Analysis of Influencing Factors for High-Quality Employment of Vocational Bachelor Graduates Based on ISM-MICMAC

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Abstract: Driven by industrial upgrading and the "Vocational Education 20 Measures," vocational bachelor education has become a new pathway for cultivating high-level technical and skilled talents. However, the employment quality of its graduates still exhibits the dilemma of "quantity increases while quality lags." Taking vocational bachelor graduates as the research object, this paper comprehensively employs bibliometrics, the Delphi method, and the Interpretive Structural Model (ISM) to identify and structure 14 key influencing factors, and uses the MICMAC method to test robustness. The findings reveal that the university-enterprise collaboration mechanism and government policy support constitute deep-rooted drivers; the proportion of practical teaching and vocational qualification certification play intermediary roles; salary and benefits and job satisfaction are direct surface-level outcomes. By applying the ISM-MICMAC combination to the study of vocational bachelor employment quality, this paper proposes countermeasures from four dimensions-government, university, enterprise, and student-offering a theoretical basis for governments and institutions to improve the employment quality of vocational bachelor graduates.

Keywords: Vocational Bachelor Students; High-Quality Employment; ISM; MICMAC Method; Influencing Factors

1. Introduction

Under the impetus of industrial upgrading and the strategy of building a manufacturing powerhouse, vocational bachelor education has entered a stage of rapid development. Although only 9,220 students nationwide graduated from China's first-ever cohort of vocational bachelor's programs in 2022, some institutions and majors already reported employment-destination fulfillment rates nearly five percentage points above the national undergraduate average for the same period [1]. However, there are still clear gaps in salary levels and major-job matching. According to the 2023 MyCOS Employment Blue Book and annual reports from various universities, the average monthly income of vocational bachelor graduates six months after graduation is about 5,100-5,500yuan, equivalent to 85 %-90 % of that of ordinary undergraduates [2]; the major-job matching rate remains above 70 %, yet it is about 10 percentage points lower than that of application-oriented undergraduates. This contradiction of "quantity increases while quality lags" indicates that high-quality employment of vocational bachelor graduates has entered a critical bottleneck.

Based on this, this paper raises two research questions: (1) What are the key factors influencing the high-quality employment of vocational bachelor graduates? (2) How do these factors interact and form a hierarchical structure? Answering these questions will provide a theoretical basis for education authorities and vocational bachelor institutions to formulate precise high-quality employment measures.

2. Research Progress on Influencing Factors of Employment Quality of Vocational Bachelor Graduates

2.1 Evolution of Research Themes

The concept of "vocational bachelor" was formally written into national policy documents in 2019 with the National Vocational Education Reform Implementation Plan (commonly referred to as the "Vocational Education 20 Measures"). Subsequently, from 2020 to 2021, the Ministry of Education approved 32 higher

vocational colleges to be upgraded to vocational bachelor institutions, with the first cohort of students graduating in 2022. Since then, the employment quality of this new type of education has received continuous academic attention. Xing et al. [3] argue that the evaluation of employment quality for vocational bachelor degrees must be differentiated from that of ordinary undergraduate and higher vocational colleges, highlighting the orientation of "high-level technical and skilled talents"; Xu et al. [4] point out that its employment quality should simultaneously meet the triple needs of students, enterprises, and regional industries. The research focus has gradually shifted from a single indicator of "employment rate" to a multi-dimensional framework of "salary-matching-development" for "high-quality employment."

2.2 Connotation and Measurement of High-Quality Employment

Domestic and international measurements of graduate employment quality are basically consistent. Hao [5] proposes four dimensions of "decent work": income, stability, career development, and social dialogue; domestic scholars further summarize it into a five-dimensional framework of "salary and benefits, job matching, career development space, social security, and job satisfaction" based on the characteristics of Chinese university graduates [6]. Ke [7] further quantified the five dimensions into 13 observed variables and verified their reliability and validity in the context of undergraduate-level vocational education. Combining the above studies, high-quality employment of vocational bachelor graduates can be defined as the comprehensive manifestation of salary level, job matching, career growth space, social security, and subjective satisfaction after obtaining employment.

2.3 Three Perspectives of Influencing Factors Research

A review of domestic and international literature on influencing factors of high-quality employment of graduates shows that existing studies generally explore influencing factors of vocational bachelor employment quality from three perspectives— "individual-institution-environment," as shown in Table 1.

