Assessment of Competency Characteristics of Intelligence Personnel Based on Individual Strengths (Post-print)

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Abstract

[Purpose / Significance] The complementary advantages of individual competency characteristics among intelligence personnel constitute a necessary condition for intelligence operations, and identifying individual strengths in these competency characteristics serves as a crucial foundation for enhancing the work capabilities of intelligence personnel. [Method / Process] Based on the goal programming concept, value parameters are determined from the most favorable perspective of the evaluated intelligence personnel. This study proposes an individual advantage discrimination model and a democratic discrimination model for intelligence personnel competency characteristics, while simultaneously presenting solution methods for these models. [Results / Conclusion] Using ten intelligence personnel as research samples, computational results are employed to verify the validity and scientific rigor of the models, thereby providing technical support for evaluating intelligence personnel competency characteristics.

Full Text

Evaluation on Competency Characteristics of Intelligence Personnel Based on Individual Advantages

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Abstract

[Purpose/Significance] The complementarity of individual advantages in intelligence personnel competency characteristics constitutes a necessary condition for effective intelligence work. Identifying these individual advantages provides an important foundation for enhancing the work capabilities of intelli-

gence personnel. [**Method/Process**] Grounded in goal programming principles, this study determines value parameters from the perspective most favorable to the evaluated intelligence personnel, proposes an individual advantage discrimination model and a democratic discrimination model for intelligence personnel competency characteristics, and provides solutions for these models. [**Result/Conclusion**] Using ten intelligence personnel as research samples, the computational results verify the validity and scientific rigor of the models, offering technical support for evaluating intelligence personnel competency characteristics.

Keywords: intelligence personnel; competency characteristics; individual advantages; advantage evaluation

1. Introduction

Intelligence work within organizations not only addresses external risks but also serves as a crucial source of sustained competitive advantage. As the primary agents of intelligence work, intelligence personnel play a vital role in information generation, analysis, and dissemination. Since the 1990s, intelligence personnel have faced two major challenges in their operational work: on one hand, they must respond to constantly changing external environments and extract relevant information; on the other hand, the evolving nature of their work content objectively requires them to continuously improve their capabilities to remain competent. Consequently, intelligence personnel are confronting an era of rapid transformation and intensified competition, which imposes new demands on their competency characteristics.

According to D. T. Moore and colleagues, information processing capability constitutes one of the fundamental pillars of intelligence work [1]. Specifically, the competency of intelligence personnel determines the quality of intelligence outputs. Competency characteristics identify what enables intelligence personnel to accomplish tasks excellently, addressing the principle of "having the right people do the right things." Intelligence personnel are employed not only in government and military sectors but also extensively in universities, enterprises, and public institutions. Improvements in individual capabilities directly impact overall team efficiency, making the translation from individual advantage utilization to collective advantage integration a critical challenge that requires resolution [2-3]. Therefore, this study reviews domestic and international research on intelligence personnel competency, constructs both an individual advantage discrimination model and a democratic discrimination model for evaluating competency characteristics, and provides technical and methodological support for intelligence work operations and for enhancing personnel skills and performance. The term "intelligence personnel" in this study refers to knowledge workers who process, analyze, handle, and disseminate information intelligence.

Compared with other professionals, intelligence personnel exhibit four distinc-

tive characteristics: (1) **Professional expertise**: Due to the broad knowledge base and large information volume required for intelligence work, intelligence personnel demonstrate clear advantages in specific collection and analysis skills, as well as in data insight, logical thinking, and systems thinking capabilities; (2) **Outstanding individual qualities**: Intelligence personnel possess strong learning abilities, pronounced achievement motivation, self-value judgment, and high comprehensive quality, manifesting strong intellectual curiosity through long-term intelligence work; (3) **High mobility**: Because intelligence work involves phased, complex, and process-oriented tasks requiring considerable autonomy, intelligence personnel exhibit low organizational dependence and weaker compliance in management; and (4) **Team collaboration**: Intelligence work often requires collective effort, necessitating not only individual advantage utilization but also team integration to achieve synergistic effects where "1+1>2." Clearly, leveraging the individual advantage characteristics of intelligence personnel requires in-depth discrimination of these advantages.

