

Development and Validation of an Administrative Characteristics Model of Public Vocational College Administrators in Guangdong Province

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ABSTRACT

The purpose of this study was to develop and validate an Administrative Characteristics Model for public vocational college administrators in Guangdong Province within the context of High Plan and the provincial vocational-education modernisation agenda. A sequential explanatory mixed-methods design was adopted, combining a 500-respondent survey of administrators selected through stratified random sampling with proportional allocation by institutional size from 70 public vocational colleges, with in-depth interviews of nine senior expert administrators drawn from seven colleges across the Pearl River Delta and western Guangdong regions. A 120-item self-report questionnaire was developed based on seven theoretical constructs and refined through expert content validation and a pilot test. Exploratory Factor Analysis using Principal Component Analysis with Varimax retained 91 items based on the following criteria: $h^2 \geq 0.40$, primary loading ≥ 0.50 , and primary-to-secondary margin ≥ 0.10 , and produced a seven-factor solution (KMO = 0.950; Bartlett $\chi^2 = 31,490.296$, $df = 4,095$, $p < 0.001$) that explained 58.89 % of the cumulative variance with a balanced rotated-variance profile from 7.91 % to 8.97 %. The seven factors are Strategic Leadership, Industry-Education Collaboration, Team Development and Support, Policy Implementation and Execution, Resource Planning and Allocation, Coordination and Communication, and Innovation and Continuous Improvement, with internal-consistency reliability estimates from $\alpha = 0.930$ to $\alpha = 0.947$ and an overall scale alpha of 0.970. Three-stage qualitative coding (open, axial, selective) of 63 expert interview segments confirmed the factor content with inter-coder agreement above 85 percent and produced 28 themes organized under

the seven empirical factors. The validated model offers an empirically grounded, provincially situated framework for administrator selection, structured professional development, annual performance review, and policy design in public vocational colleges in Guangdong Province, and provides a transferable methodological template for vocational governance research in other Chinese provinces and applied-education systems beyond the Chinese context.

Keywords: Administrative characteristics, Public vocational colleges, Exploratory factor analysis, Guangdong Province, Mixed-methods research

Introduction

Vocational colleges play a vital role in developing human resources and a skilled workforce capable of supporting economic expansion, industrial growth, and technological advancement in countries around the world. This is particularly evident in the People's Republic of China, where the government has placed significant emphasis on educational reform and workforce development as strategic mechanisms for long-term national development. China's Ministry of Education (MOE) has established policies promoting vocational education as a fundamental pillar of modern economic and industrial development. Guangdong Province, in particular, serves as one of China's major centers for industry, technology, and international trade, playing a critical role in driving the national economy. The province has also become a leading pilot area for the development of special economic zones and digital industries. Consequently, public vocational colleges in Guangdong Province are entrusted with the mission of producing high-quality graduates equipped with professional competencies and practical skills that can effectively respond to the rapidly changing demands of the labor market (Zhao et al., 2021). Therefore, administrators of vocational colleges hold a crucial responsibility in formulating policies, planning institutional management, and improving educational quality in alignment with China's socio-economic development direction in the era of globalization and the digital economy.

The administration of public vocational colleges in Guangdong Province has become increasingly complex since the introduction of the Double-High Plan in 2019 and the provincial agenda for modernizing vocational education through 2035. Administrators in this sector are required to translate multilayered national and provincial policies into practical implementation, coordinate industry–education integration across the Pearl River Delta

industrial corridor and manufacturing–education cities such as Shunde, Foshan, Dongguan, and Zhongshan, develop administrative personnel under increasingly stringent budget constraints and sustain continuous quality improvement amid rapid reform conditions. vocational education leadership has expanded considerably, the empirical structure of administrative characteristics within this specific governance context remains insufficiently defined. International competency frameworks have largely been developed within research-oriented universities and are not fully adapted to the institutional logic of China’s public vocational education system. At the same time, studies in Chinese vocational education have tended to focus more on policy critique and descriptive case analysis than on the development of measurable administrative models. As a result, a significant gap remains between the everyday administrative practices occurring in public vocational colleges in Guangdong Province and the existing theoretical frameworks used to explain, assess, and improve such practices. This study therefore seeks to address this gap by developing and validating a seven-factor Administrative Characteristics Model grounded in the governance realities of public vocational colleges in Guangdong Province and empirically testing the model through self-reported data and expert interviews.

