Original Research Article

Evolution, challenges, and restructuring pathways of talent evaluation systems: Based on comparative analysis of domestic and international practices

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Abstract: A scientific and efficient talent evaluation system is a core element for building a powerful country. This study systematically reviews and compares foreign talent evaluation systems (e.g., tenure-track system, peer review, developmental evaluation, "horse-racing mechanism"), summarizing their advanced experiences in systematic evaluation and support mechanisms. It also sorts out five evolutionary stages of China's talent evaluation system since the establishment of the People's Republic of China, exposing the dilemma between overemphasis on scholar practice and insufficient assessment of potential innovation capabilities.Through comparative analysis of domestic and international practices, three key optimization paths are proposed: constructing an innovation capability framework, formulating comprehensive evaluation criteria integrating explicit and implicit indicators, and adopting dynamic evaluation mechanisms, so as to provide theoretical and practical support for the reform of China's talent development mechanisms.
Keywords: talent evaluation; innovation capability; evaluation effectiveness; international comparison

1. Introduction

President Xi Jinping has repeatedly emphasized "innovation capacity, quality, effectiveness, and contribution" as the guiding principles for talent evaluation. These words provide fundamental guidance for talent development and deepening reforms. Establishing a comprehensive, scientific talent evaluation system is a crucial task these years, while also providing support for building a talent-strong country.

Therefore, by studying the evolution and challenges of domestic and foreign talent evaluation systems, it is helpful to rebuild a talent evaluation system oriented by "innovation ability, quality, effectiveness and contribution".

2. Comparison of domestic and international practices

2.1. The American tenure system and peer review

The tenure system and "peer review" in the United States are widely adopted in American universities (Alstete, 2000)[1]. In the 1930s, the U.S. pioneered the introduction of peer review in the research project funding application. Peer review is a comprehensive approach using a "community" of experts and scholars. They share the same discipline, specific criteria and procedures to assess, evaluate, and judge matters within a relevant field. They rely on the "group effect" and "interactive consultation" of multiple experts to ensure scientific and objective evaluation. Depending on the familiarity between evaluators and the evaluated subjects, peer review can be categorized into three forms: one-way anonymous, two-way anonymous, and open review (Deng Liping, 2012)[2].

2.2. The UK's developmental evaluation and REF system

The "developmental evaluation concept" in the UK's talent evaluation and its specific application, the "Staff Review and Development Programme" of the University of Cambridge demonstrate a high degree of professionalism and innovation.

The UK's developmental evaluation emphasizes two-way communication and constructive feedback throughout the assessment process. An example of this approach is the University of Cambridge's "Staff Review and Development Programme", which enhances employees' career satisfaction and performance through

regular, constructive two-way reviews. This strengthens Cambridge's competitiveness as a world-class academic institution (Yang Yuekun et al., 2020)[3].

The UK's Research Assessment Exercise (RAE) and its successor, the Research Excellence Framework (REF), demonstrate a pioneering approach to evaluating research talent. However, RAE heavily relies on subjective judgment and costs a lot. REF implies significant reforms in assessment criteria, methodologies, and public disclosure of results (Xu Fang et al., 2014)[4].

2.3. DARPA's "horse-race" evaluation

The Defense Advanced Research Projects Agency (DARPA) integrates evaluation agencies, projects, and talent, replacing the traditional 'horse selection system' with a 'horse racing system' to foster innovative achievements. The 'horse racing system' is designed to stimulate innovation, optimize resource allocation, and enhance talent development (Sun Yanling, 2023)[5].

2.4. Inspirations of foreign evaluation systems

In the construction of talent evaluation system, the United States and the United Kingdom have not only made remarkable achievements in evaluation concepts, evaluation methods and evaluation systems, but also paid attention to the construction of guarantee and supervision mechanism, which together constitute the complete framework (Yang Yuekun et al., 2020)[6].

Assessment indicators have been extensively applied across various dimensions of scientific evaluation (Langfeldt et al., 2021)[7]. International talent evaluation focuses on three key dimensions: firstly, an individual's inherent qualities and capabilities, including cognitive abilities, personality traits, strategic thinking, emotional intelligence, as well as intrinsic motivation and potential that drive behavior. Secondly, adaptability and growth potential, highlighting the speed of adaptation to new environments, sustained learning capacity, and clear career aspirations. Thirdly, professional skills and practical competencies, including specific expertise and essential skills required for executing research tasks. These three dimensions collectively form the foundational framework for evaluating an individual's overall competence and capabilities (Silzer, 2009)[8].

