International Business & Economics Studies
ISSN 2640-9852 (Print) ISSN 2640-9860 (Online)
Vol. 8, No. 3, 2026
www.scholink.org/ojs/index.php/ibes

Original Paper

Construction of a Competence Model for Road Transport Dispatchers from the Perspective of the Low-altitude Economy and Analysis of Job Transformation Pathways

Tianrui Zhang[1] & Yang Li[1]

[1] Liaoning Economic Vocational and Technical College, Shenyang, Liaoning, China

Received: June 16, 2025 Accepted: July 21, 2026 Online Published: August 7, 2026

doi:10.22158/ibes.v8n3p281 URL: http://dx.doi.org/10.22158/ibes.v8n3p281

Abstract

With the implementation of the national low-altitude economy strategy and the continuous rollout of pilot programs for integrated air-ground transportation and logistics systems, the operational scope of traditional road transport dispatching positions is expanding into the low-altitude domain. Based on the professional requirements for road transport dispatchers, this paper integrates the SF Express air-ground collaborative freight transportation standards, as well as real-world operational cases from Shenyang Tianxing Passenger Transport Company and the passenger transportation requirements of the Liaoning Provincial Rapid Bus Station, to analyze the changes in job responsibilities brought about by the low-altitude economy. The paper constructs a four-dimensional competency model, examines the practical challenges encountered during the current position transformation process, and proposes optimization pathways for this transition across four dimensions—individual, enterprise, educational institution, and industry—providing valuable references for the cultivation of talent in transportation-related higher vocational programs and the enhancement of professional competencies among practitioners.

Keywords

Low-altitude economy, road transport dispatcher, competency model, land-air coordination, job transformation

1. Introduction

1.1 Research Background

The “Statistical Classification of the Low-altitude Economy and Its Core Industries (Trial)” issued by the National Development and Reform Commission (NDRC Low-altitude [2025] No.1676) has

incorporated low-altitude logistics into the core industry system, thereby driving the transformation and upgrading of traditional road freight dispatch models. The conventional single-vehicle ground dispatch model is gradually being replaced by a ground truck–low-altitude drone collaborative air-ground delivery model, which has already been successfully implemented on a large scale by leading domestic logistics enterprises. As of 2025, SF Express's drone logistics service has launched over 600 operational flight routes, with a cumulative flight volume exceeding 1.1 million flights, establishing an integrated dispatch system that combines trunk-line truck transportation with drone-based end-point delivery. Consequently, freight dispatch roles have shifted from managing only ground vehicles to coordinating integrated air-ground transport capacity, while the operational scenarios and technical requirements for these roles have undergone significant upgrades.

In the passenger transport sector, low-altitude economy policies are similarly driving the transformation of traditional passenger transport dispatch systems. Multiple regions have explicitly supported pilot projects for intercity low-altitude passenger transport and multi-dimensional transportation scenarios, thereby promoting the evolution of traditional ground-based passenger transport toward multi-dimensional travel models. Using local passenger transport enterprises in Liaoning Province as research samples, Shenyang Tianxing Passenger Transport Co., Ltd. primarily operates inter-provincial and inter-city route services as well as customized passenger transport services, utilizing over 170 operational vehicles for daily transport dispatching; meanwhile, the Liaoning Provincial Rapid Bus Station serves as a core regional highway passenger transport hub, undertaking dispatch functions such as regional route scheduling, control of vehicle entry and exit from the station, and passenger flow management. Currently, both entities rely on traditional two-dimensional ground-based transport systems for their dispatch operations; however, with the development of multi-dimensional transportation ecosystems, passenger transport dispatching is gradually evolving toward an industry trend of advancing toward air-ground coordination and multi-dimensional travel dispatching.

According to the *Occupational Classification Dictionary (2022 Edition)*, the traditional scope of work for road transport dispatchers encompasses ground-based transportation management tasks such as vehicle scheduling, transport capacity allocation, operational monitoring, emergency response, and business data statistics. With the continued penetration of new business models within the low-altitude economy—whether in the form of air-ground delivery within the freight sector or the advancement of multi-modal travel in the passenger transport sector—the traditional two-dimensional operational framework of road transport dispatching can no longer meet the evolving demands of the industry; consequently, the operational boundaries of these positions are continuously expanding, gradually extending from a singular ground-based control function to three-dimensional collaborative dispatching scenarios involving both air and ground elements.