However, despite continuous governmental support in terms of funding, technology, and educational policy, public vocational colleges in Guangdong Province continue to encounter several administrative challenges that affect the efficiency and quality of educational management. These challenges include issues related to institutional leadership, human resource management, faculty development, financial management, and the integration of digital technology into educational management systems. Furthermore, problems persist regarding the misalignment between institutional administration and industrial demands, insufficient collaboration between educational institutions and enterprises, and limitations in strategic management that hinder timely responses to economic and technological transformation (Ling et al., 2021). The rapid expansion of the digital economy and artificial intelligence technologies has also increased the complexity of teaching, learning, and workforce development, requiring educational administrators to possess advanced knowledge, managerial competencies, and visionary leadership in order to modernize educational systems and align them with future labor market demands (Chen, 2023) Ineffective administration may result in declining educational quality, reduced graduate competitiveness, and negative long-term impacts on national economic development.

For these reasons, the study entitled Administrative Characteristics Model of Public Vocational College Administrators in Guangdong Province is of significant importance, as it seeks to identify the existing conditions, obstacles, and factors influencing the effectiveness of institutional administration. The findings are expected to contribute to the development of practical guidelines and strategic measures for enhancing the administrative competencies of vocational college administrators, enabling them to manage educational institutions effectively in response to social, technological, and global economic changes. Moreover, the study may promote stronger collaboration between educational institutions and industrial sectors in curriculum development and instructional management to better satisfy labor market requirements. In addition, the research findings may serve as a valuable reference for the improvement of vocational education policies in China and provide useful insights for other countries seeking to strengthen their vocational education systems in accordance with international standards (Liu and Huang, 2022). Ultimately, improving the administrative effectiveness of vocational college administrators will directly contribute to educational quality, workforce development, national economic competitiveness, and the sustainable establishment of an effective Administrative Characteristics Model of Public Vocational College Administrators in Guangdong Province for the future.

Objectives of study

1. to study the level of administrative characteristics demonstrated by public vocational college administrators in Guangdong Province;
2. to study the constituent exploratory factor analysis of the Administrative Characteristics Model in the context of public vocational colleges in Guangdong Province;
3. to propose the Administrative Characteristics Model for public vocational college administrators in Guangdong Province.

Literature Review

The conceptualisation of administrative characteristics in this study draws on three converging lines of scholarship. The first is the competency-based tradition associated with Boyatzis (1982) ; Spencer and Spencer (1993) which posits that effective administration can be specified as a configuration of observable behavioural capabilities rather than as an undifferentiated personal quality. In this tradition, an administrative competency is a clustered

pattern of knowledge, skills, and behavioural dispositions that distinguishes effective from less effective performance in a given organisational context. Applied to public vocational colleges, this framing supports the treatment of each of the seven theoretical constructs in the present study as a behaviourally anchored competency domain composed of discrete items that administrators can self-report, and that can be aggregated into factor scores for assessment, development, and policy use.

The second stream is the educational and strategic-leadership literature, which has developed theoretical accounts of how institutional leaders set long-term direction, scan environmental contingencies, and translate strategy into administrative routines (Bass and Avolio, 1994; Davies and Davies, 2010). Contemporary educational-leadership research increasingly frames successful institutional leadership in distributed and team-based terms, in which collective capacity-building, staff engagement, and coherent systems for improvement matter more than individual authority alone (Leithwood et al., 2020; Blom and Mifsud, 2026). For vocational institutions specifically, this scholarship implies that administrative effectiveness depends not only on the strategic-leadership capability of senior administrators but also on the team- development, coordination, and continuous- improvement capabilities of administrators across the institutional hierarchy.