Through literature review, it has been found that talent evaluation, consistently faces common challenges. These include balancing quantitative metrics with research quality and motivating researchers' intrinsic drive. In this situation, the international academic community has increasingly emphasized the urgent need to re-examine and reconstruct talent evaluation systems.

3. Domestic talent evaluation system in China

3.1 The historical evolution of China's talent evaluation system (five stages)

Along with the history of China, the evolution and characteristics of the domestic talent evaluation system can be clearly seen.

China's talent evaluation system has undergone five stages since the establishment of China. Each stage has its unique background and characteristics (Xiao Mingzheng et al., 2019)[9]. These stages include the exploratory period (1949-1977), the recovery period (1978-1991), the rapid growth period (1992-2002), the scientific development period (2003-2012), and the mechanism development period (2013 to present). The characteristics of each stage are as follows:

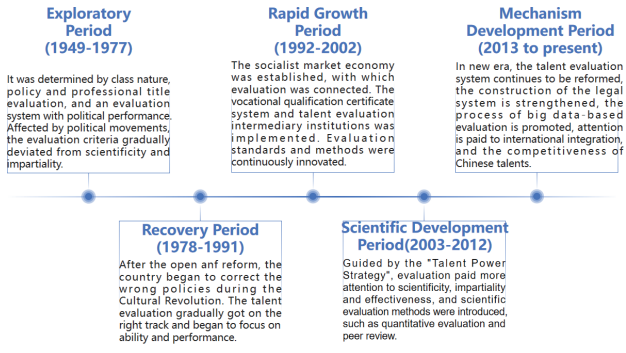

Figure 1. Diagram of stage of China's talent evaluation system based on the research results of Xiao Mingzheng.

3.2. Structure and composition of talent evaluation mechanism

Early research established the fundamental framework of talent evaluation mechanisms. These mechanisms, also known as talent evaluation systems, consist of two major components: foundational structures and operational systems. The core of the evaluation mechanism lies in evaluators, evaluation criteria, and evaluation techniques, as well as how these

three elements work together in a coordinated manner. They interact together. This framework can be represented by the following structural system (Xiao Mingzheng, 2009)[10].

Among them, the talent evaluation criteria is the core of the construction, which is reflected in the aspects of morality, innovation value, ability, contribution, effectiveness, innovation behavior and so on.

Early research revealed that China's higher education institutions primarily adopted foreign evaluation theories focusing on performance-based assessments such as output, competency, and behavioral indicator (Zhang Xiaolin, 2004)[11]. With the rapid development, new perspectives emerged, which emphasized that cultivating innovative capabilities in talents. They included five key aspects: imagination, critical questioning, memory, self-confidence, and insight (Yu Xuying, 2006) [12].

3.3. Classification of domestic evaluation

3.3.1. Focus on innovation capacity and potential

Research on talent innovation capabilities has gradually emphasized that talent evaluation is a process of identifying, distinguishing, and assessing individuals' qualities, abilities, performance, achievements, contributions, developmental potential, and value (Xiao Mingzheng, 2012)[13]. Scholars have proposed the Iceberg Model of Talent Evaluation based on competency models and individual innovation behavior theory, encompassing six dimensions: innovative knowledge, innovative skills, influence, innovation capability, innovation motivation, and management competence (Zhao Wei et al., 2012)[14]. Building individual innovation behavior theory, researchers have designed an indicator system from both endogenous and exogenous motivation dimensions, including potential, capability, motivation, and individual and organizational performance outcomes (Liu Ying, 2019)[15]. In terms of position matching, the framework establishes three indicators: basic qualities, innovation capability, and innovation outcomes, along with nine secondary indicators such as academic ethics, professional expertise, research capacity, learning ability, and influence, reflecting the requirements for scientific and technological talents to create (Sheng Nan et al., 2016)[16].

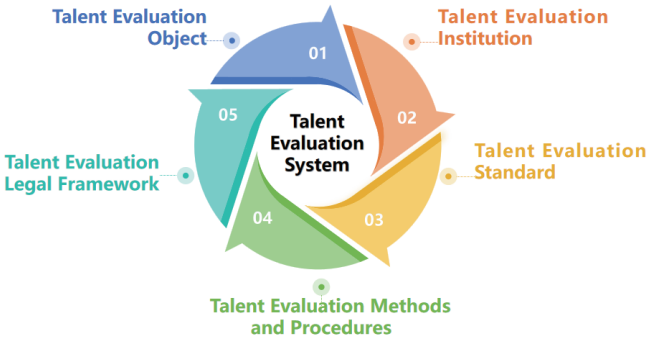

Figure 2. Diagram of the talent evaluation system based on research by Xiao Mingzheng.