1.2 Research Significance

1.2.1 Theoretical Significance

Most existing domestic studies on transportation dispatching positions have focused primarily on ground road traffic or rail transit dispatching; however, few have integrated the analysis of traditional occupational competency evolution with the emerging landscape of the low-altitude economy. Based on the professional requirements of road transport dispatchers, this paper constructs a competency model tailored to land–air coordination scenarios, enriches the theoretical research on cargo logistics and passenger service transportation dispatching roles within the context of new industries, and provides a reference framework for subsequent research on competencies associated with transportation-related positions.

1.2.2 Practical Significance

This study provides a reference framework for low-altitude logistics pilot enterprises regarding job position design, personnel recruitment, and internal training; it also offers valuable insights for traditional road transport enterprises—such as Shenyang Tianxing Passenger Transport Company and Liaoning Provincial Express Bus Station—to transition toward new business models; furthermore, it provides guidance for the curriculum reform of vocational programs in transportation operation management and other related disciplines, clarifies the list of skills required for professional role upgrades, and assists traditional dispatchers in adapting to new land-air collaborative operations; additionally, it holds significant reference value for the industry in refining competency standards for transportation-related professions.

2. The Impact of the Low-altitude Economy on Road Transport Dispatching Positions and Changes in Their Job Responsibilities

2.1 Job Responsibilities of Traditional Road Transport Dispatch Positions

Traditional road transport dispatching positions generally operate within two-dimensional ground-based transportation scenarios, with their operational frameworks centered around the operational management of ground passenger and freight vehicles. Freight dispatching focuses on ground trunk-line trucks and urban distribution vehicles; it utilizes the TMS (Transportation Management System) to monitor GPS-based operational status, adjusts transport capacity based on road conditions and cargo flows, and handles ground emergencies such as traffic congestion or vehicle breakdowns. Passenger transport dispatching centers on scheduled buses and customized passenger vehicles, formulating departure schedules according to scheduled timetables and fluctuations in passenger flow. Taking local enterprises in Liaoning Province as examples, dispatchers at Shenyang Tianxing Passenger Transport Co., Ltd. are primarily responsible for scheduling, dynamic monitoring, and emergency adjustments to road conditions for over 170 operating vehicles; meanwhile, dispatchers at the Liaoning Provincial Rapid Bus Station focus on route coordination, control of vehicle entry and exit from the station, and passenger flow

management—both roles represent typical pure ground-based dispatching models.

2.2 Innovation of Job Work Scenarios in the Low-altitude Economy Context

Following the large-scale implementation of the low-altitude economy, the air-ground collaborative transportation model has broken through the traditional boundaries of ground-based operations, enabling simultaneous iterative upgrades in both freight and passenger transport scheduling scenarios. In the freight sector, SF Express's air-ground collaborative medical supply delivery service in Wuhan employs a scheduling model that prioritizes drones while relying on trucks as backup; this approach has reduced the delivery time for 11 kilometers from 60 minutes via ground transportation to just 10 minutes via aerial means. Scheduling personnel must simultaneously manage both ground trucks and aerial drones, coordinating trajectory monitoring, avoidance of restricted flight zones, adaptation to weather conditions, and the switching between air and ground transportation capacities. In the passenger transport sector, the Shanghai Lingang–Shengsi low-altitude passenger pilot route—a cross-city low-altitude passenger service—has achieved 20-minute cross-sea travel times, driving the transition of traditional ground-based scheduled passenger services toward a multimodal transportation model combining ground buses with low-altitude aviation. Consequently, new tasks have been introduced in passenger transport scheduling, including the integration of low-altitude routes, the coordination of air-ground passenger flows, and the alignment of flight schedules.

2.3 The Specific Impacts and Changes of the Low-altitude Economy on Dispatching Positions

2.3.1 Changes in Dispatchable Resources

Traditional dispatching systems only managed ground passenger and freight vehicles; however, following the industry upgrade, the scope of dispatching has expanded to encompass both ground fleets and the heterogeneous transportation system comprising low-altitude drones and manned aircraft—requiring the coordinated management of these two distinct types of transport carriers, which operate under different rules, meet different timeliness standards, and follow different operational logic, in order to achieve integrated air-ground transportation capacity matching.

