) proposed combining marketing with recruitment when establishing a company's recruitment system. This approach can achieve both marketing and talent acquisition, driving the company's development. Campos et al. (2018) analyzed labor market trend data and compared online recruitment with traditional recruitment. They found that the increase in online job seekers positively impacts the effectiveness of online recruitment. Maurer (2011) suggested that effective recruitment websites should create a virtual recruitment environment and use the interactivity and rich information resources of internet recruitment to better understand job seekers' motivations and needs.

Overall, based on experts' and scholars' research findings, recruitment effectiveness can be understood as the process by which an organization optimizes recruitment activities

through decision-making, organization, coordination, and other functions. It requires the rational allocation of various resource elements in the recruitment process to improve recruitment management efficiency and levels, thereby maximizing the achievement of recruitment goals for the enterprise.

3. Research Methods

3.1. Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) was introduced by Saaty in 1990. AHP is a multi-objective decision-making method mainly used in uncertain situations and decision problems with multiple evaluation criteria. It integrates experts' and scholars' opinions to analyze complex evaluation problems into simple factor hierarchy structures, forming hierarchical relationships. Multiple evaluation elements are combined into several mutually exclusive sets, and their importance is measured using evaluation scales (Satty Thomas L., 1990). This method decomposes decision-related elements into levels such as goals, indicators, and schemes, achieving further qualitative and quantitative analysis. It fully utilizes human experience, intuition, and insight to judge uncertain environments and considers unquantifiable factors. It also systematically compares and analyzes indicators, calculates based on quantified data, and ultimately arrives at objective conclusions, providing significant reference for improving decision-making systematization and reliability.

M.P.S and H.T et al. (2021) conducted in-depth research using AHP, finding no significant differences in the weights of different risk variables, with price and cost fluctuations considered the most important factors. Olayinka (2021) and other scholars comprehensively evaluated the financial performance of logistics companies from multiple angles and levels using AHP, reflecting the overall financial status more comprehensively and accurately in performance evaluations. Abraham L and Alejandro (2021) used AHP to establish connections between indicators of different sustainable development goals, finding that health, employment, and education had higher weights, while environmental indicators had lower weights. This discovery provides important guidance for balancing different sustainable development goals and formulating scientifically reasonable policies.

When using AHP for comparative evaluation, absolute value scales can be converted into ratio scales for pairwise comparison, and the positive reciprocal matrix is used to test whether preference relationships satisfy transitivity. Not only must superior-inferior relationships satisfy transitivity (e.g., A is stronger than B, B is stronger than C, thus A is stronger than C), but intensity relationships must also satisfy transitivity (e.g., A is three times stronger than B, B is twice as strong as C, thus A is six times stronger than C). Since complete transitivity is challenging in practice, incomplete transitivity can be allowed, but the consistency degree must be tested to see if it is within an acceptable range, which can be determined using the weighting principle. Table 1 shows the Random Index (R.I) table.

Table 1. Random Consistency Index (R.I)

Values Dimensi-ons of A	1	2	3	4	5	6	7	8	9
R.I	0.0	0.0	0.58	0.96	1.12	1.24	1.32	1.41	1.45

3.2. Research Design

This study employs the Delphi method, which Gupta & Clarke (1996) regard as a qualitative research technique. Its main purpose is to find the common opinions of a group of people or experts through an iterative process, which serves as a basis for long-term forecasting of specific phenomena. Therefore, this study interviews students taking university career planning courses and senior students. Through multiple rounds of face-to-face discussions, the collected information is categorized into main user needs, which are divided into five categories: systematization, professionalism, security, service, and reliability.

