

Construction of Human Resource Manager Competency Model Based on Data Mining Technology in Cross-Cultural Background

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ABSTRACT

In the era of knowledge economy, enterprises are facing unprecedented competition and challenges. The process of globalization has accelerated the communication and integration between different cultures, making cross-cultural management an indispensable ability for enterprises. Especially in the field of human resource management, it is of great significance to build a competency model based on data mining technology to improve the cross-cultural communication ability, teamwork ability, and innovation ability of enterprise managers. The application of competency theory in the field of human resource management has the potential to completely revolutionize traditional management practices, enabling better adaptation to the continuous changes in the management environment. It plays a significant role in promoting the reform of the human resource management system. The aim of this paper is to build a competency model of human resource managers based on data mining technology and verify its effectiveness in cross-cultural background. It is assumed that the model can accurately evaluate the ability level of human resource managers and provide reference for enterprises to select and train outstanding talents. The experimental results demonstrate that the model achieves an accuracy of approximately 89%, a 93.3% improvement in efficiency, and a salary range exceeding 90%. The model is deemed reasonable, feasible, and highly precise in terms of competency assessment.

KEYWORDS

Cross-Cultural Background, Data Mining, Human Resource Managers, Competencies

With the deepening of globalization, enterprises are facing more and more cross-cultural management challenges. Human resource managers need not only the traditional abilities of recruitment, training, and performance management, but also the abilities of cross-cultural communication, teamwork, and innovation to cope with the diversified working environment. However, at present, there is a lack of scientific and objective tools for evaluating the ability of human resource managers in cross-cultural backgrounds. Therefore, the purpose of this study is to provide reference for

DOI: 10.4018/IJITSA.347913

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enterprises to select and train excellent human resource managers under the cross-cultural background by building a competency model based on data mining technology.

Human resource management in a cross-cultural context exhibits distinct practical characteristics. Firstly, due to differences in working languages, foreign multinational companies tend to prefer employees proficient in their own language. Proficiency in the investor's native language becomes a crucial criterion for recruitment, particularly for middle and senior core candidates. Secondly, differences in corporate culture, including management style, philosophy, and pricing, are apparent. Thirdly, decision-making methods, democratic processes, and legal concepts vary between cultures (Lu et al., 2015). A notable disparity in the expectations of leadership qualities for managers, particularly senior managers, between Chinese and foreign companies is evident. Foreign companies prioritize managers who possess the ability to work independently, emphasizing skills in analysis, decision-making, and taking responsibility. In contrast, Chinese companies place a greater emphasis on the ability of managers to unite and bring together members of the organization (Liskova & Tomsik, 2013).

Cross-cultural human resource management presents significant challenges. The values, management concepts, and diverse management philosophies of foreign companies center around managing employee behavior. There is an emphasis on the coordinated control of processes and organizations, with a belief that employees should exert effort to advance enterprise development. Moreover, there is a focus on educating employees to view the enterprise as their home and actively contribute to its success (Dilu et al., 2017). In cross-cultural human resource management, it is essential to incorporate the values, visions, ideas, and corporate ethics advocated by the company into competency modeling or corporate evaluation standards. By ensuring that individuals who align with and embrace the company's core values are recruited to manage it, the company can mitigate unnecessary internal friction stemming from cultural differences and reduce the turnover rate of personnel (Alan, 2015). Chinese companies typically employ collective evaluation methods, where the person in charge of each department establishes a performance evaluation mechanism based on departmental performance. In this approach, individual performance is often assessed in the context of team cooperation and communication. In contrast, foreign companies commonly rely on individual performance and efficiency as the primary criteria for performance evaluation (Zhu and Warner, 2019).

In recent years, with the maturation of cloud computing, data mining technology has found extensive applications in enterprise management systems. Over the years, enterprises have amassed substantial volumes of data stored in databases. It has become crucial for enterprises to extract concealed information from this data, comprehend the relationships within the data, and identify valuable insights. However, there are certain shortcomings in the current approaches to understanding competency (Wood & Cookl, 2015). For example, the application of competency models often tends to be broad, encompassing both managerial and technical personnel without specific delineation for various job roles. Moreover, when a competency model is developed for a specific position, it frequently lacks the categorization of different proficiency levels within the same role. Additionally, the current research on competency models often neglects to consider the factors that influence the nature of the enterprise (Chowhan et al., 2017). The development of a systematic and scientifically established human resource management model is a crucial research focus. Such a model can offer robust human resource support aligned with the company's business development and significantly contribute to shaping the company's core competitiveness. Research on the competency of human resource managers in a cross-cultural background is relatively rare among Chinese enterprises, and engaging in such research poses significant challenges (Lee et al., 2016). The selection of this topic arises from the practical needs of enterprise management, and the research results hold the potential to directly benefit both domestic and foreign-funded enterprises operating in China, providing tangible value.

In this context, the paper aims to discern differences in competency models among managers in various positions and ranks through data mining. The competency model should not only pinpoint key competencies distinguishing general technical workers from their counterparts but should also

delve deeper into reflecting the developmental competencies specific to technical workers. Firstly, the collected data are cleaned and preprocessed, including missing value filling, abnormal value processing, and data standardization. Then, the feature selection technology is used to screen out the features that have important influence on the ability evaluation, and the corresponding ability evaluation model is constructed. Finally, the cross-validation method is used to verify and evaluate the model (Wang et al., 2023).

