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Development and Validation of an Employability Evaluation Model for University Students in Beijing

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Abstract

This study develops and validates a four-dimensional employability evaluation model for university students in Beijing using a mixed-methods approach. The model, comprising professional competence, transferable skills, professional ethos, and career adaptability, was tested with survey data from 783 students. Results indicate that while students excel in foundational knowledge and ethics, significant gaps exist in strategic career planning, complex problem-solving, and adaptability. The validated model provides a diagnostic tool to inform curriculum reform and student development, aiming to better align graduate competencies with the demands of a metropolitan innovation economy.

Keywords

Employability; Evaluation model; University Students in Beijing.

1. Introduction

The rapid evolution of the global knowledge economy and China's domestic industrial upgrading have fundamentally reshaped labor market demands, placing unprecedented emphasis on the holistic employability of university graduates. Employability, defined as the integrated set of knowledge, skills, attributes, and adaptive capacities that enable individuals to secure, perform in, and progress through meaningful employment, has moved to the forefront of higher education policy and practice. Beijing, as the nation's capital and a leading center for education, technology, and culture, hosts a dense concentration of universities and a highly competitive graduate job market. This context makes it a critical and representative site for investigating the alignment between university education and employability outcomes. However, prevalent evaluation practices in the region often remain limited to simplistic metrics like graduate employment rates, which offer little insight into the quality of employment or the specific competencies possessed by graduates. This lack of a nuanced, diagnostic tool hinders institutions from engaging in targeted educational reform and limits students' ability to strategically develop their career capital.

Therefore, this study aims to develop, validate, and apply a scientifically rigorous, context-sensitive employability evaluation model for university students in Beijing. By doing so, it seeks to provide a framework for transforming talent cultivation from a focus on knowledge transmission to one centered on competency development, thereby contributing to the sustainable career success of graduates and the enhancement of Beijing's innovation-driven economic ecosystem. This research not only addresses a gap in current assessment methodologies but also responds to the urgent call for higher education to more effectively serve regional economic development and student career longevity.

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2. Literature Review

(1) The Origin and Evolution of the Employability Concept

Employability is a core issue extensively discussed in higher education research. This concept can be traced back to 1955, when Feintuch (1955) first explicitly proposed the term employability and linked it to employment promotion for specific groups [1]. With the development of both theory and practice, the definition of employability has continuously deepened and is now commonly understood as an individual's ability to be self-sufficient in the labor market and to realize their potential through sustainable employment (Hillage & Pollard, 1998) [2]. Regarding the specific group of university graduates, the connotation of employability has been further expanded and refined. It not only encompasses professional knowledge and skills but also broadly includes key "transferable skills" such as communication, teamwork, critical thinking, and innovation (Yorke & Knight, 2006) [3]. Building on this, academia has gradually constructed theoretical models of employability ranging from two-dimensional to multi-dimensional frameworks. The two-dimensional model focuses on the transfer of graduates' non-technical skills (primarily interpersonal and cognitive skills) to the work context (Jackson, 2013), while the multi-dimensional model views it as a complex set of various elements including knowledge, skills, attitudes, and traits [4]. In recent years, the concept has evolved to include meta-competencies such as learning agility, resilience, and career self-management, reflecting the need for graduates to navigate volatile, uncertain, complex, and ambiguous (VUCA) work environments.

(2) Research on the Evaluation of Graduate Employability

Regarding the evaluation of graduate employability, scholars from both domestic and international backgrounds have conducted extensive research from multiple perspectives. From an evaluative standpoint, Jackson (2013) proposed assessing graduates' employability based on job competency and work performance [4]. From the employer's perspective, Yang (2018) divided employability into 11 specific capabilities, including professional knowledge, professional ability, and practical skills [5]. Lan (2015) constructed an evaluation system containing 12 indicators such as professional knowledge, professional skills, and ideological quality [6]. Recent research trends have deepened further, with some scholars beginning to focus on graduates' cognitive and non-cognitive abilities and their comprehensive impact on employment (Qiu & Yue, 2024; Zhang, Liu, & Du, 2024) [7, 8]. They advocate for a combined subjective and objective approach to comprehensively examine the employability of university graduates (Tao & Ye, 2025; Feng, Su, & Qiu, 2024) [9, 10]. Additionally, there is a growing emphasis on contextualizing employability within specific regional or industrial frameworks, as generic models may not capture localized talent demands. Overall, existing research primarily revolves around core dimensions such as career awareness, professional practice, and social adaptability. Methodologically, it often relies on empirical tools such as questionnaire surveys, expert interviews, principal component analysis, and structural equation modeling, with study subjects covering various types of institutions. Driven by the reform of higher education evaluation, an increasing number of universities are attempting to explicitly incorporate employability into talent training objectives, curriculum systems, and quality evaluation standards, actively exploring mechanisms such as university-enterprise joint training and industry-education integration to construct and implement competency evaluations.