This study uses the House of Quality (HOQ) to analyze the causal relationships influencing the effectiveness of online recruitment services and strategies. The basic idea is "what is needed" and "how to meet it." Its core is the method of detailed decomposition of customer needs based on the acquisition and integration of customer needs. The House of Quality is an intuitive matrix framework that provides tools for concretely realizing this demand transformation in product development. The concept of the House of Quality extends from the theory of Quality Function Deployment (QFD), which Yoji Akao proposed in 1972 as a product development method concept of quality function allocation. QFD integrates user needs throughout the entire design cycle, overcoming the drawbacks of outdated design methods by acquiring and analyzing user needs. Duan et al. (2020) used the Quality Function Deployment tool for reverse decomposition to extract key variables of potential impact. Tontini G (2007) proposed a product design method combining the QFD model to determine customer demand weights. This method determines the importance of customer needs based on customer survey results, thus optimizing the product design method. HOQ can be categorized within the scope of Quality Function Deployment. Its pattern resembles a house, so it is vividly called the House of Quality. In reality, it consists of many matrices and tables forming a pattern, including the roof structure, main body structure, and left and right wall structures. The House of Quality originates from customer needs analysis, placing the required elements of these needs in the pattern in a certain format. Besides needs analysis, the resources required for these needs should also be reflected. Integrating all these elements constitutes the House of Quality. With the development of strategic management theory, the theory of Quality Function Deployment and its measurement tool, the House of Quality, have been applied to the strategic management of many organizations and regions, including enterprises.

4. Data Analysis

4.1. Establishing a Hierarchical Decision Model

The first step in using the Analytic Hierarchy Process (AHP) to analyze problems is to decompose and layer decision-making goals from top to bottom, constructing a hierarchical structure diagram based on in-depth problem analysis and various factors, combined with the ultimate goal. In this hierarchical structure diagram, the goal layer is at the top, usually referring to the issue the researcher needs to solve, typically with only one goal. The criterion layer generally exists as the middle layer, having a certain subordinate relationship with the goal layer and a connection with the

subsequent scheme layer. The lowest layer is the scheme layer, which includes the alternatives for decision-making. Specifically, in this study's service evaluation, the final recruitment effectiveness score is the goal layer, the first-level indicators are the criterion layer, and the second-level indicators are the scheme layer. Therefore, this study categorizes the collected information into main user needs, divided into systematization, professionalism, security, service, and reliability. The importance weights of each main category are obtained through a questionnaire, with 150 questionnaires distributed, 121 valid, and 29 invalid. The survey period was from March 18, 2024, to April 5, 2024, with an 18-day recovery period and a recovery rate of 80.6%. The hierarchical structure is shown in Figure 2.

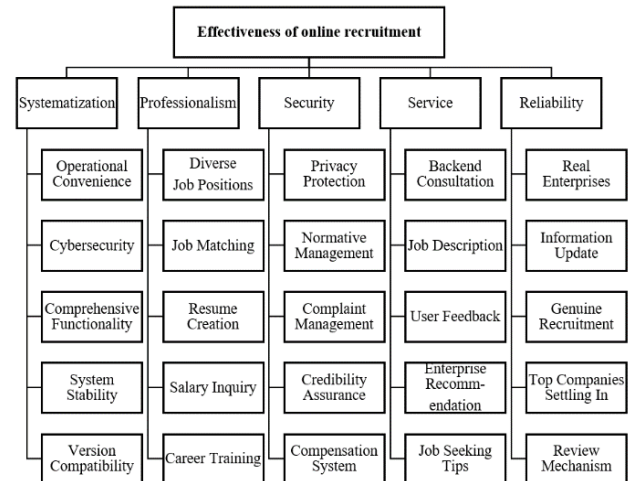


Figure 2. Hierarchical Structure Diagram of This Study

4.2. Constructing the Judgment Matrix

In the process of using the AHP (Analytic Hierarchy Process), the most crucial task is the construction of weights. The method used in weight construction involves: first establishing a comprehensive indicator evaluation system for the object of analysis, then comparing all the indicators in the evaluation system pairwise to determine the relative importance of each indicator, and finally using objective mathematical operations to determine the weights of each evaluation indicator. The most commonly used method is the eigenvalue method. Let A be a judgment matrix representing the relative importance judgment values of the same level indicators, thus: $A = (a_{ij})_{m \times n}$. In this judgment matrix, each element a_{ij} represents the pairwise comparison value of the relative importance of the row indicator Z_i to the column indicator Z_j . Clearly, this judgment matrix is actually a square matrix, meaning it can also be represented as: $A = (a_{ij})_{m \times m}$.