This paper aims at the construction and analysis of the competency model of human resource managers based on data mining technology within a cross-cultural background. The innovations of this paper can be summarized as follows:

- (1) **Innovative Topic Selection:** This paper pioneers a unique approach by combining data mining with human resource management personnel competency. By integrating insights from both fields, it enriches the understanding of the human resource management system and cross-cultural competency theory. The empirical analysis of human resource management personnel competency sheds light on the significance of competency within the cross-cultural background, emphasizing its importance to the enterprise.
- (2) **In the preliminary development of the in-depth follow-up model,** each module of human resource management in the enterprise extends beyond mere application. It places emphasis on verification, evaluation, and continuous improvement, forming a dynamic cycle process that enhances the model's practicality. The competency model for human resource managers presented in this paper is hierarchical and pertinent. This allows for a comprehensive measurement of cross-cultural competency within current enterprises and enables the analysis of the influence of variables between different levels on the overall competency landscape.

This paper establishes a competency model for human resource managers utilizing data mining technology within a cross-cultural context. The structure is outlined as follows: The first chapter serves as the introduction, delving into the research background and the significance of exploring the competency of human resource management personnel through data mining technology in a cross-cultural setting. It articulates the research purpose, methodology, and the innovations introduced in this paper. Moving on to the second chapter, it extensively reviews pertinent literature, outlining both advantages and disadvantages, and introduces the research ideas driving this paper. The third chapter, dedicated to the methodology, concentrates on the construction and analysis of the competency model for human resource managers utilizing data mining technology. The fourth chapter focuses on experimental analysis, wherein the model's performance is scrutinized through experimentation on the dataset.

RELATED WORK

Upon conducting a more in-depth exploration of competency, it becomes evident that the general competency model faces practical scrutiny. In practice, there is a shift toward emphasizing competency models tailored to specific industries or positions. The effectiveness of such industry-specific models has been substantiated through empirical cases, particularly in the realms of human resource management recruitment, training, and performance improvement. Numerous scholars have dedicated significant research efforts to identify the management problems inherent in this field. As a result, a substantial body of related research literature has emerged, shedding light on the intricacies of this inquiry.

Pak et al. (2019) have defined competency as an individual's enduring behavioral characteristics, asserting that these attributes can distinguish outstanding performance from mediocre performance in a given position. These characteristics encompass cognitive abilities, willpower, attitude, emotions, motivation, and inclinations (Pak et al., 2019). The competency characteristics defined by Guerci

and Rahimian (2017) encompass a collection of various personality traits. These traits can motivate employees to achieve excellent work performance. Additionally, the knowledge, skills, personality, and internal drive of employees can be exhibited in different ways (Guerci & Rahimian, 2017). These characteristics serve as the starting point for assessing whether an individual is suitable for a particular job. They represent the personal traits that determine and differentiate performance variances. Gutierrez et al. (2018) conducted empirical research on the competency of management cadres in China's communication industry using behavioral event interviews. For the first time, they distinguished excellent management cadres from general management cadres through competency evaluation, resulting in the identification of 10 competency elements in the management cadre model for China's communication industry: influence, social responsibility, research ability, desire for achievement, leadership and control ability, interpersonal insight, initiative, market awareness, self-confidence, and human resource management ability. (Gutierrez et al., 2018). A competency model for managers in the communication industry and family businesses has been developed, comprising 11 competency characteristics: authority orientation, initiative, seizing opportunities, seeking information, organizational awareness, command, kindness and care, self-control, self-confidence, self-learning, and influencing others. Notably, authority orientation and kindness and care are considered distinctive competencies for senior managers in Chinese family businesses. Zhuang and Pan (2022) conducted a study on the competency model for specific positions in service industry regulation. They validated the established competency model through practical application and explored the role of competency models in human resource recruitment, talent selection, and their broader application (Zhuang and Pan, 2022). Focusing on the project manager as the research subject, the identified competency characteristics primarily encompass communication ability, team management skills, and the ability to work effectively in complex environments, among others.

Liu (2021) think that competency is a dynamic and multidimensional process, which should include three dimensions: technical skills, management skills, and leadership skills (Liu, 2021). Building on this foundation, they have validated the positive correlation between competency and job performance. They have also identified and summarized the competency characteristics that R&D personnel in the manufacturing industry should possess. Furthermore, they have proposed a market-oriented and technology-oriented R&D core competitiveness model. Peng and Zhuang (2020) divided the competency model of a manufacturing project management team into two dimensions: general competency and special competency. Their study provided the specific competency elements, including logical thinking, individual characteristics, self-management, technical ability, project management, organizational development, organizational management, customer management, communication management, and other internal and external elements. Marucci et al. (2021) obtained the competency model of professional and technical personnel through a questionnaire survey and a behavioral event interview. The specific competency factors encompass achievement orientation, conceptual thinking, analytical thinking, teamwork, innovation, knowledge mastery, technical ability, and learning ability. Engineers are expected to possess knowledge and problem-solving abilities, management and analysis skills, as well as communication and international collaboration skills. In the research on innovative scientific and technological talents, it is determined that their innovative quality system should comprise four dimensions: innovative knowledge (knowledge elements), innovative thinking (thinking elements), innovative ability (ability elements), and innovative character (personality elements). The special competency model for R&D personnel is summarized into four modules: basic competency, personality traits, professional knowledge and skills, and innovative thinking. The competency of engineering project managers is measured, resulting in a competency model with four dimensions: emotional management, personality charm, project and team management, and self-cognition and image management (Vraňáková et al., 2021).