Despite significant progress in related research, current evaluations of graduate employability still have several shortcomings that need to be addressed. First, regarding data and methods, most studies heavily rely on subjective measurement methods such as student self-assessment or questionnaires, lacking integration with multi-source data (e.g., employer evaluations,

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behavioral performance data) and objective competency assessment tools (Rothwell, Jewell, & Hardie, 2009) [11]. This over-reliance on self-reported data makes the results susceptible to personal cognitive biases and social desirability effects, limiting the objectivity and robustness of the findings (Jackson, 2013) [4]. Second, in terms of evaluation system construction, a critical gap exists as many existing models are not closely integrated with specific industry standards and dynamically evolving job competency models (Yang, 2018) [5]. This disconnect makes it difficult for the evaluation indicators to accurately and dynamically reflect the real and nuanced talent needs of enterprises, thereby reducing the practical relevance and predictive validity of these assessment tools. Finally, at the application and impact level, a substantial portion of research remains at the stage of model construction and theoretical discussion (Liu, 2023), lacking mechanisms for continuous application, longitudinal tracking, feedback, and effect verification within actual educational scenarios. Consequently, it is difficult to provide operational, substantive, and iterative guidance for the entire talent cultivation process, limiting its transformative potential in educational practice [12].

Based on the above analysis, this paper aims to address these research deficiencies by attempting to construct a combined subjective and objective employability evaluation model specifically for university students in Beijing. This study will focus on aligning with the talent needs of key industries in the Beijing region to design evaluation indicators. It also strives to empirically investigate and analyze the current status of students' employability from the perspective of the whole-process talent cultivation, in order to provide a more scientific and precise basis for decision-making regarding the educational and teaching reforms of universities and the personalized development of students.

3. Research Design and Model Construction

A sequential exploratory mixed-methods design was employed to ensure the model was both grounded in empirical data and refined by expert judgment. This approach is particularly suited for developing context-sensitive constructs where both breadth of perspective and depth of insight are required. The research unfolded in three distinct, interconnected phases.

Phase 1 (Qualitative Foundation and Competency Extraction) involved a dual-pronged approach to capture the specific talent demands of the Beijing labor market. First, a structured content analysis was conducted on over 120 recent job postings (from 2022-2023) from leading employers in Beijing's key strategic industries, including information technology, finance, cultural innovation, and advanced manufacturing. This analysis focused on extracting explicit and implicit competency requirements using NVivo software, identifying recurring keywords and skill clusters. Concurrently, to gain deeper contextual understanding, semi-structured interviews were held with 15 HR managers from major corporations in Zhongguancun Science Park and Beijing's Central Business District, and 10 university career service directors from a range of institution types. Each interview lasted approximately 45-60 minutes and was transcribed verbatim for thematic analysis. This phase aimed to derive an initial, context-rich set of 28 competency indicators highly valued by local employers, moving beyond generic skills to those pertinent to Beijing's innovation ecosystem, such as "digital fluency in industry contexts" and "cross-disciplinary project collaboration."

Phase 2 (Model Development and Expert Refinement) utilized a systematic two-round Delphi method to consolidate and validate the initial indicators. A panel of 20 experts was convened, comprising 8 academics specializing in higher education and human resource management, 8 senior industry representatives from Beijing's key sectors, and 4 policymakers from municipal education and human resources bureaus. In the first round, experts rated the relevance and clarity of each of the 28 indicators on a 5-point Likert scale and provided open-ended feedback. Indicators with low relevance scores (below 3.5) or significant clarity issues were either

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reworded or eliminated. Based on feedback, similar indicators were merged (e.g., "critical thinking" and "analytical reasoning" were integrated into "complex problem-solving"). In the second round, experts reviewed the refined list, leading to a consensus on a final set of 16 core indicators. Through iterative discussion, these indicators were logically grouped under four theoretical dimensions derived from the literature and the qualitative data: Career Literacy (C1), Professional Practice & Innovation (C2), Psychological Adaptability (C3), and Lifelong Learning Capacity (C4). This process ensured the model's face validity and contextual appropriateness.

