

Institutional Coordination Readiness as a Precondition for Port-Airport Synergy in Inland China

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Abstract

Port-Airport Synergy (PAS) has been widely recognized as a key mechanism for enhancing multi-modal connectivity and supporting regional logistics integration. However, despite increasing policy attention, PAS remains underdeveloped in inland non-provincial capital logistics hub cities in China. Existing studies have predominantly focused on infrastructure development and performance outcomes, while overlooking the institutional conditions required for cross-modal coordination. This study addresses this gap by introducing the concept of Institutional Coordination Readiness (ICR) as a precondition for PAS implementation. Rather than treating PAS as an already realized operational system, this study conceptualizes it as a potential outcome contingent upon underlying institutional arrangements. Drawing on existing literature and contextual evidence from inland China, the study argues that fragmented governance structures, weak inter-agency coordination and inconsistent policy frameworks significantly constrain PAS feasibility. By reframing PAS as a feasibility-oriented problem, this paper develops a conceptual framework linking institutional coordination readiness to PAS implementation feasibility. The findings contribute to the literature by shifting the analytical focus from infrastructure and performance to institutional preconditions, and by providing a theoretical foundation for understanding why PAS often fails to emerge in governance-constrained inland contexts. This study makes two main contributions. First, it introduces Institutional Coordination Readiness (ICR) as a novel analytical construct to assess the preconditions for Port-Airport Synergy. Second, it develops a feasibility-oriented conceptual framework that shifts the focus from infrastructure performance to institutional conditions, offering new insights into PAS development in inland logistics system.

Keywords: Port-Airport Synergy, Institutional Coordination Readiness, Inland Logistics, Multi-modal Integration, Feasibility

Introduction

In recent years, global logistics systems have undergone a structural transition from an “efficiency-oriented” paradigm to a “resilience-oriented” one, where adaptability, risk mitigation and system integration have become increasingly important (Revilla et al., 2024; UNCTAD, 2023). This shift reflects a broader transformation in how logistics performance is conceptualized and evaluated, moving beyond cost efficiency toward system-level coordination (Rodrigue, 2024). Within this evolving landscape, logistics systems are increasingly assessed in terms of their capacity to achieve coordinated multi-modal integration across institutional, technological and spatial dimensions (Coşkun & Erturgut, 2025; Zhang & Huang, 2024).

Against this backdrop, inland logistics hubs, particularly non-provincial capital logistics hub cities, are gaining strategic importance, as they are expected to function as integrated nodes supporting regional supply chain restructuring (UNCTAD, 2023; Li et al., 2023). However, the effectiveness of this transformation is no longer determined solely by infrastructure expansion. Instead, it depends on the extent to which governance frameworks, data systems and policy mechanisms are institutionally coordinated to ensure system integration and operational responsiveness (Zhao & Xie, 2022).

Port-Airport Synergy (PAS) has emerged as a key concept in this context. It refers to a coordinated arrangement between ports and airports aimed at enhancing multi-modal connectivity through the alignment of infrastructure, logistics functions, technical systems and governance mechanisms (De Martino, 2020; Magnan & van der Horst, 2020). Despite its relevance, PAS remains underdeveloped in inland non-provincial capital logistics hub cities in China (Li et al., 2023).

A growing body of evidence suggests that institutional conditions are increasingly more decisive than infrastructure availability in determining PAS feasibility (Haugstetter & Cahoon, 2010; De Martino, 2020; Zhao & Xie, 2022). Fragmented governance structures and weak inter-agency coordination continue to constrain cross-modal integration, indicating that infrastructure investment alone is insufficient to ensure effective port-airport integration (Magnan & van der Horst, 2020; Raimbault & Nicolas, 2019). However, existing research has not sufficiently explained these challenges. Many studies still adopt a node-centric perspective, examining ports and airports as isolated systems while overlooking the institutional mechanisms required for coordination (De Martino, 2020). In addition, empirical research remains concentrated in coastal and provincial capital cities, with inland non-provincial capital logistics hub cities receiving limited attention (Guo & Yu, 2022; Zhang & Li, 2021).