From the above-mentioned summary of research, it is found that most studies utilize behavioral event interviews, literature analysis, and the evaluation center method. Simultaneously, they use data and examples to verify and test to establish a general competency model. However, it is noted that

the above research is primarily limited to senior managers such as managers and leaders. Therefore, there is a need to construct the competency model of human resource managers, analyze, and study this content. This will also play a role in further exploring and developing this type of research in the future. Considering how the competency of human resource managers affects the development of enterprises, this paper constructs the competency model of human resource managers and demonstrates the relevance between the competency of human resource managers and the present situation from the model's perspective. This will more clearly showcase the effectiveness of this type of research.

METHODOLOGIES

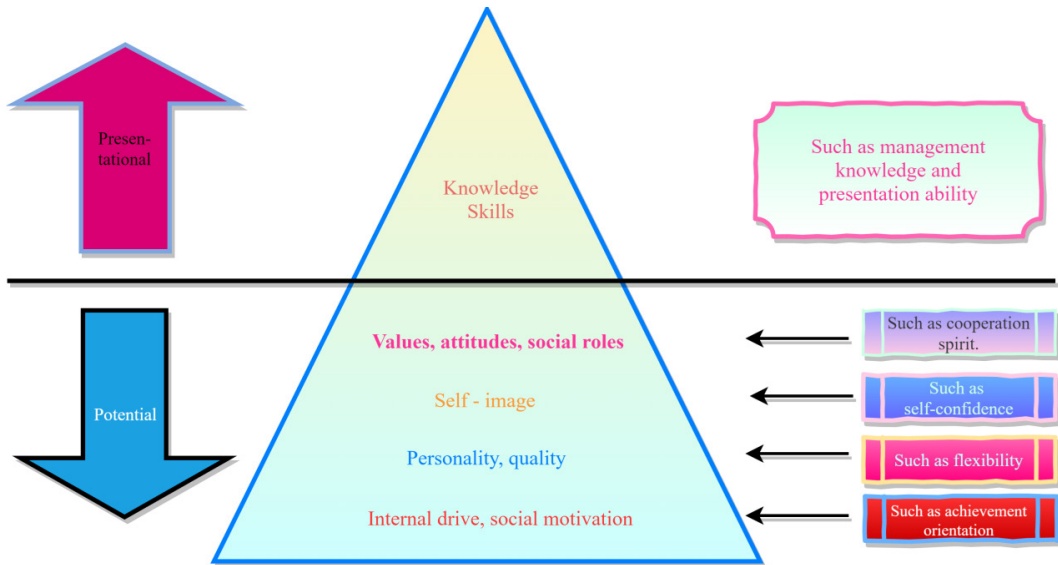
Overview of Competency of Human Resource Managers

D. McClelland, a professor at Harvard University in the United States, first introduced the concept of competency, challenging the operational model of screening students through intelligence tests in American higher education. He argued that higher education should focus on students' academic performance abilities rather than IQ. Competency encompasses the potential and ingrained characteristics of an individual, distinguishing those who excel in a particular job, organization, or culture from those who perform poorly. It can include motivations, traits, self-image, attitudes or values, knowledge, cognition, or behavioral skills in a specific field that can be reliably measured or counted, significantly differentiating excellent performance from ordinary performance. The mining of competency exhibits the following characteristics: Firstly, the composition of competency. Competency comprises a person's knowledge, skills, personality traits, role/image orientation, values, and motivations. Secondly, competency is a crucial factor influencing a person's job performance (Zaid et al., 2018). Competency can predict a person's future work performance, and individuals with specific competency characteristics can achieve outstanding results in their roles. This serves as a vital criterion for differentiating those with exceptional performance from those with ordinary performance. Thirdly, competency is characterized by its potential, measurability, malleability, and dynamism. Competency possesses the potential for growth and adaptability, as it can be transformed through learning and training. Furthermore, competency is a measurable factor contributing to excellent performance. Lastly, competency is dynamic, influenced by factors such as position, enterprise, industry, and others.

The competency model primarily addresses questions about the required knowledge, skills, and personality characteristics necessary to fulfill a job. It also identifies behaviors that directly influence the enhancement of job performance and the attainment of job success. Currently, there are two prevalent competency models globally: the iceberg model and the onion model. Enterprises can use competency models to identify gaps between actual competency levels and the requirements for a given role. By constructing a competency model, organizations can organize targeted training initiatives, effectively promoting employees' career development and enhancing their abilities. This, in turn, contributes to performance improvement, fostering a mutually beneficial situation for both enterprises and employees (Chelsea et al., 2022). Therefore, constructing a competency model, grounded in a thorough understanding of the systematic model-building process, standardized model-building principles, and scientific model-building methods, can assist employees in enhancing their competency levels. This, in turn, facilitates the smooth and effective completion of various tasks and contributes to the healthy development of various enterprises.

The "iceberg model" of competency, as proposed by McLelland, comprises five components. Based on varying degrees of manifestation, he likens competency to an iceberg floating in water, presenting the competency model as an "iceberg model" (Li., 2021a or b). Explicit competency encompasses the knowledge and values that employees possess, residing in the skills and behaviors that surface like the tip of an iceberg. On the other hand, the implicit component includes attitudes, personality traits, motivation, and self-knowledge, situated beneath the surface of the "iceberg."

Figure 1. Iceberg Model of Competency



Implicit competency plays a crucial role in determining employee behavior. Figure 1 illustrates the iceberg model of competency (Song & Hua, 2022).

The model consists of two parts: representation and representation. In the quality hierarchy of the iceberg model, knowledge and skills occupy the top position. Knowledge refers to employees' theoretical reserves in specific fields related to their roles, such as management knowledge, forming the foundation for the effective completion of tasks. Skills, on the other hand, reflect employees' ability to execute a particular job by integrating their knowledge, including expressive abilities, which are integral to overall performance.