4.3. Determining the Weights

This study adopts the most common normalization of the geometric mean of the rows (NGM) method proposed by Saaty (1990) for the approximate solution method of the Analytic Hierarchy Process. Using the NGM method, the numerical values in the pairwise comparison matrix above are used to calculate the priority vector for each column value of the pairwise comparison matrix. If the importance weights of each evaluation indicator are expressed in a vector, then it is called the eigenvector of the judgment matrix: $\omega = (\omega_1, \omega_2, \dots, \omega_m)$. The formula is as follows:

$$w_i = \left(\prod_{j=1}^n a_{ij} \right)^{\frac{1}{n}} / \sum_{i=1}^n \left(\prod_{j=1}^n a_{ij} \right)^{\frac{1}{n}} \quad i, j=1,2,\dots,n. \quad (1)$$

Where w_i is the eigenvector, and a_{ij} is the pairwise comparison matrix, $i, j=1, 2, \dots, n$.

4.4. Consistency Test

Step 1: Calculate the largest eigenvalue of the judgment matrix. This study uses the "systematic category" indicator values as a demonstration, as shown in Formula 2:

$$\lambda_{\max} = \frac{1}{n} \left(\frac{w_1'}{w_1} + \frac{w_2'}{w_2} + \dots + \frac{w_n'}{w_n} \right) \approx 5.044793632. \quad (2)$$

Where λ_{\max} is the largest eigenvalue, n is the number of factors, n is the largest eigenvalue of each column, and w_i is the eigenvector. Step 2: Calculate the Consistency Index (C.I) of the judgment matrix. The Analytic Hierarchy Process (AHP) uses the Consistency Ratio (C.R) to measure the consistency of pairwise comparison matrices, primarily relying on the Consistency Index (C.I) and the Consistency Ratio (C.R). Saaty (1990) suggested that the Consistency Ratio (C.R) should be 0.1 or less, indicating that the level of consistency is within an acceptable range. The following formula can be used:

$$C.I = \frac{\lambda_{\max} - n}{n - 1} \approx 0.011198408. \quad (3)$$

Where λ_{\max} is the largest eigenvalue, n is the number of factors, and C.I is the Consistency Index, which must be less than or equal to 0.1. Step 3: Calculate the Random Consistency Ratio (C.R) of the judgment matrix. From the Consistency Index (C.I), the Random Consistency Ratio (C.R) for testing can be calculated. Confirm whether the C.R value is 0.1 or less; if $C.R \leq 0.1$, it indicates that the level of consistency is within an acceptable range. The calculation method is shown in Formula 4:

$$C.R = \frac{C.I}{R.I} \approx 0.009998579. \quad (4)$$

Where $C.R$ is the Consistency Ratio and must be 0.1 or less, $R.I$ (Random Index) is the Random Consistency Index (which can be looked up in a table, such as Table 1). According to Figure 1 of this study's hierarchical structure, the values obtained from each category questionnaire are used to repeatedly execute the AHP process to derive the pairwise comparison matrices for systematization, professionalism, security, service, and reliability. The $C.I$ and $C.R$ values of the pairwise comparison matrices for the five main user demand items are shown in Table 2. As indicated, the $C.R$ values obtained in this study are all less than 0.1, indicating that the values obtained in this study are within an acceptable range.