The third stream is the Chinese vocational-education governance literature, which highlights the dual accountability of public vocational colleges to provincial policy authorities and to industrial-corridor partners, and which positions industry-education collaboration, policy implementation, and continuous quality improvement as defining administrative competencies in the Chinese context (Zeng, 2024; He et al., 2023). Within this body of work, scholars have argued that the translation of provincial policy mandates, the cultivation of dual-subject governance with enterprise partners, and the institutionalisation of continuous improvement constitute particularly consequential administrative capabilities under the Double-High Plan and the Guangdong vocational-education province strategy (Ling et al., 2021). International vocational education and training scholarship from OECD (2021); Cedefop (2023) and Cedefop (2023) frames these capabilities within wider trends toward competency-based provision, employer engagement, and quality assurance, while resource-governance research documents the increasing demand for administrators to balance fiduciary accountability with strategic- investment judgement under performance- oriented funding regimes (Beerens, 2021). An important point of convergence across these strands is that

administrative effectiveness in Chinese public vocational colleges cannot be adequately characterised by any single construct in isolation: it requires the simultaneous specification of outward-facing strategic and partnership capabilities, internally oriented team-development and coordination capabilities, and system- level policy- execution and continuous-improvement capabilities. Together, these three streams support the a priori specification of the seven theoretical constructs tested empirically in this study and establish the rationale for treating Strategic Leadership, Industry- Education Collaboration, Team Development and Support, Policy Implementation and Execution, Resource Planning and Allocation, Coordination and Communication, and Innovation and Continuous Improvement as separable, theoretically grounded administrative characteristic dimensions. The integration of these three streams is particularly important for the present context because each stream addresses only a partial view of administrative practice: the competency tradition supplies the unit-of-analysis logic, the leadership stream supplies the cross-construct integrative perspective, and the Chinese vocational- governance stream supplies the institutional and political specificity required for a context-sensitive empirical model. Their joint deployment in the design of this study allows the proposed measurement structure to be both theoretically generalisable and empirically calibrated to the governance realities of Guangdong's public vocational sector.



Figure 1 Conceptual Framework of the Study

The conceptual framework illustrates the logical development of the study. Three complementary streams of literature— competency theory, educational leadership, and Chinese vocational-governance scholarship—were integrated to establish the theoretical

foundation of the proposed Administrative Characteristics Model. From this integrated framework, seven theoretical constructs were identified and operationalized into questionnaire items for empirical testing. These constructs were subsequently examined through Exploratory Factor Analysis (Principal Component Analysis with Varimax rotation), while qualitative interviews with expert administrators were employed to corroborate and validate the resulting factor structure.

Methodology

Population

The population of this study consisted of approximately 5,000 full-time administrative personnel serving in the 70 public vocational colleges of Guangdong Province (Guangdong Provincial Department of Education, 2024). The target population was defined to include administrators across the full range of administrative positions and primary functions, from section-level administrators to college-leader-level administrators, covering academic affairs, student affairs, finance, human resources, industry partnership, quality assurance, and general administration.

Sample

The quantitative sample comprised 500 administrators selected through a stratified random sampling method with proportional allocation by institutional size, ensuring representation across colleges of different scales and improving sample balance. A sample size of 500 is considered very good for factor-analytic studies and satisfies conventional sample-size guidelines for instrument development. The qualitative component additionally drew on nine senior expert administrators purposively selected from seven public vocational colleges distributed across the Pearl River Delta and western Guangdong regions, with diversity across institutional type and administrative seniority.

Research Instrument

The research instrument was a 120-item self-report questionnaire consisting of two parts, developed based on the integrated theoretical framework reviewed above and refined through expert review for content validity and a pilot test involving 30 administrators. The first part collected respondents' demographic information across seven variables: gender, age, highest educational qualification, years of service in vocational education, years of administrative service in vocational colleges, current administrative position level, and primary

administrative function. The second part measured the seven a priori constructs of administrative characteristics on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Data Analysis

Descriptive statistics were used, including item-level and instrument-level means and standard deviations, were computed to assess the level of administrative characteristics. Exploratory Factor Analysis using Principal Component Analysis with Varimax rotation was applied to the 91 retained items under the following thresholds communality $h^2 \geq 0.40$, primary loading ≥ 0.50 , and primary-to-secondary margin ≥ 0.10 . Three-stage content analysis comprising open, axial, and selective coding was conducted on the transcripts of the nine expert interviews to corroborate the empirical factor structure and to enrich the behavioural interpretation of each factor.