Values, attitudes, and social roles form the next layer and are closely interconnected. Values encompass employees' perspectives on life, moral judgments, and beliefs, exemplified by the spirit of cooperation. Attitudes represent the behavioral tendencies and psychological impetus of employees in dealing with the persistence and stability of external factors, such as a sense of responsibility. Social roles denote employees' comprehension of social norms and serve as a crucial manifestation of their behavioral style, such as that of managers. Li (2021a or b) studied the influence of business process improvement and human resources promotion on enterprise performance and their contingency factors, and found that both of them have positive effects on enterprise performance, but the specific effect depends on organizational situation and factors. Jaung (2021) used big data to analyze the changes of the relationship between man and nature during the epidemic, and found that the interaction between man and nature changed significantly during the epidemic, which provided a new perspective for further understanding the relationship between human behavior and the environment.

Self-image represents a form of self-presentation that emerges after employees gain a clear understanding of their own abilities and roles, such as self-confidence, which frequently exerts a significant impact on their performance. Personality and quality serve as tangible expressions of employees' personality traits, with attributes like flexibility directly influencing their typical behaviors. At the foundational level, internal driving forces and social motivation manifest as employees' inherent, stable desires and needs, exemplified by achievement orientation. This intrinsic motivation serves as the potential driving force for employees to exert effort and achieve results, proving to be a pivotal factor in generating high performance.

Figure 2. Application of Competency Model in Human Resource Management



Competency Analysis of Human Resource Managers Based on Data Mining Technology in Cross-Cultural Backgrounds

Data mining is a new information processing technology, which is characterized by extracting, converting, analyzing, and other modeling processing from a large number of incomplete, noisy, fuzzy, and random business data, and extracting key data to assist decision-making. It develops algorithms and systems for mining large-scale massive and multidimensional data sets, develops appropriate privacy and security models, and improves the ease of use of data systems. Zhang et al. (2019a or b) used big data analysis method to study the development of human emotional circuits, and they thought that this method was stable, reliable, and robust, which provided new tools and methods for the further study of emotional circuits. Liu (2021) studied the human resource management of internet enterprises based on big data mobile information system, and found that big data technology has broad application prospects in recruitment, employee training, performance management, and so on. Data sources mainly include internal databases and questionnaires, and sample selection follows the principle of random sampling to ensure the representativeness of the results. At the same time, the data are cleaned, preprocessed, and feature selected to improve the accuracy and efficiency of model construction. Figure 2 illustrates the application diagram of a specific competency model in human resource management.

The competency model also serves as a strong foundation for the systematic construction of the human resource management system. It ensures the selection of individuals best suited for specific roles, thereby enabling the orderly execution of all other facets of human resource management. The ultimate objective of management is to achieve the organization's strategic goals, with organizational strategy serving as the benchmark for assessing the reliability and validity of the competency model. The compatibility of the competency model for middle-level human resource managers with the company's strategy determines not only its complementarity but also its viability during enterprise transformation. Cross-cultural competency pertains to the ability of expatriates to adapt to a new cultural background and achieve job performance. Its development involves three key phases: awareness and understanding of cultural differences, motivation for cross-cultural adaptation, and effective cross-cultural competency. Higher cross-cultural knowledge and skills, coupled with increased cultural sensitivity, result in better insight into differences and main characteristics of diverse cultural systems. This, in turn, fosters expatriates' confidence and enthusiasm to integrate into different cultures.

As the cornerstone of enterprise human resource management, the employee competency model becomes the basis for formulating and implementing the enterprise strategy, aligning with the organization's core competency. By constructing and reinforcing human resource management based on employees' core specialties and skills (competency), enterprises can sustain and enhance their core competency, thereby contributing to the realization of the organization's overall strategy. In different cultural backgrounds, the ability requirements of human resource managers may be different due to cultural background, values, and working methods. Therefore, the influence of cultural differences should be fully considered when applying this model. Specifically, the model can be trained and adjusted according to the data in different cultural backgrounds to improve its applicability in different cultural backgrounds. In addition, we can combine qualitative research methods to deeply understand the actual needs and challenges of human resource managers in different cultural backgrounds and provide more targeted suggestions for the application of the model.

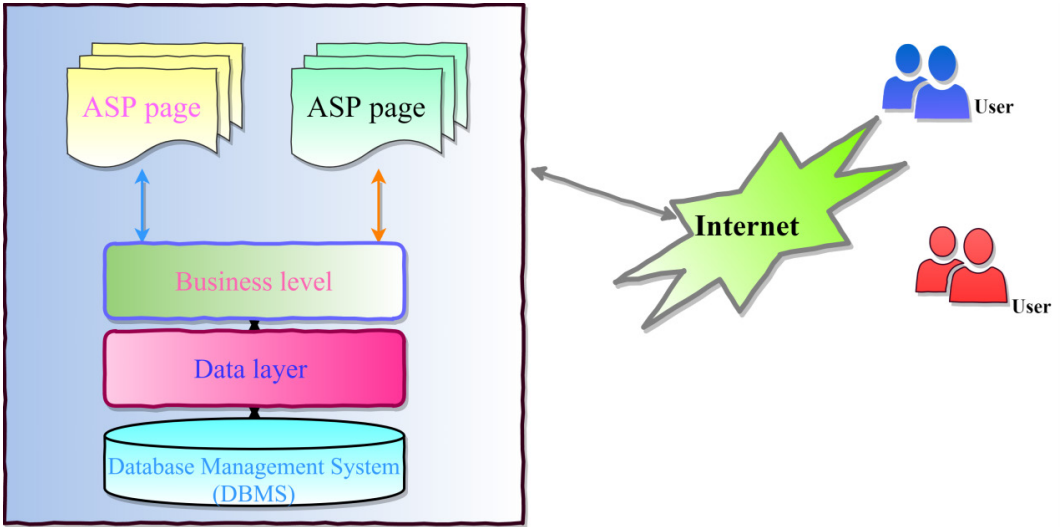
Construction of Competency Model of Human Resource Managers Based on Data Mining Technology Under Cross-Cultural Backgrounds