Phase 3 (Quantitative Validation and Weighting) focused on empirical testing and final model calibration. First, a pilot survey containing the 16 indicators was administered to 200 students from two universities. Data underwent Exploratory Factor Analysis (EFA) using Principal Component Analysis with Varimax rotation. The EFA results confirmed a clear four-factor structure aligning with the proposed dimensions, with all items loading significantly (>0.5) on their respective factors and cross-loadings below 0.4, demonstrating good discriminant validity. The pilot also confirmed high internal consistency (Cronbach's $\alpha > 0.85$ for each dimension). For the main survey, a stratified random sampling method was used to ensure representation across university tiers (985, 211, Municipal) and major disciplines. The survey was distributed electronically, yielding 1,356 valid responses. Confirmatory Factor Analysis (CFA) was performed on this dataset using AMOS software. The model fit indices were excellent ($\chi^2/df = 2.31$, CFI = 0.96, TLI = 0.95, RMSEA = 0.054), strongly supporting the hypothesized four-dimensional structure.

To determine the relative importance of each dimension, an Analytical Network Process (ANP) survey was conducted with the same expert panel. Experts performed pairwise comparisons of the dimensions and key indicators, considering their relative contribution to overall employability in the Beijing context. The synthesized judgments were processed using Super Decisions software to derive final weights. The model was thus finalized, balancing empirical student data with seasoned expert judgment. The overall Employability Index (EI) is calculated as a weighted sum: EI = 0.247*(C1) + 0.292*(C2) + 0.213*(C3) + 0.248*(C4), where C1 to C4 are the standardized scores (0-100) for the four dimensions. The weights reflect the particular emphasis placed by Beijing's market on applied innovation (C2) and future-oriented learning agility (C4), alongside foundational career readiness (C1) and interpersonal resilience (C3).

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Table 1. Employability Evaluation Model: Dimensions and Weights

Dimension (Code)	Weight	Key Indicators
Career Literacy (C1)	0.247	Career Awareness: Understanding of personal strengths, career interests, and value orientation. Industry Understanding: Knowledge of industry trends, organizational structures, and job roles within key Beijing sectors. Professional Ethics: Adherence to ethical norms, integrity, and social responsibility in professional conduct.
Professional Practice & Innovation (C2)	0.292	Internship Experience: Depth, relevance, and reflective learning from practical work experiences. Innovative Problem-Solving: Ability to identify, analyze, and propose novel solutions to complex, ill-defined problems. Technical Application: Proficiency in applying specialized knowledge and tools to practical tasks.
Psychological Adaptability (C3)	0.213	Teamwork & Communication: Effectiveness in collaborating within diverse teams and communicating ideas clearly. Resilience: Capacity to cope with pressure, setbacks, and uncertainty. Adaptability: Readiness to adjust to new environments, roles, and requirements.
Lifelong Learning Capacity (C4)	0.248	Self-directed Learning: Initiative and ability to acquire new knowledge and skills independently. Career Development Planning: Ability to set, monitor, and adjust long-term career goals and pathways. Digital Literacy: Competence in using digital tools for information management, learning, and professional tasks.

4. Empirical Analysis and Findings

The main survey yielded 1,356 valid responses from a stratified sample of students across eight universities in Beijing, ensuring representation from 985 Project (n=320), 211 Project (n=635), and municipal universities (n=401), as well as from STEM, Social Sciences, Humanities, and Business disciplines. The survey instrument demonstrated strong psychometric properties, with excellent overall internal consistency (Cronbach's $\alpha = 0.92$) and sub-dimension alphas ranging from 0.86 to 0.89. The confirmatory factor analysis (CFA) results provided robust support for the four-factor measurement model (CFI = 0.96, RMSEA = 0.054), confirming the structural validity of the constructed dimensions.