Table 2. Summary of Weights for Main User Demand Items

Main Item	C.I Values	R.I Values	C.R Values
Systematization	0.011198	1.12	0.009999
Professionalism	0.009442	1.12	0.00843
Security	0.019325	1.12	0.017254
Service	0.013278	1.12	0.011855
Reliability	0.029559	1.12	0.026392

Finally, the weight values for the five main user demand items are obtained, as shown in Table 3.

Table 3. Summary of Weights for User Demand Items

Main Item	Sub-Item	Weight Value	Main Item	Sub-Item	Weight Value
Systematization	Operational Convenience	0.1677	Professionalism	Diverse Job Positions	0.1639
	Cybersecurity	0.1317		Job Matching	0.1401
	Comprehensive Functionality	0.2003		Resume Creation	0.2550
	System Stability	0.2082		Salary Inquiry	0.2500
	Version Compatibility	0.2921		Career Training	0.1910
Security	Privacy Protection	0.1156	Service	Backend Consultation	0.1696
	Normative Management	0.2018		Job Description	0.1820
	Complaint Management	0.2068		User Feedback	0.1886
	Credibility Assurance	0.2309		Enterprise Recommendation	0.2310
	Compensation System	0.2449		Job Seeking Tips	0.2287
Reliability	Real Enterprises	0.1451			
	Information Update	0.2094			
	Genuine Recruitment	0.1515			
	Top Companies Settling In	0.2891			
	Review Mechanism	0.2314			

4.5. Establishing the House of Quality

Using the weight values obtained through the Analytic Hierarchy Process (AHP), the House of Quality is constructed step by step as follows:

User Demand Items. This is the first step in establishing the

House of Quality in this study. The results of various interviews are presented systematically and structurally, representing the user demand part of the House of Quality. The collected information is categorized into five main categories: systematization, professionalism, security, service, and reliability. Table 4 shows the user demand items.

Table 4. User Demand Items Table

Main Item	Sub-Item	Main Item	Sub-Item
Systematization	Operational Convenience	Professionalism	Diverse Job Positions
	Cybersecurity		Job Matching
	Comprehensive Functionality		Resume Creation
	System Stability		Salary Inquiry
	Version Compatibility		Career Training
Security	Privacy Protection	Service	Backend Consultation
	Normative Management		Job Description
	Complaint Management		User Feedback
	Credibility Assurance		Enterprise Recommendation
	Compensation System		Job Seeking Tips
Reliability	Real Enterprises		
	Information Update		
	Genuine Recruitment		
	Top Companies Settling In		
	Review Mechanism		

Technical Demand Items. Facing user demand items, the relevant information personnel responsible for maintaining the recruitment platform must propose relevant technical solutions for optimization. Through interviews with the information personnel participating in the recruitment platform service process, this study identifies the current technical demand solutions for online recruitment platforms and establishes a structured item table. Table 5 shows the technical demand items for online recruitment platforms.

Table 5. Technical Demand Items Table

Technical Demand Items	
Training Skills	Network Maintenance Reasonable Compensation
Reasonable Compensation	Strengthen Review
Platform Management	Customer Service Training
Maintenance Management	Simplify Operations
Job Matching	Job Skills Design Beautification
Design Beautification	Value-Added Services
Job Types	Dispute Resolution
Improve System	Talent Exchange

Relationship Matrix: To understand whether the functional quality provided by the online recruitment platform meets user needs, this study starts from collecting user feedback, aiming to improve the service quality of online recruitment to provide services that better meet user needs. The user demand item table and the technical requirements response item table established by this study are linked using a relationship matrix to understand the importance of the technical requirements provided by relevant personnel of the online recruitment platform. By multiplying the importance of user demands for functional quality by the related strength, the weighted total score is obtained, as shown in Formula 5.

$$X = \sum_{i=1}^n w_i * k_i \quad (5)$$

Where X is the total score, w_i is the weight, and k_i is the relationship strength. The higher the total score, the more the online recruitment platform should prioritize implementing technical demand improvement solutions under limited resources. The study results show that user demands can be divided into five categories: systematization, professionalism, security, service, and reliability. In systematization, version compatibility, system stability, and comprehensive functionality have higher weights; in professionalism, resume creation, salary inquiry, and career training have higher weights; in security, compensation system, credibility assurance, and complaint management have higher weights; in service, enterprise recommendation, job-seeking tips, and user feedback have higher weights; in reliability, company entry, review mechanism, and information update have higher weights. Overall, the top six highest weights are, in order: version compatibility, company entry, resume creation, salary inquiry, compensation system, and review mechanism.