The fundamental principle of constructing a competency model is to discern and extract the distinctions in explicit and implicit competency characteristics between employees exhibiting excellent performance and those with average performance. This involves establishing a competency model framework based on job roles, achieved by systematically collecting and scientifically analyzing pertinent data. Through continuous practical validation, this process aims to gradually shape and enhance a new, adaptable, and operational human resource management system. Ding et al. (2022) systematically investigated the application of data mining and big data in human behavior analysis. They think that the current data sets and models have potential in behavior identification, prediction, and intervention, but there are still some challenges and problems to be solved. Zhang et al. (2019a or b) introduced the database resources of the National Genome Data Center in 2020. They thought that these resources provided important data support and services for the research in genomics and related fields and helped to promote the progress of biomedical research (Zhang et al., 2019a or b).

Constructing a competency model to ensure its reliability and validity in the application of a human resource management system has been a major and prominent focus in competency theory research for many years. One approach is to build the competency model base by obtaining a list of competencies from open or closed fields. Subsequently, relevant personnel engage in collective discussions, screening, and adjustments to refine the competency qualities. While this modeling process is simple and cost-effective, the reliability and practical utility of the model may be questionable. Generally, this method is more suitable for high-tech enterprises or small private industries. The overall system framework is depicted in Figure 3.

A competency model encompasses a collection of competency elements needed for a specific position or role. These elements encompass attitudes and values, characteristics and motivations,

Figure 3. Overall Framework of the System



knowledge, and skill levels, among others. These competency components can be assessed at various levels and represent integrated competency structures derived from summarizing the behaviors and personal characteristics of exceptional employees. The formula is as shown in Equation (1):

$$CM = \{CI_i | i = 1, 2, 3, \dots, n\} \quad (1)$$

CM is the competency model, CI is the competency project, CI_i is the i th competency project, and n is the number of competency projects. Generally speaking, competency models include competency items, definitions, weights, evaluation grades, and corresponding behavior descriptions. The establishment of a competency model assists enterprises in identifying the factors contributing to the performance gap between excellent and mediocre employees. This, in turn, enables more targeted improvement efforts, fostering the achievement of organizational strategic goals. To construct the judgment matrix, the index weight of each group must first be determined. The function of the judgment matrix is to determine the index weight of each group, that is, to give a group information, factor c_1, c_2, \dots, c_n needs to be compared in pairs for the criterion layer, so that the compared matrix is called the judgment matrix. c_{ij} is used to represent the comparison of the i th factor relative to the j th factor, and the judgment matrix formula is as follows in Equation (2):

$$B = (c_{ij})_{m \times n} = \begin{bmatrix} c_{11} & c_{12} & \dots & c_{1n} \\ c_{21} & c_{22} & \dots & c_{2n} \\ \dots & \dots & \dots & \dots \\ c_{n1} & c_{n2} & \dots & c_{nn} \end{bmatrix} \quad (2)$$

Rank the importance of elements at the current level, based on the calculation results of the judgment matrix from the previous level. The singular ranking is considered as the ranking of weight indexes, and the weight of indexes is determined by the eigenvector and eigenvalue of the matrix. To establish the weight of each factor, use Equation (3):

$$W_i = \frac{\left(\prod_{j=1}^n c_{ij}\right)^{\frac{1}{n}}}{\sum_{k=1}^n \left(\prod_{j=1}^n c_{kj}\right)^{\frac{1}{n}}}, i \in N \quad (3)$$

The eigenvector is calculated using Equation (4):

$$W = [w_1, w_2, \dots, w_n]^T \quad (4)$$

The maximum characteristic root after the normalization of the judgment matrix is expressed as shown in Equation (5):

$$\lambda_{\max} = \frac{1}{n} \sum_{i=1}^n \frac{\sum_{j=1}^n c_{ij} w_j}{W_i} \quad (5)$$

The order of the feature vectors of the criterion layer to the target layer is as follows in Equation (6):

$$W = x_1, x_2, \dots, x_n \quad (6)$$

The results of ranking the factors in the upper layer by the scheme are as follows in Equation (7):

$$y_{1j}, y_{2j}, \dots, y_{mj}, (j = 1, 2, \dots, n) \quad (7)$$

The total hierarchy of schemes is as follows in Equation (8):

$$\sum_{j=1}^n X_j b_{ij} = x_1 y_{n1} + x_2 y_{n2} + \dots + x_n y_{nn} \quad (8)$$

To address the issue of incomparable multiple indicators after data completion, we can employ dimensionless methods to handle the indicators, thus eliminating dimensional differences among the data. This approach enables a more rational and scientifically grounded comparative analysis. Based on the intrinsic characteristics of evaluation indices, five commonly utilized methods—standardized method, normalized method, standard fingering method, specific gravity method, and binomial method—are generally applied for dimensionless data treatment. The standardization method, offering comprehensive processing for sample groups, employs the following specific procedures, as shown in Equation (9):

$$x'_{ij} = \frac{(x_{ij} - \bar{x}_j)}{\delta_j} \quad (9)$$

The formula of sample variance is shown in Equation (10):

$$\delta_j = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_{ij} - \bar{x}_j)^2} \quad (10)$$