Summary of Research Results

Sample Adequacy and Sphericity

The 91-item correlation matrix yielded a Kaiser-Meyer-Olkin measure of sampling adequacy of 0.950, well above the 0.80 benchmark conventionally considered indicative of meritorious sampling adequacy, and a significant Bartlett's test of sphericity, $\chi^2(4,095) = 31,490.296$, $p < 0.001$, confirming that the inter-item correlation structure departed sufficiently from an identity matrix to support factor extraction. The detailed KMO and Bartlett's test results are reported in Table 1.

Table 1 KMO and Bartlett's Test of Sphericity values

KMO		0.950
Bartlett's Test of Sphericity	Approx. Chi-Square	31,490.296
	df	4,095
	Sig.	0.000

Note. Bartlett's Test is significant at $p < .001$, supporting factorability.

Level of Administrative Characteristics

Across the 500 respondents the overall mean score was 3.78 with a standard deviation of 0.88, and mean scores across the 91 items ranged from 3.62 to 3.93 with standard

deviations between 0.78 and 0.93. On the Best and Kahn (1986) five-level interpretation scale these values correspond to a high level of administrative characteristics, with the narrow standard-deviation band indicating a high degree of inter-respondent consistency. Together these descriptive findings support the interpretation that administrators across the Guangdong public vocational sector demonstrate a consistently high level of administrative characteristics across all measured dimensions.

Exploratory Factor Analysis

Principal Component Analysis with Varimax rotation extracted seven factors that jointly explained 58.89 % of the cumulative variance, exceeding the commonly recommended 50% threshold conventionally required for factor retention in social-science instrument development. Nine components recorded eigenvalues above 1 under the Kaiser criterion, but Components 8 and 9 contributed only 1.281 % and 1.209 % respectively and were not retained based on theoretical interpretability and the scree plot inflection between Component 7 and Component 8. The rotated variance was distributed evenly across the seven retained factors, ranging from 7.91 % to 8.97 %, indicating a balanced multidimensional structure. The seven factors aligned one-to-one with the seven a priori theoretical constructs. As shown in Table 2, the initial, extraction, and rotation sums of squared loadings for the seven retained components together explain 58.892 % of the total variance.

Factor Composition and Reliability

Factor 1, Strategic Leadership (SLF), consisted of 15 items with primary loadings from 0.642 to 0.781 and Cronbach's $\alpha = 0.930$. Factor 2, Industry-Education Collaboration (IECF), comprised 12 items with loadings from 0.682 to 0.766 and $\alpha = 0.934$. Factor 3, Team Development and Support (TDSF), comprised 12 items with loadings from 0.713 to 0.763 and $\alpha = 0.933$. Factor 4, Policy Implementation and Execution (PIEF), comprised 14 items with loadings from 0.601 to 0.746 and $\alpha = 0.936$. Factor 5, Resource Planning and Allocation (RPAF), comprised 13 items with loadings from 0.656 to 0.738 and $\alpha = 0.943$. Factor 6, Coordination and Communication (CCF), comprised 13 items with loadings from 0.647 to 0.717 and $\alpha = 0.947$. Factor 7, Innovation and Continuous Improvement (ICIF), comprised 12 items with loadings from 0.652 to 0.753 and $\alpha = 0.933$. The overall 91-item scale yielded $\alpha = 0.970$.