Table 1. Three Perspectives on Influencing Factors of Employment Quality of Vocational Bachelor Graduates

Perspective	Representative Factors and Conclusions	Literature Examples
Individual	1+X certificates, career expectations, social capital	[8]
Institutional	Proportion of practical teaching, university-enterprise collaboration, faculty	[9]
Environmental	Government policies, regional industrial structure, social recognition	[10]

In summary, existing research can be summarized as having three shortcomings:

(1) Fragmentation: most studies focus on single or a few variables, lacking systematic integration;

(2) Static nature: the obtained influencing factors of high-quality employment are mostly cross-sectional data, failing to reveal hierarchical transmission relationships among factors;

(3) Methodological singularity: dominated by regression or structural equation models, they struggle to portray the structure of complex social systems.

Therefore, this paper intends to use the Interpretive Structural Model (ISM) as a tool [11] to incorporate 14 verified key influencing factors into a unified framework, construct a hierarchical structure of vocational bachelor employment quality, and use the MICMAC method to test robustness, thereby addressing the above shortcomings.

3. Research Design

Employment quality of vocational bachelor graduates involves four-dimensional stakeholders—government, university, enterprise, and student—with numerous variables and mutual feedback. Using regression models directly can only answer whether "X significantly affects Y," but cannot reveal hierarchical transmission among factors. Therefore, a "funnel-shaped" four-step design is adopted: first, exhaust potential factors on a large scale, then condense expert consensus on a small scale, and finally use ISM to "flatten" the complex system into a directed topological graph, verified for robustness by MICMAC. This ensures both the completeness of the factor pool and the order of policy interventions,

as shown in Figure 1.

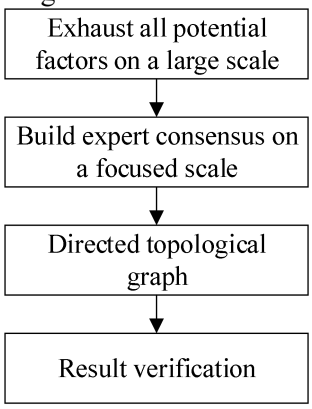

Figure 1. "Funnel-shaped" Research Flow Diagram

3.1 Exhausting Potential Factors on a Large Scale

To avoid missing important indicators, we collected employment data of vocational bachelor graduates from 2022 to 2025, employment quality annual reports released by universities in the past five years, and relevant papers in CNKI and Web of Science, ultimately identifying 28 high-frequency candidate factors.

3.2 Condensing Expert Consensus on a Small Scale

As different sources may express the same issue inconsistently, the 28 high-frequency keywords may overlap, be missing, or be unranked. This step aims to retain factors "highly relevant" to vocational bachelor employment quality while deleting marginal or duplicate variables to ensure the subsequent ISM matrix is not overly sparse. The Delphi method is therefore introduced to use "expert consensus" for screening. The implementation process includes:

• Expert Selection

To analyze influencing factors from different angles and ensure heterogeneity, 12 experts were selected from different positions related to employment: five university career guidance teachers, four enterprise HR managers, and three government vocational education administrators, with an average working experience of 11.6 years.

• Scoring and Screening

A three-round Delphi procedure is adopted. In the first round, experts freely scored and supplemented; in the second round, the mean, standard deviation, and coefficient of variation (CV) of the first round were announced, allowing experts to revise; in the third round, only items with CV>0.25 were rescored until CV≤0.25 and Kendall's W≥0.8, providing a verifiable consensus basis for the subsequent "directed topological graph: system structure."

• Quality Control

Table 2. Key Influencing Factors and Their Codes

No.	Factor	Operationalization Example
F1	University-enterprise Collaboration Mechanism	Number of annual university-enterprise council meetings, co-developed courses
F2	Job Matching Degree	Graduate major-job matching rate (%)
F3	Salary and Benefits	Median starting salary + social insurance and housing fund coverage
F4	Institutional Orientation	Clarity of vocational bachelor orientation in university charter (Likert)
F5	Proportion of Practical Teaching	Practical credits as a percentage of total credits (%)
F6	Government Policy Support	Per-student fiscal appropriation, enterprise tax incentive intensity
F7	Job Satisfaction	Likert 5-point scale mean
F8	Career Expectation	Ratio of expected salary to regional salary median
F9	Vocational Qualification Certification	Proportion of graduates holding at least one X certificate (%)
F10	Depth of University-Enterprise Collaboration	Proportion of majors with ≥30 % enterprise participation in courses
F11	Precision of Career Guidance	Number of personalized guidance sessions per student per year
F12	Proportion of Dual-qualification Teachers	Percentage of dual-qualification teachers (%)
F13	Social Recognition	Employer recognition of vocational bachelor degrees (Likert)
F14	Regional Industrial Structure	Proportion of high-tech manufacturing in the city where the university is located (%)

Each round achieved 100 % response rate, with Zoom focus groups providing real-time Q&A to reduce understanding bias.