Sum the normalized judgment matrices, as shown in Equation (11):

Table 1. Distribution Table of Competency Evaluation Score Set According to Post Level

Competency	Working ability		Psychological quality	
	Social ability	Professional ability	Personality characteristics	Intelligence level
Director level	40	20	30	10
Department Manager level	30	30	25	15
Supervisor level	20	40	25	10
General staff level	15	45	25	15

Table 2. Weight Table of Performance Appraisal Indicators

Post level	Weight of key performance indicators	Weight of competency indicators
Director level	70%	30%
Department manager level	50%	50%
Supervisor level	40%	60%
General staff level	25%	75%

$$\bar{W}_1 = \sum_{j=1}^3 \bar{b}_{1j} + \sum_{j=2}^3 \bar{b}_{2j} + \dots + \sum_{j=n}^3 \bar{b}_{nj} \tag{11}$$

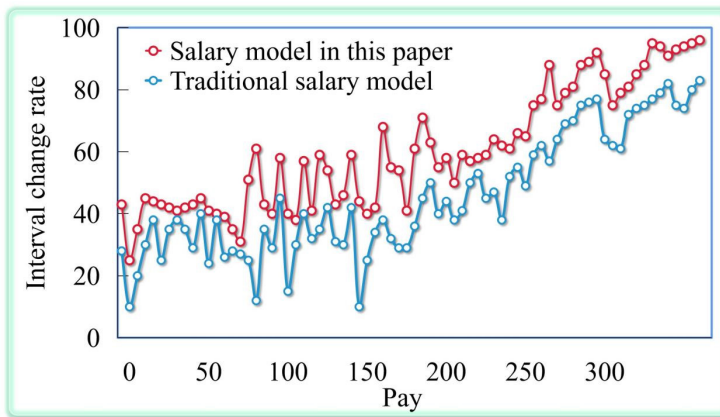
RESULT ANALYSIS AND DISCUSSION

Through the examination of data similarity, the data can be categorized into N groups, where data within each category exhibit similarities, while those across different categories display dissimilarities. Clustering analysis facilitates the identification of distribution patterns among data, allowing for macro-level data analysis. Moreover, employing clustering analysis algorithms can unveil hidden relationships between data and the number of saw blades in the dataset. The quantitative distinction between high-performing employees and those with ordinary performance relies on setting the competency weight. Therefore, determining the weight is the final and crucial step in constructing a competency model. The process of setting competency weights requires flexibility and simplification, allowing for adjustments to the weight proportions based on the job content's significance for the employee. To illustrate this, Table 1 displays the setting of competency weights using the job rank and level of job performance.

During the development of the competency model, the trial operation stage can commence with key positions. This approach not only saves costs but also mitigates risks. As the company accumulates experience, the comprehensive development and application of the competency model can be implemented. In performance appraisal, the weight assigned to key performance and competency indicators varies. For senior employees, the appraisal places greater emphasis on key performance indicators reflecting their crucial responsibilities. Conversely, frontline employees at grassroots levels should prioritize moldable competency indicators in the assessment. Table 2 provides an illustration.

When constructing the post competency model, it is crucial to ensure the validity of collected data and the representativeness of the selected interviewees. Utilizing HM Company as the database, the competency index is categorized into working ability and psychological quality. The competency indices include logical thinking, financial management, team leadership, attention to details, decision-making, financial analysis and management, analysis and judgment, and innovation. To explore the

Figure 4. Comparison Results of Salary Range Change Rate Under Different Salary Modes



competency-based salary model, this paper compares the broadband salary model with the traditional salary system. The results are presented in Figure 4.

The traditional salary system employs a pyramid salary mode based on the position's rank, encompassing multiple salary grades. Each salary grade typically exhibits an interval change ratio between the highest and lowest values, often exceeding 100%. However, in the traditional salary structure, the change rate of the salary range tends to hover around 80%. Without promotion, employees often find it challenging to attain significant salary increases, leading to a lack of motivation. In contrast, most competency-based salary models adopt a broadband salary model with a salary range that can exceed 90%. This not only reflects the post's value but also underscores efforts to motivate employees actively, guiding them toward the company's expected direction. To delve deeper into the salary levels of various job tiers concerning the change in salary grade, refer to Figure 5.

The compensation system based on the competency model encompasses six levels, each divided into different salary bands with several intervals, and each post level can have a set of competency models. As illustrated in Figure 5, the highest salary level for high-level positions exceeds 9000, while for employees at the general level, the highest salary can only reach 8000. Concerning the competency requirements for posts, an employee's achieved performance directly determines their standing. Even within the same level, when an employee's performance and competency level meet the standards of the preceding level, the corresponding salary level automatically advances one level in the compensation system, which positively reflects the incentive for employees. Simultaneously, by linking variable salary with performance results based on the competency model, the outcomes of performance will have a direct and significant impact on an employee's income, thereby realizing the influence of the competency model on salary.

To further verify the reliability and performance of the model, the model presented in this paper is tested alongside different models using test data. The comparison in Figure 6 illustrates the indirect efficiency of the two models.

As depicted in Figure 6, the model training convergence speed based on data mining technology is notably faster. The data mining-based model demonstrates superior performance, with a 93.3% improvement in efficiency. It also exhibits better training effects on the number of project transactions. To further assess the algorithm's operational efficiency, Figure 7 illustrates the changes in the number of data sets and saw blades under different algorithms with increasing running time.