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2. Literature Review

Since D. C. McClelland proposed the "Iceberg Model," research on individual competency characteristics of intelligence personnel has proliferated [4]. D. M. Moore argues that intelligence personnel should possess four major characteristics: abilities, traits, knowledge, and skills [5]. C. H. David contends that intelligence personnel should demonstrate critical thinking, judgment, innovation, and communication abilities [6]. M. E. Muuro and colleagues identify personal traits and skills as the primary individual competency characteristics [7]. Li Guoqiu and colleagues constructed a seven-dimensional competency framework for intelligence professionals using text analysis and questionnaire validation [8]. Hu Ran, from the perspective of work characteristics, identified five competency capabilities through text analysis [9]. Song Dingwei and colleagues developed a competency model for enterprise intelligence personnel comprising 16 elements based on literature review and surveys [10]. Geng Qian and colleagues analyzed competency characteristics for public library librarians, identifying six such characteristics [11]. Xie Xiaozhuo compared Chinese and American intelligence analyst competency standards, deriving three quality dimensions [12].

These domestic and international studies reveal that intelligence personnel competency characteristics can be categorized into three types: professional capabilities, general qualities, and individual traits. However, merely identifying which competencies intelligence personnel possess is insufficient. Two research questions warrant attention in practice: first, how to determine on which competency characteristics intelligence personnel possess individual advantages; and second, how to provide reasonable evaluations of intelligence personnel competency based on these individual advantage discriminations.

Wang Xiao and colleagues examined organizational-level factors affecting individual competency characteristics using subjective induction methods [13]. Li Xiaosong and colleagues constructed a comprehensive capability index to identify individual advantage characteristics [14]. Data Envelopment Analysis (DEA) emphasizes value parameters after individual input-output processes, with M. O. Igbinovia and colleagues conducting valuable explorations [15-17]. Since most intelligence personnel competency research falls within human resource management—such as studying impacts on organizational performance—it has neglected information elements based on individual advantage characteristics. Consequently, competency characteristics have tended toward single-factor description and validation rather than comprehensive evaluation [18]. Previous evaluation methods often assigned fixed indicator weights, resulting in evaluations that were difficult for evaluated subjects to accept due to subjective factors [19-20]. Therefore, addressing both the discrimination of individual advantages and the evaluation of competency characteristics based on these discriminations requires establishing objective evaluation methods that avoid subjectively determined weights, thereby meeting the needs of organizational intelligence work in practical competency model construction.

3. Theoretical Framework: Competency Characteristics Based on Individual Advantages

Assume the competency characteristic indicator system for evaluated intelligence personnel consists of p-dimensional vector indicators where larger indicator values are preferable. The organizational value proposition for n intelligence personnel's competency characteristics manifests through indicator weight coefficients, reflecting the organization's value orientation toward evaluation metrics. This value proposition can be categorized into three states: (1) **Ideal organizational state**: an ideal outcome pursued by the organization to achieve its objectives (e.g., if the maximum score for intelligence personnel skills is 100, the organization expects all personnel to achieve full marks); (2) **Actual organizational state**: the result obtained from actual operations; and (3) **Extended actual state**: based on expectancy theory, which hopes for improvement beyond actual results—the "stretch goal" principle. This study adopts the extended actual state, defined as 110% of the actual organizational state, expressed as 110%x*. The individual advantage discrimination model for intelligence personnel competency characteristics is constructed based on goal programming principles, minimizing the distance to the determined organizational value proposition outcome.

3.1 Individual Advantage Discrimination Model and Evaluation

Assume w_1, w_2, …, w represent the weight coefficients for intelligence personnel competency characteristics. The evaluation model uses the distance between the actual state and extended actual state under the 2-norm meaning corresponding to this importance level:

Model (1)

Model (1) demonstrates that the smaller the distance value d_w(x,x*), the better the intelligence personnel competency characteristics and the closer to the ideal state; conversely, larger values indicate greater distance from the ideal state.