Ultimately, the Delphi method, acting as both

"gatekeeper" and "calibrator," eliminated 14 low-consensus factors from 28 candidates and retained 14 core factors, providing a high-quality and credible factor set for ISM input, as shown in Table 2.

3.3 Directed Topological Graph

Traditional structural equation modeling (SEM) requires large samples and assumes linear relationships, whereas the influencing factors of vocational bachelor employment quality exhibit obvious nonlinearity and hierarchy. ISM can transform "who influences whom" into "who precedes whom," helping policymakers identify leverage points at a glance. Therefore, ISM is used to construct the directed topological graph.

Establish the Adjacency Matrix

Let the matrix element $a_{i\ j}$ be assigned as follows:

• If experts judge that "factor F_i has a direct influence on F_j," then $a_{ij} = 1$, otherwise 0;

• Diagonal elements a_{ii} are uniformly set to 0 (no self-loop).

After three rounds of Delphi with 12 experts and Kappa=0.74 convergence, the adjacency matrix is determined. The adjacency matrix is as shown in Table 3.

Table 3. Adjacency Matrix

factor	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14
F1	0	0	0	0	1	0	0	0	1	0	0	0	0	0
F2	0	0	1	0	0	0	0	0	0	0	0	0	0	0
F3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F4	0	0	0	0	1	0	0	0	0	0	0	0	0	0
F5	0	1	0	0	0	0	0	0	0	0	0	0	0	0
F6	0	0	0	0	0	0	0	0	1	0	0	0	0	0
F7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F9	0	1	0	0	0	0	0	0	0	0	0	0	0	0
F10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F11	0	0	0	0	0	0	0	0	0	1	0	0	0	0
F12	0	0	0	0	0	0	0	0	0	0	1	0	0	0
F13	0	0	0	0	0	0	0	0	0	0	1	0	0	0
F14	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Construct the Reachability Matrix

Input the above adjacency matrix into MATLAB, add the identity matrix I, and use Boolean multiplication to iterate until convergence to obtain the 14×14 reachability matrix M, as shown in Table 4.

Level Partitioning

After iteration, a 4-level structure is obtained, as shown in Table 5.

Combining Table 3, the final interpretive structural model is constructed, as shown in Figure 2.

Table 4. Reachability Matrix

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14
F1	1	1	1	0	1	0	0	0	1	1	1	0	0	0
F2	0	1	1	0	0	0	0	0	0	0	0	0	0	0
F3	0	0	1	0	0	0	0	0	0	0	0	0	0	0
F4	0	1	1	1	1	0	0	0	0	0	0	0	0	0
F5	0	1	1	0	1	0	0	0	0	0	0	0	0	0
F6	0	1	1	0	0	1	0	0	1	1	1	0	0	0
F7	0	0	0	0	0	0	1	0	0	0	0	0	0	0
F8	0	0	0	0	0	0	0	1	0	0	0	0	0	0
F9	0	1	1	0	0	0	0	0	1	0	0	0	0	0
F10	0	0	0	0	0	0	1	0	0	1	0	0	0	0
F11	0	0	0	0	0	0	0	0	0	1	1	0	0	0
F12	0	0	0	0	0	0	0	0	0	1	1	1	0	0
F13	0	0	0	0	0	0	0	0	0	1	1	0	1	0
F14	0	0	0	0	0	0	1	0	0	1	0	0	0	1

Table 5. ISM Level Results

Level	Factor Numbers
L1	F3, F7
L2	F2, F10
L3	F5, F9, F11, F14
L4	F1, F4, F6, F8, F12, F13

Create the Interpretive Structural Model

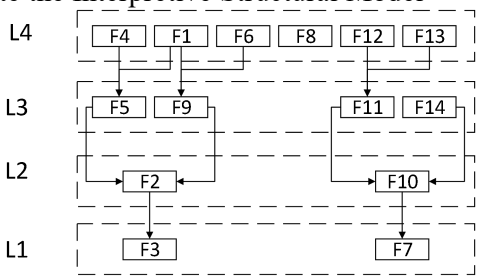

Figure 2. Interpretive Structural Model of Influencing Factors

MICMAC Validation

ISM provides a "static hierarchy," but policymakers are more concerned with "which factors, once leveraged, can drive a large set of factors." MICMAC uses a two-dimensional plot of "driving power-dependence" to answer this question: the horizontal axis shows "how many others I influence," and the vertical axis shows "how many others influence me." Therefore, the four-quadrant graph illustrates "driving-dependence" policy levers, making ISM conclusions more operational. After a second round of expert scoring, MICMAC quadrant division achieved 92.3 % consistency with the ISM hierarchy ($\kappa = 0.81$, $p < 0.01$), as shown in Figure 3.