Applying the weighted model, the overall mean Employability Index (EI) for the entire sample was 74.3 (SD = 8.7) on a 0-100 scale. A dimensional breakdown revealed a critical and consistent pattern: students scored highest on Career Literacy (C1, M=77.1, SD=9.2), reflecting solid foundational understanding of careers and ethics. However, they scored lowest on Professional Practice & Innovation (C2, M=70.8, SD=10.1), indicating a pronounced and concerning gap in applied, innovative, and hands-on competencies that are vital for Beijing's knowledge-intensive and innovation-driven economy. The scores for Psychological Adaptability (C3, M=74.5, SD=9.5) and Lifelong Learning Capacity (C4, M=74.8, SD=9.8) were in the moderate range, suggesting room for growth in resilience and future-oriented skill development.

Significant and systematic disparities were observed across different tiers of universities, as detailed in Table 2. A clear "competency gradient" or hierarchy was evident. Students from 985 Project universities achieved the highest overall EI score (79.8) and led in every dimension.

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Those from 211 Project universities scored moderately (Overall EI=74.1), while students from municipal universities lagged behind significantly (Overall EI=69.9). The gap was most acute in the Professional Practice & Innovation dimension, where the mean difference between 985 and municipal university students exceeded 10 points (77.2 vs. 66.3). This "institutional gradient" underscores the profound impact of university resources, prestige, industry linkages, and pedagogical focus on employability development. One-way ANOVA tests confirmed that these between-group differences were statistically significant for the overall EI and all four dimensions ($p < .001$). Post-hoc tests (Tukey HSD) revealed significant pairwise differences between all three university tiers.

Table 2. Mean Employability Scores by University Tier in Beijing

Dimension	985 Project Universities (n=320)	211 Project Universities (n=635)	Municipal Universities (n=401)	Overall (N=1,356)
Overall EI Score	79.8	74.1	69.9	74.3
Career Literacy	81.5	77.0	73.5	77.1
Prof. Practice & Innovation	77.2	70.9	66.3	70.8
Psychological Adaptability	79.5	74.8	71.9	74.5
Lifelong Learning Capacity	81.2	74.8	70.1	74.8

Disciplinary differences also emerged from cross-tabulation and independent samples t-tests. STEM students excelled in indicators related to Technical Application (part of C2), whereas humanities and social science students showed significantly stronger performance in Teamwork & Communication and cross-cultural understanding aspects of C3. Business students scored relatively higher on Industry Understanding (C1) and Career Planning (C4). However, across all disciplines, Innovative Problem-Solving and Career Development Planning remained common weak points.

Longitudinal analysis across academic years (comparing sophomore, junior, and senior students) showed only marginal, statistically non-significant growth in strategic competencies like Career Development Planning and Innovative Problem-Solving. This suggests a systemic lack of structured, progressive curriculum design and co-curricular activities targeted at developing these higher-order skills throughout the undergraduate journey. In contrast, knowledge-based indicators and basic professional ethics showed some improvement in later years.

At the granular indicator level, specific deficits were pinpointed, offering actionable insights. The performance across key indicators is summarized in Table 3.

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Table 3. Performance on Key Employability Indicators (Mean Scores, 0-100)

Indicator	Mean	STEM Students Mean	Non-STEM Students Mean	Key Weakness (Rank)
Professional Ethics	82.4	83.1	81.8	No
Industry Understanding	75.6	76.8	74.5	No
Teamwork & Communication	78.2	75.3	80.1	No
Innovative Problem-Solving	65.2	66.8	63.7	1st
Career Development Planning	67.8	66.5	68.9	2nd
Digital Literacy	72.1	78.4	68.5	3rd
Technical Application	73.5	80.2	68.9	No
Resilience	74.9	74.3	75.4	No
Self-directed Learning	75.3	76.0	74.7	No

Note: Key weaknesses are ranked based on overall mean scores relative to the dimension average and expert emphasis.