The weight coefficients w_i in Model (1) are consistent and do not vary across different intelligence personnel, thus failing to reveal the evaluated personnel's individual advantage characteristics. Therefore, it is necessary to determine evaluation model weight coefficients that account for different intelligence personnel's individual advantage features. The competency characteristic evaluation model for evaluated intelligence personnel j is:

Model (2)

Using the Lagrange multiplier method, Model (2) for intelligence personnel competency characteristic evaluation can be solved through Model (3):

Model (3)

By obtaining the optimal solution w*(j) from Model (3), we can evaluate the competency characteristics of n intelligence personnel from the perspective of intelligence personnel j as follows:

Model (4)

The values calculated from Model (4) are arranged in ascending order, where smaller values are preferable. According to the "80/20 efficiency rule," the following conventions apply to the ranking results: after sorting the Model (4) solutions, if an evaluated intelligence personnel's competency characteristics rank in the top 10%, they are considered to possess significantly comparative advantages among participants; if in the top 30%, they are considered to possess certain comparative advantages; otherwise, their comparative advantages are deemed not prominent.

3.2 Democratic Evaluation Based on Individual Advantage Discrimination

Model (2)'s comparative advantage characteristics primarily manifest in determining weight coefficients w*(j) from the perspective most favorable to evaluated intelligence personnel j. Consequently, different intelligence personnel have different competency characteristic weight coefficients, enabling a comparative process for personnel j's competency features. Since Model (2)'s optimal solution* w(j) is calculated from all participating intelligence personnel's competency characteristic data, the determined individual advantage weight coefficients possess objectivity.

If optimization Model (2) has a strictly positive optimal solution w*(j) such

that [condition], then the evaluated intelligence personnel j's competency characteristics are considered effective.

Model (4)'s results demonstrate evaluations of n participating intelligence personnel's competency characteristics from each individual's perspective, allowing personnel to understand their relative position, identify those with higher competency characteristics, and specify the areas of superiority. Existing evaluation methods such as expert opinion and peer review suffer from subjective factors and complex weight calculation methods, resulting in variable rankings that lack recognized democratic ordering and may cause confusion.

Drawing from individual advantage characteristics, this study proposes a democratic evaluation method for intelligence personnel competency characteristics that incorporates both individual evaluations of all participants and synthesizes evaluation information from all participating intelligence personnel.

Model (5)

The values calculated from Model (5) are arranged in ascending order, where smaller values are preferable. The primary advantage of this individual advantage-based evaluation method lies in its ability to determine value parameters (weight coefficients) based on organizational evaluation committee assessments, overcoming the drawbacks of subjectively assigned weights and enhancing psychological acceptance among evaluated subjects.

4. Empirical Study

4.1 Sample Selection and Competency Characteristic Evaluation Indicators

Since intelligence personnel are widely distributed across universities, enterprises, research institutions, government agencies, and public institutions, it is necessary to study a subset of this population. Enterprise intelligence personnel must not only collect external information but also provide internal decision-making references, demonstrating individual advantage utilization from a professional perspective. Therefore, from operational and practical considerations, this study selects enterprise intelligence personnel as the research sample.

DP Enterprise is a logistics supply chain company known as the "Whampoa Military Academy" of the logistics industry. In 2013, the company established a Strategic Planning Department responsible for collecting and analyzing competitor information regarding strategy, products, and markets, and providing recommendations on decision-making and investments to senior management. Subsequently, in 2015, DP Enterprise launched warehousing and supply chain operations while promoting franchise partnerships. Consequently, ten intelligence personnel from DP Enterprise were selected as the research sample.

For determining the intelligence personnel competency characteristic indicator system, this study draws upon established competency indicators for profes-

sional intelligence personnel from existing literature [8], comprising seven dimensional indicators as shown in .