4. Results and Analysis

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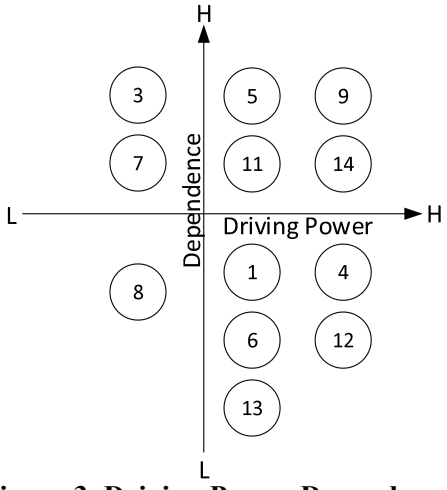

Figure 3. Driving Power-Dependence Quadrant Diagram

4.1 Analysis of the Interpretive Structural Model

Figure 2 shows the four-level hierarchical structure of influencing factors for high-quality employment of vocational bachelor graduates. From top to bottom, it is divided into four layers: surface outcomes (L1), bridging layer (L2), intermediary bridges (L3), and deep-rooted drivers (L4). Each layer contains different factors, and arrows indicate direct influence relationships between factors. For example, the university-enterprise collaboration mechanism (F1) in L4 directly influences the proportion of practical teaching (F5) in L3, which in turn influences job matching degree (F2) in L2, ultimately influencing salary and benefits (F3) in L1. This hierarchical structure helps us understand which factors are root causes, which are intermediary variables, and which are final outcomes.

4.2 MICMAC Quadrant Analysis

Figure 3, through MICMAC analysis, distributes the 14 factors into four quadrants. The horizontal axis represents driving power (the extent to which the factor influences others), and the vertical axis represents dependence (the extent to which the factor is influenced by others).

For the above quadrants, the following definitions can be made:

Autonomous quadrant: F8 (student career expectations) - low driving power, low dependence, requiring guidance rather than compulsion;

Dependent quadrant: F3, F7 - high dependence, low driving power, serving as the "display" of policy effects;

Linkage quadrant: F5, F9, F11, F14 - high driving power and high dependence, requiring collaborative governance;

Driving quadrant: F1, F4, F6, F12, F13 - high driving power, low dependence, serving as policy leverage points.

For example, in the driving quadrant, the university-enterprise collaboration mechanism (F1) and government policy support (F6) are priority points for policy intervention. In the dependent quadrant, salary and benefits (F3) and job satisfaction (F7) are the direct manifestations of policy effects.

It can be seen that MICMAC analysis further validates the robustness of the ISM model and indicates that factors with high driving power and low dependence (such as university-enterprise collaboration mechanism and government policy support) are priority points for policy intervention. Improvements in these factors can drive the enhancement of overall employment quality.

5. Countermeasures and Suggestions

Government: Establish a dynamic "major-industry" docking list, link per-student fiscal appropriations to enterprise participation in talent cultivation, and implement tax incentives for university-enterprise collaboration enterprises to leverage deep-rooted causes through institutional supply.

University: Through the university-enterprise council, ensure that enterprise-involved courses account for no less than 35 % of total credits and that practical credits account for no less than 50 %, integrate 1+X certificate standards into the training program, and rely on a digital platform to provide "one student, one policy" precise career guidance to strengthen intermediary bridging roles.

Enterprise: Advance the job competency profile to the enrollment stage, implement a modern apprenticeship system of "enrollment equals employment," and assign dual mentors from both university and enterprise for every six students to ensure demand-side and supply-side resonance.

Student: Actively participate in vocational qualification certification and regional salary expectation management workshops, build a real-time updated "career passport," to narrow the gap between personal expectations and market realities, ultimately achieving high-

quality employment.

6. Conclusion

Applying ISM to vocational bachelor employment quality, this paper constructs a four-level hierarchical structure: university-enterprise collaboration mechanism and government policy support are located at the deep-rooted driver level; the proportion of practical teaching and vocational qualification certification play intermediary bridging roles; job matching degree and university-enterprise collaboration depth serve as direct supporting layers; salary and benefits and job satisfaction are surface-level direct outcomes. MICMAC validation shows model robustness of 92.3 %, providing actionable countermeasures for government, universities, enterprises, and students. In the future, a dynamic DEMATEL-ISM model can be adopted and recruitment platform big data can be introduced for real-time monitoring to achieve employment quality early warning and rolling policy adjustment.

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