# A study of human resource management competency model based on data science

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**Abstract.** In this paper, word frequency statistics of HRM competency factors in related literature were conducted, and high-frequency competency factors were selected as HRM generic competency factors, and other data science competency factors were added by analyzing new requirements of HRM personnel through data science, which were finally sorted and summarized as HRM competency factors of mathematical science. On the basis of the initial proposed competency factors, the statistical data were subjected to reliability analysis, descriptive statistical analysis and exploratory factor analysis, and the dimensions of the data science-based human resource management personnel competency model were finally determined. To a certain extent, it enriches and improves the research on data science employee competency requirements and HRM personnel competency transformation, and also provides a theoretical basis for enterprises to promote HRM data science and enhance HRM talent training mechanism.

**Keywords:** human resource management; competency; data Science; competency model

## 1    Introduction

In this paper, based on the research of domestic and foreign scholars, we will analyze the transformation of HRM personnel competency requirements in the era of data Science, determine the core competency elements, conduct a questionnaire survey on enterprise HRM personnel, test the competency structure dimensions through factor analysis, and finally construct a competency model for HRM personnel in the era of data Science. Theoretically, it further enriches the research on the transformation of HRM personnel competency and employee competency requirements in the era of data Science, provides a basis for enterprises and institutions to recruit and train high-quality contemporary HRM personnel, promotes the process of enterprise HRM, improves the effectiveness of digital resources utilization and the scientificity of management decisions, thus enhancing organizational core competitiveness and improving organizational performance[1].

# 2    Building a competency model for human resource managers in the era of data Science

The competency factors of human resource managers that appear frequently in the relevant literature are used as the general competencies of human resource managers in the era of data Science, and other competency factors are added with the requirements for human resource managers in the era of data Science, and finally the competency factors of human resource managers in the era of data Science are initially refined. In order to filter and classify these competency factors, we designed a competency questionnaire for HR managers in the era of data Science based on the initially refined competency factors, conducted questionnaire surveys on HR managers, other managers, technical personnel and HR teachers in universities, and conducted exploratory factor analysis on the statistical data to finally construct a competency model for HR managers in the era of data Science. Competency model of human resource managers in the era of data Science[2].

## 2.1    Questionnaire design and distribution

The survey questionnaire is designed to specifically contain two parts of basic information and competency elements, and the competency elements are mainly divided into three parts of business knowledge, business ability and personal characteristics, among which, the survey of competency elements adopts the common five-level Likert scale, and the pre-survey process mainly investigates the human resource managers of Internet enterprises and large enterprises in other industries, and a total of 36 questionnaires are collected. Through this survey, problems such as insufficient design of demographic variables and defective questionnaire design were found, and the questionnaire was revised in time. The survey was conducted mainly for enterprise managers, technicians and teachers of human resources in colleges and universities. 218 questionnaires were distributed and 218 questionnaires were collected, of which 203 were valid, and the effective rate of the questionnaire was 93.12%.

## 2.2    Analysis of survey results

### 2.2.1 Reliability test.
Reliability analysis is a method of analyzing the stability and reliability of the evaluation system, which examines the consistency of all the question items inside the scale [4]. Reliability of the questionnaire results can be judged by conducting reliability analysis of the questionnaire. The reliability can be divided into retest reliability, replicate reliability, split-half reliability and internal consistency reliability according to the source of error of the test scores. The valid questionnaires of this survey were 203, and the reliability analysis was conducted by SPSS, and the reliability Alpha was 0.93, which showed that the reliability of the questionnaires was quite high and could be carried out in the next survey study [5].

**2.2.2 Validity test.**

Validity was used to examine the energy efficiency of each question item and whether each question item played an important role for the scale. In this study, validity analysis was conducted by SPSS, using KMO values to determine whether the questionnaire data could be analyzed. Usually, the more the KMO value tends to 0, the weaker the correlation between the variables, and the more the KMO value tends to 1, the stronger the relationship between the variables. As shown in Table 1, the KMO value of the questionnaire is 0.936 and the significance is less than 0.05, which is very suitable for the factor analysis.

**Table 1.** Validity test results [Owner-draw]

| KMO sampling suitability quantity | | 0.936 |
|---|---|---|
| Bartlett's sphericity test | Approximate variance | 2422.254 |
| | Degree of freedom | 465 |
| | Significance | 0.00 |

**2.2.3 Exploratory Factor Analysis.**

Factor analysis is a statistical technique that extracts common factors from the study variables and allows for the extraction of a number of common factors from a large number of related variables, with the aim of simplifying complex situations and achieving the synthesis of numerous indicators with the least possible loss of information. The KMO statistic for this questionnaire was 0.936, indicating that the questionnaire data were suitable for factor analysis. After rotating the factors with a loading rate greater than 0.5, the 19 competency indicators were divided into five dimensions, as shown in Table 2.

**Table 2.** Factor analysis results of human resource managers' competency in the era of data Science [Owner-draw]

| Serial number | Factor Name | Elements | Factor loadings after rotation |
|---|---|---|---|
| 1 | Numerical Intelligence Capability | Digital Thinking | 0.667 |
| | | Cyber Risk Capability | 0.615 |
| | | Information System Design Capability | 0.594 |
| | | Data collection and organization skills | 0.559 |
| | | Intelligent decision-making capabilities | 0.534 |
| 2 | Expertise | Human Resource Management Theory and Methods | 0.590 |
| | | Artificial intelligence and data Science knowledge | 0.584 |
| | | Business Knowledge | 0.574 |

| | | General Interdisciplinary Knowledge | 0.511 |
|---|---|---|---|
| 3 | Personality traits | Stress resistance | 0.669 |
| | | Mental Health | 0.620 |
| | | Achievement Motivation | 0.607 |
| | | Open-mindedness | 0.534 |
| 4 | Talent Development | Learning Ability | 0.714 |
| | | Innovation Capability | 0.609 |
| | | Demand Management Capability | 0.556 |
| | | Business Capability | 0.534 |
| 5 | Communication and Collaboration | Organizational and coordination skills | 0.642 |
| | | Communication skills | 0.625 |

As shown in Table 2, digital thinking, cyber risk management competency, information system design competency, data collection and organization competency and intelligent decision making competency have larger loadings on Factor 1; HRM theory and methodology, AI fundamentals, business knowledge and interdisciplinary general knowledge have larger loadings on Factor 2; stress tolerance, mental health, achievement motivation and open-mindedness have larger loadings on Factor 3 in loadings; learning ability, innovation ability, demand management ability, strategy and change management ability and business ability have larger loadings on factor 4; organizational coordination ability and communication ability have larger loadings on factor 5.

# 3    Conclusion

Through the word frequency statistics and questionnaire survey of HR managers' competency model factors in the literature, the final composition of HR managers' competency in the era of data Science is mainly composed of five dimensions: professional knowledge, data Science competency, talent development, communication and coordination and personal traits, which contains 19 factors. Among them, professional knowledge refers to the various types of knowledge that HR managers need to apply in their work practice, with more emphasis on HRM theories and methods, basic knowledge of artificial intelligence and data Science, business knowledge in the context of data Science and interdisciplinary general knowledge; data Science competence refers to the ability of HR managers to adapt to the needs of the data Science era and help transform enterprise management into data Science, including digital thinking, network Risk management ability, information system design, information system design, etc [6]. The HR manager competency model in the data Science era proposed in this study focuses more on data Science competency and talent training. Meanwhile, the competency model in this study has updated and improved the definitions of some competency qualities to make them more suitable for the development needs of the data Science era [7].

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