In incremental data mining of association rules, the TIUA algorithm stands out by maximizing the utilization of mining results. In comparison to the Apriori algorithm, the TIUS algorithm leverages the efficiency of binary tree search to reduce the time needed for item set retrieval. This significant

Figure 5. Changes in Salary Levels of Salary Broadband for Jobs at Different Levels

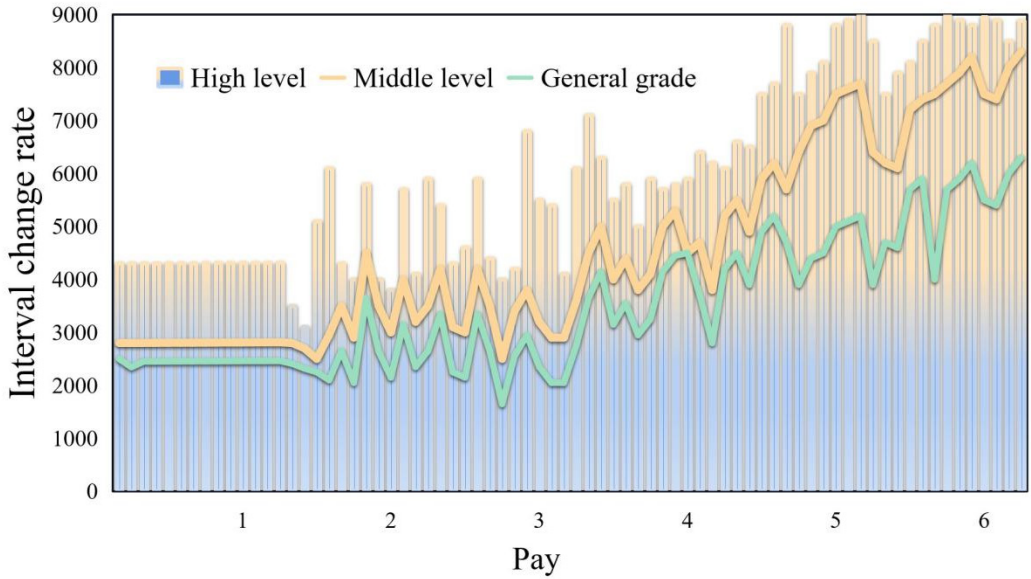
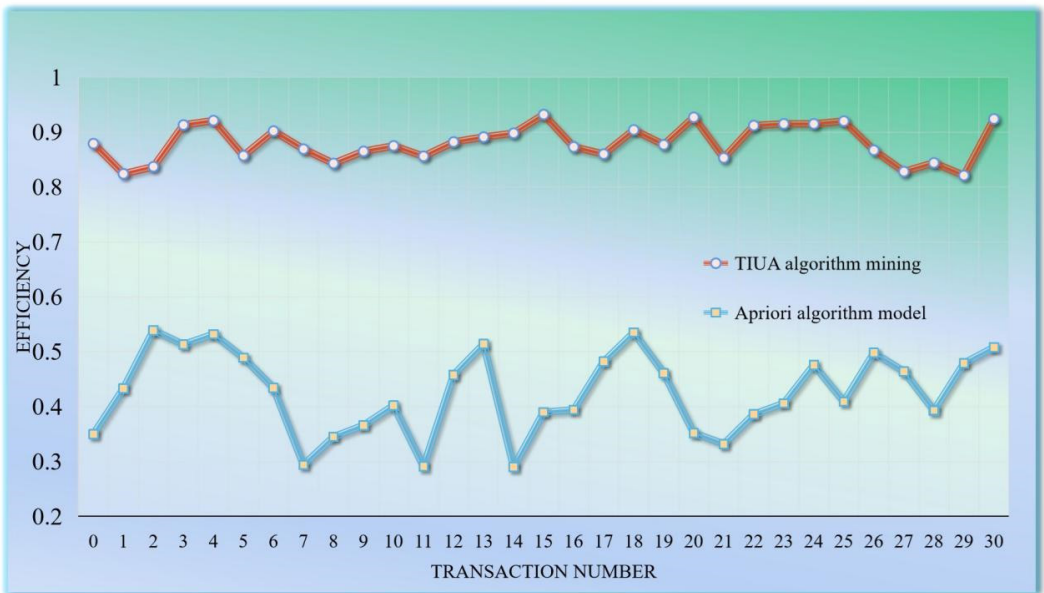
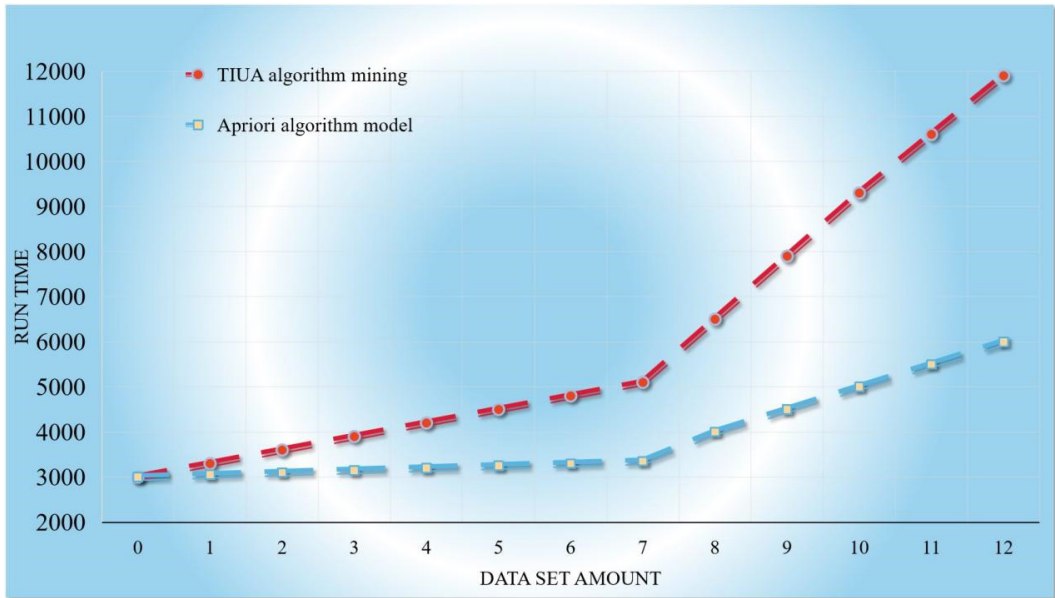