Table 2 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% Var	Cum%	Total	% Var	Cum%	Total	% Var	Cum%
1	23.691	26.034	26.034	23.691	26.034	26.034	8.165	8.972	8.972
2	8.820	9.692	35.726	8.820	9.692	35.726	7.812	8.585	17.557
3	6.189	6.801	42.527	6.189	6.801	42.527	7.762	8.529	26.087
4	4.653	5.113	47.640	4.653	5.113	47.640	7.738	8.504	34.590
5	4.013	4.410	52.050	4.013	4.410	52.050	7.461	8.199	42.789
6	3.185	3.500	55.550	3.185	3.500	55.550	7.455	8.192	50.980
7	3.041	3.342	58.892	3.041	3.342	58.892	7.199	7.911	58.892

Note. Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Qualitative Corroboration

Three-stage coding (open, axial, and selective) of 63 expert interview segments drawn from the nine senior administrators produced 28 themes that were conceptually aligned with the seven empirical factors., with inter-coder agreement exceeding 85 percent. Every theme mapped to one of the seven empirical factors and no new construct emerged beyond the seven-factor structure, providing convergent qualitative evidence that the empirical model adequately represents of administrative practice as experienced by senior administrators in the Guangdong public vocational sector.

Discussion

Strategic Direction and External Engagement

This findings indicate that Strategic Leadership emerged as the most influential administrative characteristic (SLF, 8.972 % rotated variance) and Industry-Education Collaboration (IECF, 8.585 %) are the two largest factors confirming that the outward-facing, environmentally oriented dimensions of administrative work are central to effective public vocational college administration. This finding is consistent with the strategic-leadership perspective developed by Davies and Davies (2010) who emphasise long-term direction, environmental scanning, and organisational alignment as defining strategic-leader functions, and it extends that framework by specifying a context-sensitive policy-translation capability

that links provincial mandates such as the Double-High Plan to concrete institutional positioning. The composition of IECF, which integrates strategic partner selection, curriculum co-design, dual-mentor arrangements, and workplace-learning quality assurance into a unitary administrative competency, aligns with international vocational-governance scholarship that frames industry-education partnership as a defining feature of effective vocational institutions (Cedefop, 2023; OECD, 2021) and refines that scholarship with a place-based specification rooted in the Pearl River Delta industrial corridor and the production-education cities of Shunde and Foshan.

Internal Integration and Team Capability

Team Development and Support (TDSF, 8.529 %), Coordination and Communication (CCF, 8.192 %), and Resource Planning and Allocation (RPAF, 8.199 %) together capture the internally oriented and integrative dimensions of administrative practice. The consolidation of training-needs analysis, performance evaluation, role clarification, and mentoring into a single empirical TDSF factor extends the distributed-leadership argument of Leithwood et al. (2020) and resonates with Chinese vocational scholarship that positions team development as a foundation for institutional resilience under reform pressure (Bouwman et al., 2019). The empirical separation of CCF as a unitary 13-item factor with strong inter-item coherence provides empirical support for boundary-spanning and relational-leadership scholarship that frames cross-boundary integration as a core administrative capability in multi-stakeholder governance environments. The empirical separation of resource planning from general management is particularly noteworthy because it refines the higher-education governance literature by demonstrating that, in Chinese public vocational colleges, resource planning constitutes a distinct administrative competency that combines fiduciary responsibility with strategic-investment judgement (Beerens, 2021) rather than a subordinate function of strategic leadership. In a fiscal environment shaped by performance-based provincial allocation and competitive Double-High Plan funding cycles, this distinction has direct implications for how institutional governing bodies should structure administrator role definitions and performance criteria.

Policy Execution and Continuous Improvement

The identification of Policy Implementation and Execution (PIEF, 8.504 %) and Innovation and Continuous Improvement (ICIF, 7.911 %) as standalone factors represents one of the distinctive contributions of this study. By demonstrating that effective policy

execution and diagnostic improvement are empirically separable from strategic leadership and resource management, the model provides empirical evidence supporting the summary and recommendations advanced by Bush (2020) and the vocational-reform scholarship of Zeng (2024), both of which have emphasised the gap between policy promulgation and on-the-ground execution as a critical determinant of institutional effectiveness. The PIEF factor specifies the policy- decomposition, milestone- monitoring, and responsive- adjustment capabilities required to bridge that gap, while the ICIF factor specifies the diagnostic, piloting, scaling, and benchmarking capabilities required to sustain institutional learning over time. The findings indicate that the policy-execution gap is most effectively bridged not by stronger strategic leadership alone but by a specialised competency in policy decomposition and implementation routinisation, and that continuous improvement requires an institutionalised diagnostic capability rather than reactive response to external evaluation.