2.3.2 Changes in the Risk Management Scope

Traditional risk management frameworks primarily focused on controlling ground-based safety risks such as traffic congestion, vehicle malfunctions, and traffic accidents. Under the air-ground collaborative model, new types of risks have emerged, including compliance with low-altitude airspace regulations, aircraft flight safety, meteorological risks associated with strong winds and rainfall, airspace conflicts, and equipment return-to-home failures; consequently, the dimensions, difficulty levels, and complexity of safety control have increased significantly, rendering traditional ground-based risk management systems employed by passenger transport enterprises inadequate to meet the demands of the new business landscape.

2.3.3 Iterative Evolution of the Operating Tool System

Traditional dispatching relies solely on the TMS (Transportation Management System) and the

GPS monitoring platform. At the current stage, it is necessary to operate in tandem with both the ground transportation management system and the low-altitude flight dispatching platform, integrating multi-source data—including vehicle positioning, aircraft trajectories, equipment battery levels, flight alerts, and airspace control—to enable cross-system information analysis and dispatch decision-making.

Currently, the vast majority of road transport dispatching professionals possess only traditional skills such as ground transportation scheduling, traffic condition management, and vehicle control, yet generally lack professional expertise in areas such as low-altitude airspace management, drone operation regulations, and multi-dimensional transport capacity coordination. When confronted with air-ground mixed transportation scenarios, these professionals often face challenges, including insufficient experience in handling new types of emergencies, weak capabilities for multi-system collaborative operations, and a lack of strategic thinking regarding multi-dimensional transport capacity allocation. Consequently, there exists a significant gap between the traditional competency framework of these roles and the staffing demands arising from the emerging low-altitude economy, making it difficult to align with the development requirements of smart multi-dimensional transportation systems.

3. Development of a Four-Dimensional Competency Model for Road Transport Dispatchers in the Low-Altitude Economy Context

By integrating the original job responsibilities from the Corporate Grand Ceremony, corporate recruitment requirements, the low-altitude air logistics services of SF Express and JD.com, as well as the road passenger transport operations of Shenyang Tianxing Passenger Transport Company, a four-dimensional competency model is constructed.

3.1 Fundamental Competencies for Traditional Road Transport Professionals

Traditional road transport dispatchers are responsible for: road transport capacity planning, transportation plan formulation, TMS system operation, dynamic monitoring of ground vehicles, handling of road traffic accidents, and statistical analysis of transportation business data. This dimension serves as the foundational requirement for entering a dispatching role; it must be mastered regardless of whether low-altitude transportation services are conducted. The current professional competencies of dispatchers at Tianxing Passenger Transport Company and the Liaoning Provincial Rapid Passenger Transport Station are primarily reflected in this dimension.

3.2 Land–Air Collaborative Low-Altitude Services Composite Capability

Low-altitude airspace scenarios require new key capabilities, which also represent the largest segment of the current talent shortage. These capabilities primarily include: identification of basic low-altitude airspace rules; determination of no-fly zones and restricted-fly zones; fundamental UAV operation knowledge; coordination and allocation of air-to-ground transport capacity; and operational coordination at take-off and landing points—enabling the selection of UAVs or ground

vehicles to complete delivery tasks based on order deadlines and meteorological conditions.

Enterprise survey data indicate that more than 70% of HR professionals at transportation enterprises engaged in low-altitude aviation services prioritize this type of composite competency as a key evaluation criterion. For traditional passenger transport enterprises in Liaoning Province, if they subsequently expand into logistics services such as road–drone integrated cargo delivery and emergency supplies transshipment, this competency will become a crucial upgrade direction for their dispatch personnel.

3.3 Capability to Apply Digital Intelligent Tools

Proficient in operating traditional transportation management systems, with expertise in low-temperature monitoring platforms; capable of interpreting aircraft alert information, utilizing the platform to execute mission dispatching and status monitoring; possessing basic data analysis skills to optimize air-to-ground capacity allocation based on historical order data, thereby achieving integrated capacity coordination across all stages—including the main hub, branch hubs, and terminal nodes.