Figure 6. Indirect Efficiency Comparison of Different Models



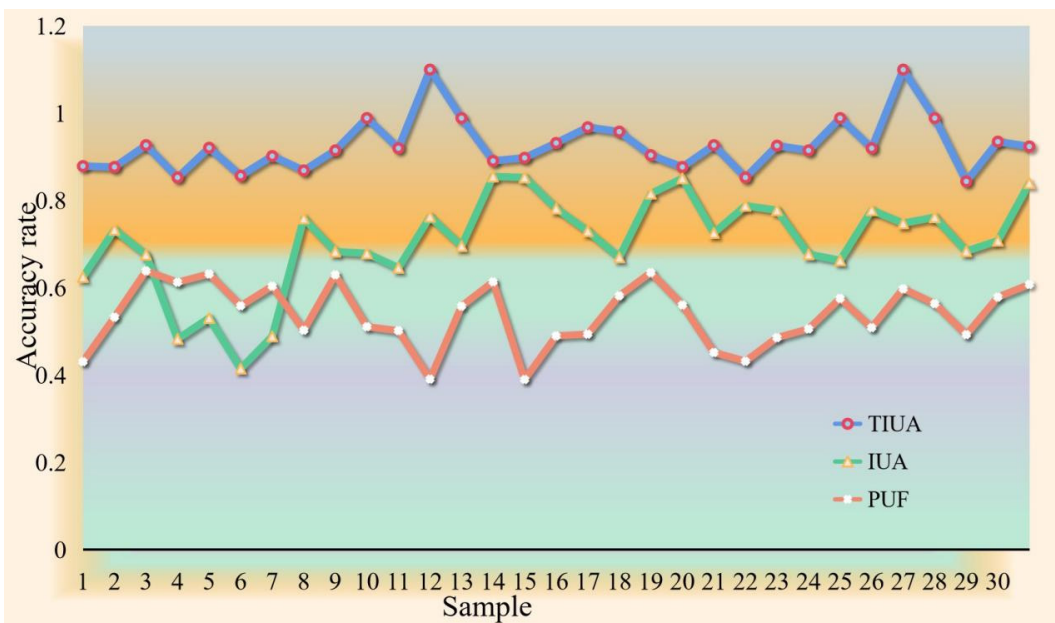
improvement in system efficiency, as the scale of the system increases, ensures the stability of system operations and greatly enhances overall efficiency. Objectively assessing the data results, Figure 8 illustrates a comparison of the accuracy of factor evaluation grades for competency across different models.

Figure 7. Comparison of Changes in the Number of Saw Blades in Different Model Datasets



The data mining algorithm used in this paper achieves an accuracy of about 89%. The experimental data show that the model has excellent performance in many evaluation indexes, and it is superior to other benchmark models, which fully verifies its effectiveness and excellence. This model simplifies the complexity of the traditional model and has the characteristics of ease of use, accuracy, reliability, and rapidity. At the same time, it can provide more realistic simulation results and recognition accuracy.

Figure 8. Comparison of the Accuracy of the Factor Evaluation Grades of Different Models for Competency



In addition, data mining technology also shows strong self-organization, self-adaptation, and self-learning ability, thus reducing the interference of human factors when determining the index weight.

CONCLUSION

In the context of cross-cultural diversity, the value of human resource management presents both unprecedented opportunities and challenges. Practitioners in human resource management should leverage the cross-cultural landscape to shift the value orientation of traditional human resource management and fully utilize their role as strategic partners in human resources. However, this also necessitates active responses from human resource management practitioners to changes in talent capacity needs, striving to enhance their competitiveness. This paper delves into the analysis of the competency of human resource managers based on data mining technology within a cross-cultural framework. It constructs a competency model for human resource managers using data mining algorithms. Experimental results indicate that the model achieves an accuracy of about 89%, a 93.3% efficiency improvement rate, and a salary range exceeding 90%. The model is deemed a reasonable, feasible, and accurate representation of competency. Effectively addressing the shortcomings of traditional competency models, this system attains a certain theoretical level and holds practical value.

Future research can further optimize the model algorithm, expand the application scope, and consider the influence of more cultural factors. In addition, the model can also be applied to the actual environment of enterprises to verify and improve, so as to improve its practical application value.

CONFLICTS OF INTEREST

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

FUNDING STATEMENT

No funding was received for this work.

PROCESS DATES

Received: This manuscript was initially received for consideration for the journal on 02/03/2024, revisions were received for the manuscript following the double-anonymized peer review on 05/17/2024, the manuscript was formally accepted on 04/14/2024, and the manuscript was finalized for publication on 05/20/2024

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