3.3.2. Focus on application effectiveness

Evaluation criteria for talent vary across different application scenarios. Functionally, talent evaluation can be categorized into three types: admission, selection, and incentive assessments (Zhang Xiaolin, 2004)[17]. For purpose, it includes professional title, qualification identified, talent project selection and awards (Sun Rui, 2019)[18]. For application, evaluations are divided into internal organizational assessments (employer-led) and external social evaluations (Sun Rui et al., 2017)[19]. Some models integrate multiple dimensions. For instance, position-based evaluations are considered a combined assessment model for job recruitment and assessment (Sun Yanling et al., 2019)[20]. Career development-focused evaluations emphasize growth potential, combining explicit metrics like publications, titles, degrees, and awards with implicit factors such as teamwork, teaching competence, disciplinary alignment, and developmental prospects (Xie Haifeng, 2019)[21].

3.3.3. Focus on effectiveness of evaluation

"Effectiveness of evaluation" serves as a crucial benchmark for establishing talent assessment criteria. It refers to the link between evaluation outcomes and actual competencies after recruitment and development. When applying uniform standards, such as using academic papers for entrepreneurial talents, without considering individual situations, evaluations may be far from expectations, resulting in evaluation failure (Chen Yanyan et al., 2018)[22]. China's evaluation system for scientific talents overemphasizes theoretical knowledge while neglecting engineering practice (Zhu Zhengzhou et al., 2011)[23]. The disconnect between professional title evaluations and practical engineering experience renders such titles largely ineffective (Sun Rui et al., 2015)[24]. In government talent programs, simple assessments replace complex evaluations, while threshold-based criteria

replaces precise assessment. Overemphasis on past achievements and limited focus on potential capabilities lead to outcomes that fail to meet expectations (Chen Yanyan et al., 2018)[25].

Most studies on evaluation criteria for assessment are not deep enough. The evaluation methods and mechanisms have not been designed to accommodate different types of scientific and technological talents. The evaluation indicators fail to reflect the orientation of innovation capability, quality, effectiveness, and contribution. Moreover, there is a lack of practical application scenarios when exploring the effect of relevant evaluation systems (Liu Yun, 2023)[26].

4. Conclusion

To sum up, with the increasing demand for talents in China, it is particularly important to build a scientific, reasonable, comprehensive and effective talent evaluation standard system.

Establishing such a system, the key is to break the current evaluation difficulty and activate the innovation potential of talents. Based on the research in this paper, the following systematic suggestions are put forward:

Firstly, establish an evaluation framework centered on innovation capabilities and potential. We should walk further beyond traditional "hard metrics" like academic papers, professional titles, and academic degrees. By drawing insights from the "Iceberg Model" and competency theory, we can expand the evaluation perspective to include deeper traits such as innovative knowledge, skills, motivations, and influence. By focusing on these potential qualities that determine long-term performance, we can create precise profiles of talent innovation capabilities and make scientific predictions about their development potential.

Secondly, integrating explicit and implicit indicators while strengthening effectiveness and contribution orientation. A robust evaluation system must combine visible innovation outcomes (such as patents and technology commercialization) with tangible contributions (including team collaboration, disciplinary leadership, and talent development). Evaluation criteria should closely connect to national strategies and industrial needs, emphasizing the practical value of achievements, social and economic impact, and effectiveness in solving technological challenges. This ensures that evaluation results authentically reflect the comprehensive value of professionals.

Finally, we should implement a dynamic and developmental evaluation system that invites multi-stakeholder participation. Drawing inspiration from the UK's developmental evaluation and DARPA's "horse race" mechanism, evaluations should span the entire talent development process, serving as a growth-encouraging tool rather than a mere certification. It also requires categorized evaluations, designing differentiated metrics for different types of talent. Simultaneously, we must establish a multi-stakeholder evaluation framework involving peer experts, employers, and research product users. The whole mechanism should be supported by monitoring and appeal mechanisms to jointly ensure the fairness of the evaluation process and the validity of its outcomes.

Through these measures, we will establish a scientific, comprehensive, and dynamic talent evaluation ecosystem. This system will not only accurately identify "promising candidates" but also promptly reward "practical contributors", thereby maximizing talent resource. It will provide support for accelerating high-level technological self-reliance and building a globally innovation center.

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