Implications for the Chinese Public Vocational Context

Together, the seven factors operate as a coherent administrative system: Strategic Leadership frames the priorities that Policy Implementation translates into action; Industry-Education Collaboration extends institutional reach into the Pearl River Delta industrial corridor; Team Development supplies the human capacity to execute; Resource Planning concentrates investment on strategic priorities; Coordination and Communication knits internal and external stakeholders together; and Innovation and Continuous Improvement sustains institutional learning under reform conditions. This systemic interpretation distinguishes the proposed model from mainstream Western competency frameworks (Boyatzis, 1982), which tend to treat administrative effectiveness as a generalised personal capability rather than as a configured set of context-anchored behaviors, and it offers a Chinese-context complement that preserves the analytical structure of the international scholarship while calibrating each construct to the institutional logic of public vocational governance in Guangdong Province, including centralised policy direction, provincial governance autonomy, industrial-corridor partnership obligations, and the hybrid market-public resource environment within which Guangdong's vocational colleges operate. The seven-factor structure therefore provides both an analytical map of what effective administrative practice looks like in this sector and a diagnostic instrument that institutional governing bodies, provincial education authorities, and individual administrators can use to identify capability strengths and gaps, prioritise targeted development investment, and align administrator selection and appraisal

practices with the empirically validated capability profile that effective public vocational college administration in Guangdong Province actually requires.

Summary and recommendations

This study developed and empirically supported an Administrative Characteristics Model for public vocational college administrators in Guangdong Province through a sequential explanatory mixed-methods design combining a 500-respondent quantitative survey with nine in-depth expert interviews. The empirical evidence supports a seven-factor structure comprising Strategic Leadership, Industry- Education Collaboration, Team Development and Support, Policy Implementation and Execution, Resource Planning and Allocation, Coordination and Communication, and Innovation and Continuous Improvement, with sound psychometric properties (KMO = 0.950; cumulative variance 58.89 %; subscale α from 0.930 to 0.947; overall α = 0.970), balanced rotated variance from 7.91 % to 8.97 %, and closely aligned with the a priori theoretical constructs and the a priori theoretical constructs derived from competency-based, strategic-leadership, and Chinese vocational-governance scholarship. Qualitative corroboration through three-stage coding of 63 expert interview segments confirmed the factor content and produced an integrated thematic matrix of 28 themes that maps one-to-one onto the seven empirical factors.

The validated model offers an empirically grounded and provincially situated framework for administrator selection, structured professional development, annual performance review, and policy design in public vocational colleges in Guangdong Province. At the provincial level, the seven-factor structure can inform administrator qualification standards, calibrate administrator- development funding toward factors where systemic capability gaps are observed, and integrate seven-factor profile information into institutional accreditation review processes alongside existing teaching- quality and student- outcome indicators. At the institutional level, the model supports Plan-Do-Check-Act administrator development cycles in which current capability profiles are assessed against the seven factors, targeted development interventions are delivered, mid-cycle and end-of-cycle re-assessments are conducted, and the institutional administrator- development plan is updated in response to observed capability change. Future research should apply Confirmatory Factor Analysis and Structural Equation Modelling to independent samples drawn from additional Guangdong institutions and from other Chinese provinces in order to test cross- sample invariance

and generalizability, broaden the sampling frame to include private vocational institutions and cross-province comparison cases, and investigate how the seven factors interact with digital transformation, smart-campus governance platforms, and the integration of generative artificial intelligence into public vocational college administration. Several limitations of this study should be acknowledged. The reliance on administrator self-report data introduces potential social-desirability bias that future research should triangulate against supervisor-rated performance data and objective behavioral observation, and the single-province sampling frame, although appropriate for the exploratory phase of model development, limits direct generalization to other provincial vocational systems with different policy and industrial environments.

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