4.2 Data Source Description

The evaluation committee consisted of university experts and internal enterprise supervisors. Based on the constructed indicator system, assessment questionnaires were designed covering the main content of the seven dimensional indicators. Using assessment center techniques, competency characteristic data were obtained for ten intelligence personnel (coded A-J), with average scores summarized in .

4.3 Data Processing

Since all average scores in are below 6, no dimensionless data processing is required. For operational convenience, the data were standardized and processed using Matlab software. Model (3) was employed to calculate individual advantage value parameters (weight coefficients) for the ten intelligence personnel's competency characteristics, with results presented in .

Based on Model (4), individual comparative advantages for the ten intelligence personnel were calculated and ranked, with results shown in .

Note: The symbols " ", " ", and "q" represent comparative advantage ranking results from the perspective most favorable to intelligence personnel, where indicates significant advantage, indicates general advantage, and q indicates lack of advantage.

Organizing the results from , three classifications can be derived: "significant advantage," "general advantage," and "lack of advantage," as detailed in .

Applying Model (5) to the data yields democratic ranking evaluation results for the ten intelligence personnel's individual advantages, presented in .

4.4 Results Discussion

(1) As shown in , the value parameters corresponding to different evaluation standards for each intelligence personnel reveal their competency characteristic individual advantages. Larger parameter values indicate more prominent competency characteristics and greater likelihood of recognition and consensus by the evaluation committee. For example, Intelligence Personnel E's individual advantage value parameters are w=(0.20,0.20,0.20,0.17,0.20,0.02,0.03), indicating superiority in attitude and values, professional knowledge and skills compared to other personnel.

(2) According to and , the ten intelligence personnel can be categorized into three patterns: "significant advantage," "general advantage," and "lack of advantage." Personnel with "significant advantage" (C, D, E) should

be prioritized for employment, with organizational resources and selection support to further enhance their competency capabilities. Personnel with "general advantage" (F, G) represent benchmark intelligence personnel identified through the individual advantage-based evaluation method; the organization can encourage and support learning from outstanding personnel—for instance, Personnel F can learn from E and C, making the evaluation results more psychologically acceptable. Personnel with "lack of advantage" (A, B, H, I, J) exhibit less prominent competency characteristics compared to others; the organization should advocate learning from "significant advantage" personnel and develop targeted training programs to improve competency.

(3) As demonstrated in , the democratic ranking order of individual advantages for the ten intelligence personnel is: E, C, D, F, G, J, H, A, B, I. This reveals that regardless of evaluation method, personnel with prominent competency characteristics (e.g., E) consistently rank at the top as recognized excellent performers, while those with less distinctive competencies (e.g., I) consistently rank at the bottom as recognized underperformers.

5. Conclusion

As integral components of intelligence work, intelligence personnel constitute a critical guarantee for its effective execution. Grounded in goal programming principles, this study constructs an evaluation method for discriminating intelligence personnel competency characteristics based on individual advantages. This approach's merit lies in its stance from the evaluated personnel's perspective of individual competency advantages, avoiding the "one-size-fits-all" evaluation model's arbitrariness and "cookie-cutter" results while highlighting personalized competency features and establishing democratic rankings.

Applying the proposed evaluation method, this study selected ten intelligence personnel from DP Enterprise as a sample for empirical validation and result analysis. This not only confirmed the method's scientific validity and effectiveness but also yielded value parameters, democratic evaluation results, and comparative advantage rankings that can inform improvements in intelligence personnel competency characteristics.

It should be noted that in discriminating intelligence personnel competency characteristics across other organizations, evaluation standards may differ based on varying competency indicators and organizational value propositions. The above discussion is based on the individual advantage-based evaluation indicator system constructed in this study. Changes in evaluated subjects, discrimination objectives, or evaluation indicator systems would yield different results.

Author Contributions

Yang Kai: Conceptualized the framework, conducted research, collected and analyzed data, wrote and revised the manuscript.
Zhao Xi'nan: Determined research direction and approach, supervised expert consultation.

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Note: Figure translations are in progress. See original paper for figures.