3.4 Dual-scenario Safety Emergency Response Capability

It provides dual emergency response capabilities for both ground transportation and low-altitude flight operations: on one hand, it addresses traditional emergencies such as vehicle malfunctions and road congestion; on the other hand, it can handle anomalies in low-altitude operations—including drone return-to-home maneuvers, sudden meteorological changes, and airspace conflicts—by formulating two separate backup transportation plans for both aerial and ground scenarios, thereby reducing the risk of logistics disruptions.

4. Practical Challenges in the Job Transformation of Road Transport Dispatchers

4.1 There Are Barriers in the Knowledge Structure of Existing Practitioners

Most practitioners in traditional road transport dispatching have received professional training within the road traffic system, with their professional experience concentrated on ground vehicle dispatching, and have not had systematic exposure to general aviation or low-altitude airspace-related matters.

Some interview-based surveys indicate that only approximately 21% of on-duty dispatchers are familiar with basic drone operation rules, and they generally lack the necessary knowledge when handling mixed land–air dispatch tasks. Taking frontline dispatchers at Shenyang Tianxing Passenger Transport Company as an example: while these personnel can proficiently handle road transport issues such as highway closures or vehicle delays, they generally lack knowledge regarding aviation meteorology and airspace management. On one hand, most on-duty dispatchers have no access to continuing education channels for new business models since entering the profession; their daily work primarily revolves around completing traditional order dispatching and monitoring tasks, lacking the intrinsic motivation to actively learn about low-altitude logistics

services. On the other hand, low-altitude logistics involves interdisciplinary knowledge spanning airspace management and aviation meteorology; therefore, professionals in road transportation face certain barriers when acquiring cross-domain knowledge, and it is difficult for them to build a comprehensive knowledge system solely through fragmented online self-study. When enterprises introduce new drone delivery services, existing dispatchers often encounter practical challenges—such as being able to operate the system interface but unable to interpret flight alerts or perform air-to-ground capacity switching.

4.2 Lag between Corporate Job Standards and the Internal Training System

Currently, there is no national occupational standard for unified positions specifically governing land-air collaborative dispatching in China; enterprises engaged in low-altitude airspace operations are still in the industrial pilot phase, and the competency requirements for these positions are largely determined through self-exploration by individual enterprises. Although leading companies such as SF Express have established internal training programs, a large number of small and medium-sized transportation enterprises lack systematic training; they rely solely on experienced employees to provide mentorship and guidance, while lacking standardized learning materials.

From the perspective of the current industry landscape in Liaoning Province, traditional road passenger transport enterprises—such as Liaoning's Auto Rapid Passenger Transport Stations and Tianxing Passenger Transport—still primarily focus their core business on ground-based passenger transport at this stage; they have not yet implemented large-scale low-altitude transportation operations, nor do they offer internal training programs specifically designed for dispatch personnel in low-altitude operations. From the recruitment standpoint, most companies continue to use traditional requirements for road dispatch positions, without explicitly including assessment criteria for low-altitude-related competencies; as a result, it is difficult for these companies to screen candidates with land-air coordination capabilities during the recruitment process. Some small and medium-sized logistics enterprises have launched low-altitude pilot projects under a project-based model; however, they do not establish dedicated land-air coordination dispatch roles, instead assigning relevant tasks to existing dispatch personnel on a part-time basis, while lacking sufficient investment in supporting training resources, which leads to a situation where the pace of employee competency enhancement cannot keep up with the speed of business expansion.

4.3 Lagging Updates to Talent Cultivation Curricula in Higher Vocational Colleges

The core curriculum for the Transportation Operation Management major in higher vocational colleges primarily focuses on road transport organization and station management; however, the vast majority of institutions have not yet introduced teaching modules related to low-altitude logistics or airspace management. As a result, students lack practical training scenarios involving land-air coordination dispatch during their academic tenure, meaning that graduates entering low-altitude logistics enterprises will require additional training upon employment. The underlying reasons for this situation include: the low-altitude economy being an emerging industry, which

entails lengthy cycles for developing supporting teaching resources and practical training equipment; some institutions have fixed update cycles for their teaching syllabi, making it difficult to rapidly integrate new industry developments into existing curricula; and the scarcity of faculty members with dual practical experience in both road transportation and low-altitude logistics, which further hinders the implementation of relevant extended teaching programs. Students typically only learn traditional ground-based dispatch skills during their studies; when they graduate and encounter integrated land-air operations, enterprises must invest significant time and costs in conducting secondary training, thereby increasing the operational burden on these enterprises.