The relationship matrix allows the online recruitment platform to understand whether the services provided meet the actual needs of users, serving as a basis for understanding user needs better, as shown in Figure 3. The top five total scores are value-added services, design beautification, platform management, dispute resolution, and reasonable compensation. Therefore, companies can prioritize increasing value-added services, optimizing the system interface, enhancing platform privacy review management, promptly handling disputes between job applicants and companies, and improving the compensation system under limited resources. If companies have extra resources, they may consider strengthening customer service training, improving training skills, and simplifying platform operations, which have lower total scores.

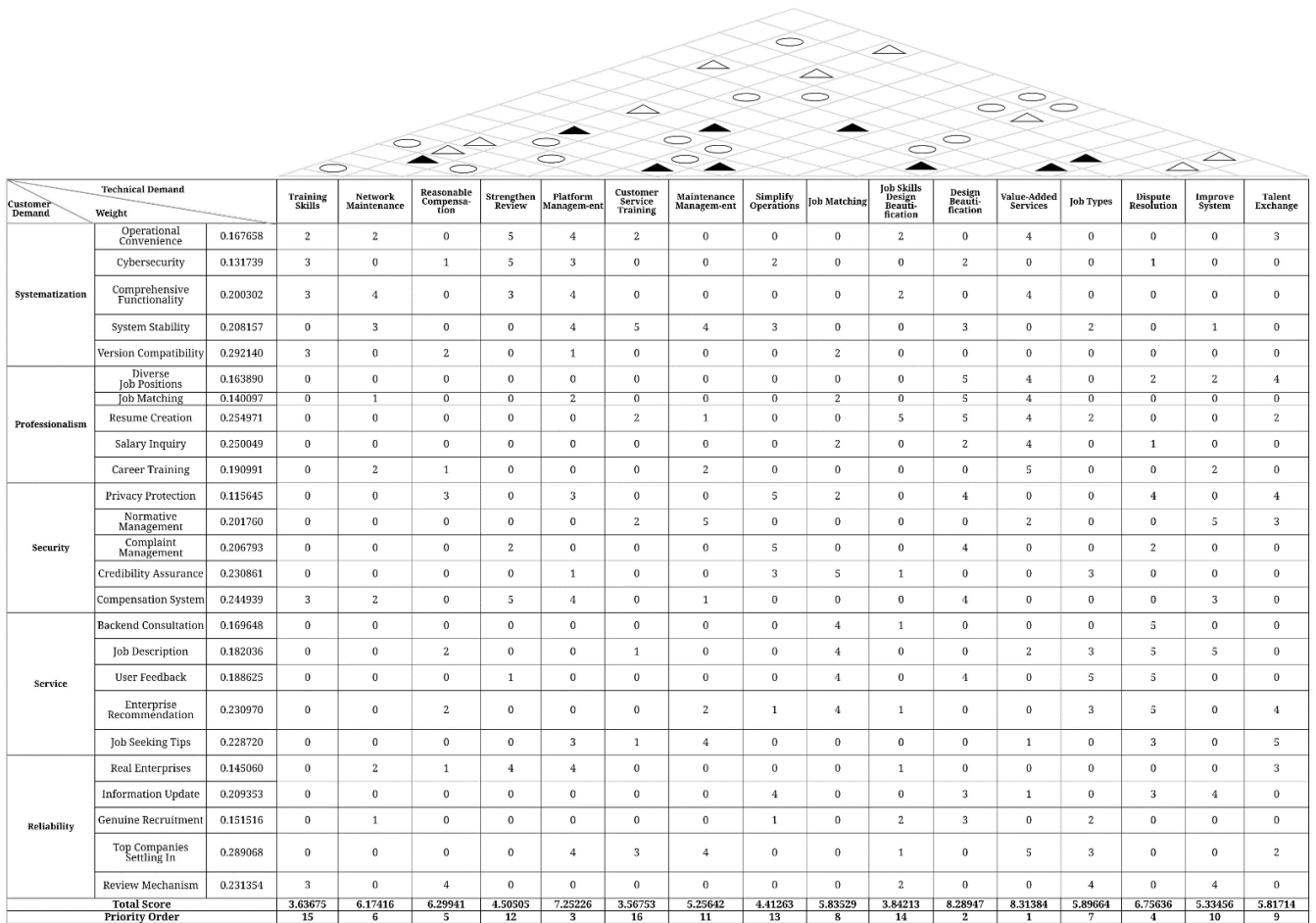


Figure 3. House of Quality

The relationship matrix represents the relationships and strengths between various technical requirements. ▲ indicates a positive correlation, ○ indicates a correlation, and △ indicates a negative correlation, as shown in the triangle at the top of Figure 3. The relationship matrix helps in understanding how multiple solutions should be coordinated or balanced when being implemented.

5. Conclusions and Recommendations

5.1. For Enterprises

Improve Online Recruitment Promotion: Currently, most job seekers learn about companies through the internet. Therefore, companies should establish a positive, active, and healthy image in their promotions, focusing on introducing the company and job content.

Perfect Online Recruitment Planning: Recruitment should vary by position, selecting different channels for different types of talents. To attract and select suitable talents through online channels, companies must fully understand the types of talents needed by each department, the current human resource status, and future talent needs, and make adequate recruitment planning preparations.

Enhance Online Recruitment Services: Companies should establish an information exchange mechanism with applicants to understand them comprehensively and improve job matching. Additionally, improving the competency of recruitment personnel, as their professionalism and service level can impact the company's recruitment of applicants, is crucial.

5.2. For Recruitment Platforms