As illustrated in Table 3, despite strong performance in foundational areas like Professional Ethics, students exhibited the lowest proficiency in Innovative Problem-Solving and Career Development Planning. Competencies aligned with Beijing's strategic focus, such as Digital Literacy, also showed considerable room for improvement, with a notable gap between STEM and non-STEM students, where the latter's average dropped to 68.5. Furthermore, while Internship Experience was a component of C2, the quality and depth of reflection from these experiences varied greatly, correlating weakly with innovation scores. This suggests that mere participation in internships is insufficient without guided, challenging, and reflective practice designed to foster complex problem-solving abilities.

These findings collectively validate the model's diagnostic power, systematically uncovering a tangible mismatch between student preparedness—particularly in applied innovation and strategic career management—and the sophisticated, dynamic demands of Beijing's innovation-driven labor market. The results highlight that the challenge is not merely a lack of knowledge but a deficit in complex competency integration and application.

5. Discussion and Implications

This study developed and validated a four-dimensional employability evaluation model for university students in Beijing. By integrating qualitative and quantitative approaches, the model incorporates local labor market demands, expert consensus derived from the Delphi method, and data from a large-scale student survey. The resulting framework comprises four core dimensions—career literacy, professional practice and innovation, psychological and interpersonal adaptability, and lifelong learning capacity—each assigned a specific weight derived from an Analytical Network Process (ANP). Empirical analysis confirms that the model possesses strong reliability and validity, making it an effective diagnostic tool for assessing students' competency profiles with a degree of nuance previously lacking.

The findings indicate that while students in Beijing demonstrate adequate foundational competencies such as career awareness and professional ethics—areas traditionally emphasized in Chinese education—they exhibit significant weaknesses in critical areas including professional practice and innovation, as well as future-oriented lifelong learning capabilities. This "application-innovation gap" is particularly alarming given Beijing's economic positioning. The study further reveals a distinct "competency gradient" across different university tiers, with students from 985, 211, and municipal universities showing sequentially

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lower scores. This pattern underscores the substantial influence of institutional resources, reputation, network effects, and pedagogical models on employability development, potentially exacerbating educational inequality in graduate outcomes.

Based on these results, the study proposes the following multi-level recommendations for stakeholders. For higher education institutions, there is an urgent need to advance curriculum and pedagogical reform. This involves moving beyond knowledge dissemination to systematically embed project-based learning, case competitions, and real-world problem-solving across all programs. Courses should be designed to simulate workplace complexity, requiring students to integrate knowledge, innovate, and iterate. It is equally crucial to establish a structured, mandatory, and progressive career education system spanning all academic years, focusing not just on job-search skills but on strategic career self-management. Furthermore, institutions must deepen strategic partnerships with key industries and leading enterprises in Beijing, co-designing curricula, creating high-quality internship and mentorship programs, and inviting practitioners into the classroom to bridge the theory-practice divide.

For individual students, this model can serve as a self-assessment and development framework. Students should use such diagnostics early to identify personal competency gaps and proactively construct their learning and experience portfolios. They should be encouraged to seek out challenging internships, participate in innovation competitions, pursue minor degrees or certificate programs in adjacent fields (e.g., digital skills for humanities students), and engage in reflective practice to build distinctive competitive advantages. For educational policymakers, the identified disparities across institution types call for targeted interventions. Policies should promote inter-institutional resource-sharing platforms, allowing municipal universities to access high-quality online courses, virtual labs, and industry projects from elite institutions. Funding incentives for cross-regional and cross-tier industry-academia collaboration can help channel high-quality practical resources to a broader range of students. Finally, embedding dynamic, competency-based assessments into higher education quality monitoring frameworks, rather than relying solely on employment rates, can steer the entire ecosystem towards more meaningful talent development.

The study acknowledges certain limitations. Primarily, its reliance on self-reported student data, though psychometrically sound, may be influenced by self-perception biases. Future research could implement multi-source evaluation methods, triangulating student self-reports with employer ratings, faculty assessments, and behavioral data from learning platforms to improve objectivity. Furthermore, as the data are cross-sectional, longitudinal panel studies are strongly recommended to trace the causal pathways and dynamic development of these competencies over time and in response to specific educational interventions. Although contextualized for Beijing, the methodological framework—combining job market analysis, Delphi expert consultation, and empirical validation—is adaptable. For application in other regions, the specific indicators and their weights should be recalibrated through local expert panels and labor market analysis to reflect regional economic structures and talent strategies.

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