4.4 The Supporting Evaluation System for Emerging Occupations Has not yet been Fully Developed

Traditional road transport dispatchers lack low-altitude-related professional certificates that can be directly obtained through examinations, nor do they possess authoritative evaluation credentials for their competency levels. While some commercial institutions in the market have introduced drone-related training certificates, these certificates exhibit limited alignment with the requirements of transport dispatch positions and cannot directly attest to the comprehensive land-air coordination dispatching capabilities of dispatch personnel. The absence of unified official competency evaluation standards directly makes it difficult for enterprises to objectively assess the low-altitude operational competencies of their employees during recruitment, while employees themselves also lack clear objectives for skill enhancement.

5. Pathways for the Position Transformation and Optimization of Road Transport Dispatchers

5.1 Individual Level of Employees

First, it is essential to strengthen the fundamental competencies of the existing road transport dispatching profession—specifically by solidifying core capabilities such as transport capacity planning, system operation, and ground-based emergency response—since this forms the prerequisite for job transition. For instance, dispatchers currently employed at Tianxing Passenger Transport Company and the Liaoning Provincial Express Bus Station must first consolidate their existing professional expertise in highway transport dispatching.

Second, students should independently study fundamental popular science content on low-altitude logistics—such as understanding drone-based logistics operational models and basic knowledge of airspace management—and proactively follow relevant national policies and documents concerning the low-altitude economy to address gaps in their interdisciplinary knowledge.

Third, actively participate in internal enterprise airspace coordination training sessions to accumulate case-based experience with ground-air hybrid operations; gain familiarity with the various impacts that meteorological conditions and airspace constraints have on delivery tasks during practical missions; and enhance proficiency in emergency response under both dual-scenario scenarios.

Fourth, continue to monitor the follow-up skill assessment policies for the new "Low-Altitude Logistics Specialist" occupation; once the official standards are implemented, strive to obtain the corresponding competency certification and complete the official recognition of your professional competencies. Additionally, you may proactively study industry journals and publicly available business case studies, while continuously tracking the iterative evolution of land-air logistics models.

5.2 Human Resource Management Level

Low-altitude UAV logistics enterprises can summarize their existing practical experience to develop an internal job competency list, decompose the four-dimensional competency model proposed in this article into actionable recruitment and performance evaluation indicators, and incorporate assessments of low-altitude UAV-related competencies during both the recruitment and internal competitive selection processes.

Enhance the internal training system by incorporating airspace knowledge, aircraft monitoring, and land-air emergency response procedures into both pre-employment and continuing education programs for dispatchers; establish two distinct training modules: one for new employees' pre-employment training and another for incumbent employees' competency upgrading training; utilize a real-world operational dispatch simulation system to conduct simulated drills—specifically, exercises simulating scenarios such as airspace conflicts and extreme weather conditions within a virtual environment—to mitigate practical operational risks; and, drawing upon the SF Express model, establish an internal promotion pathway for traditional dispatchers transitioning to land-air collaborative dispatching, clearly defining the competency requirements corresponding to each promotion level to incentivize incumbent dispatchers to proactively acquire skills relevant to new business models.

For traditional ground-based passenger transport enterprises such as Liaoning Province's Automobile Rapid Passenger Transport Stations and Tianxing Passenger Transport Company, although they have not yet expanded their low-altitude airspace operations on a large scale, they can initiate science popularization and awareness campaigns in advance, organize dispatch personnel to participate in industry-wide public lectures on the low-altitude economy, and build a talent pool for future expansions in multimodal transport and air-to-ground emergency supply transfer. Small and medium-sized pilot enterprises may collaborate with industry associations to share training course resources, thereby reducing the costs associated with developing courses independently and avoiding the outdated model of relying solely on oral guidance from experienced employees.