Optimize Professional Services of Recruitment Websites: By comparing current online recruitment requirements with applicant demands, constructively enhance the professionalism of recruitment websites to match their comprehensiveness. Recruitment websites should provide more accurate and reliable job information and clear classifications, fully understanding job seekers' intentions and characteristics to help companies find suitable talents.

Improve Security Levels of Recruitment Websites: During the online recruitment process, recruitment websites should ensure the security of important data and personal information of companies and applicants. They should also adopt more reliable and secure service systems and dynamically monitor the recruitment process to ensure all information online is genuine and reliable.

5.3. For Job Seekers

Enhance Comprehensive Abilities: Job seekers' learning ability, teamwork awareness, and innovation spirit are key focuses for companies. Besides improving professional knowledge and skills, job seekers should enhance adaptability, as weak adaptability can make it difficult to succeed in the competitive modern business environment.

Improve Resume Writing Skills: Resume content must be truthful and match the applicant's experiences, without fabrications or exaggerations. When submitting resumes, be targeted, selecting positions that suit oneself, as companies have different evaluation criteria for various positions.

Adopt a Correct Employment Perspective: Job seekers should fully understand the current employment situation,

correctly evaluate their strengths and weaknesses, choose companies that align with their values, and are conducive to their development to realize their personal value.

This study finds that the resources and system functions provided by many recruitment platforms do not necessarily meet users' needs. Instead of traditional standardized functions, it is essential to seek and develop functions that suit actual user needs. This study, using the Analytic Hierarchy Process (AHP), aims to assist in improving the service functions of online recruitment platforms to meet more user needs, providing suitable recruitment effectiveness evaluations, and serving as a reference for improving the quality of recruitment services on various online platforms.

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