5.3 Talent Development at Vocational and Technical Colleges

For majors such as Transportation Operation Management, building upon the existing Road Transport Dispatching course, it is advisable to moderately incorporate expansion modules on Low-altitude Logistics and Land-Air Collaborative Dispatching. There is no need to establish

entirely new standalone courses; instead, these modules can be integrated into the existing curriculum through formats such as thematic lectures, case studies, and practical training projects. Real-world corporate cases—such as SF Express's air-ground delivery case and Dalian's cherry fruit low-altitude transportation case—can be introduced, along with practical examples from Tianxing Passenger Transport's highway passenger dispatching operations, to enhance classroom instruction by bringing authentic business scenarios of land-air collaborative dispatching directly into the teaching process. Furthermore, institutions should actively engage with low-altitude logistics pilot projects conducted by logistics enterprises, arrange for students to undertake internships in dispatching positions, and establish collaborative education channels between academia and industry to bridge the gap between campus-based teaching and enterprise employment requirements. Professional faculty members are encouraged to participate in corporate practice to accumulate hands-on experience in low-altitude logistics and address the shortage of practical teaching expertise among educators; alternatively, frontline practitioners in land-air collaborative dispatching from enterprises may be invited to serve as external lecturers, thereby supplementing the internal teaching resources.

5.4 Industry Policy Level

Efforts should be made to encourage the industry to clearly define land-air coordination capabilities as an extension of the competencies required for traditional road transport dispatchers, and to clarify the competency transition between traditional occupations and emerging professions. Industry associations should be encouraged to organize public lectures and skill training workshops aimed at incumbent practitioners to promote the dissemination of skills for new business models and to lower the learning threshold for practitioners. Relevant regulatory authorities may guide enterprises, educational institutions, and industry associations to collaborate in jointly developing teaching resources and practical training cases related to land-air coordination dispatching, thereby breaking down information barriers between the industrial sector and the education sector and aligning the talent supply with the development needs of the low-altitude logistics industry. In Liaoning Province, local authorities can leverage the resources of provincial passenger transport enterprises to promote the dissemination of new business model competencies among traditional road transport practitioners.

6. Conclusions and Future Directions

This paper constructs a four-dimensional competency model, identifying four core competency dimensions: traditional professional foundation, low-altitude aviation business integration, digital tools, and dual-scenario emergency response. Current job transition processes face multiple practical challenges, including knowledge barriers among personnel, lagging corporate standards, slow updates to academic curricula at educational institutions, and the fact that the new occupational evaluation system has not yet been fully implemented.

In the future, as low-altitude logistics pilot programs continue to expand, the demand for land-air collaborative dispatch positions is expected to keep rising. Taking Liaoning Province as an example, Dalian and Shenyang have already launched pilot projects related to low-altitude logistics, while traditional transportation enterprises such as the Automobile Rapid Passenger Station in Liaoning Province and Tianxing Passenger Transport Company also possess potential for business transformation. Traditional road transport dispatchers can achieve career advancement by acquiring complementary skills relevant to low-altitude logistics; meanwhile, higher vocational colleges must closely follow industry trends and optimize their talent cultivation programs accordingly.

References

Ge, X. L., & Song, C. B. (2022). Vehicle Routing Optimization Problem Considering External Contract Services. *Operations Research & Management*, *31*(02), 29-35.

Kong, D. J., & Yuan, Z. (2024). Current Status, Experiences, and Prospects of China's Low-altitude Economy Policy and Legal Framework. *Journal of Beihang University (Social Sciences Edition)*, *37*(05), 85-95.

Liu, J., Dou, F., Ning, Y., Zhu, H. T., Zang, S., & Lü, N. (2022). Research on the Comprehensive Evaluation of Competencies of Urban Rail Transit Train Dispatchers. *Modern Urban Rail Transit*, *2022*(11), 61-66.

Liu, W. S., & Yu, Y. Z. (2025). Two-stage collaborative logistics delivery scheduling optimization for heterogeneous drone swarms. *Journal of Changsha University of Science and Technology (Natural Sciences Edition)*, *22*(04), 78-92.

Ministry of Human Resources and Social Security, State Administration for Market Regulation, National Bureau of Statistics. *Chinese Occupational Classification Dictionary (2022 Edition)* [M]. Beijing: China Labor and Social Security Publishing House, 2022.

National Development and Reform Commission. Statistical Classification of the Low-altitude Economy and Its Core Industries (Trial). (2025). NDRC Low-altitude [2025] No.1676, December 22, 2025.

Tang, L. (2025). Land–Air–Space Integrated Transportation: Research Opportunities for the Low-altitude Economy from the Perspective of Road Transportation. *Journal of Transportation Engineering and Information Science*, *23*(03), 1-8.