More importantly, current research lacks an analytical perspective that captures the preconditions for PAS implementation. Most studies focus on realized logistics performance rather than on whether institutional conditions are sufficiently prepared to support PAS emergence (Raimbault & Nicolas, 2019). To address these limitations, this study introduces the concept of Institutional Coordination Readiness (ICR). By conceptualizing PAS as a

feasibility-oriented outcome rather than an already realized system, the analytical shifts toward the institutional conditions required for its emergence.

Despite growing attention to multi-modal integration, limited research has systematically examined the institutional preconditions required for PAS implementation, particularly in inland non-provincial capital logistics hub cities. This gap motivates the present study. This study contributes to the literature in three ways. First, it reframes PAS as a feasibility-oriented outcome rather than a realized performance system, shifting the analytical focus toward preconditions. Second, it introduces the concept of Institutional Coordination Readiness (ICR) to capture the extent to which institutional environments are prepared for cross-modal coordination. Third, it develops a conceptual framework linking governance integration, digital interoperability and policy consistency to PAS implementation feasibility, providing a structured basis for future empirical research.

Research Gap and Problem Framing

Despite increasing attention to multi-modal integration, the literature on PAS remains limited in several important respects. First, many studies adopt a node-centric perspective, focusing on ports or airports as independent entities while overlooking the institutional mechanisms required for cross-node coordination (De Martino, 2020; Rodrigue, 2024). As a result, the role of governance structures, inter-agency collaboration and policy alignment in shaping PAS development remains insufficiently theorized (Coşkun & Erturgut, 2025).

Second, existing empirical research is geographically concentrated in coastal regions and major hub cities, where institutional capacity and resource endowments are relatively strong (Zhang & Li, 2021). In contrast, inland non-provincial capital logistics hub cities, characterized by fragmented governance structures and constrained coordination capacity, remain significantly underexplored (Li et al., 2023). This spatial bias limits the applicability of current findings to inland contexts.

Third, current research lacks analytical frameworks capable of systematically assessing whether institutional conditions are sufficiently prepared to support PAS implementation. Most studies evaluate outcomes rather than preconditions, thereby overlooking the institutional factors that determine whether PAS can emerge in the first place (Raimbault & Nicolas, 2019). Taken together, these limitations suggest that PAS should not be treated solely as a performance outcome, but rather as a conditional process dependent on underlying institutional arrangements.

This study addresses this gap by reframing PAS as a feasibility-oriented problem and introducing institutional coordination readiness as a key explanatory construct.

Conceptualizing Institutional Coordination Readiness

Institutional Coordination Readiness (ICR) refers to the extent to which institutional arrangements, governance mechanisms and coordination conditions are prepared to support the initiation of PAS. In contrast to existing approaches that focus on realized logistics performance, this study conceptualizes PAS as a potential outcome whose emergence depends on underlying institutional conditions (De Martino, 2020; Raimbault & Nicolas,

2019). Within this perspective, ICR is not treated as a contextual background factor, but as a construct that directly shapes feasibility.

ICR reflects the degree to which governance structures are aligned, information systems are interoperable and policy frameworks are consistent across organizational and administrative boundaries (Coşkun & Erturgut, 2025). These dimensions are grounded in prior research on institutional coordination and inter-modal integration (Haugstetter & Cahoon, 2010; Magnan & van der Horst, 2020). As such, ICR captures whether the institutional environment is sufficiently prepared to enable coordination among heterogeneous actors involved in port and airport systems.

This perspective helps explain why PAS often fails to emerge in inland non-provincial capital logistics hub cities. Even where infrastructure and policy support exist, insufficient institutional coordination can significantly constrain implementation feasibility (Zhao & Xie, 2022). By focusing on readiness rather than outcomes, this study shifts the analytical emphasis from ex-post performance evaluation to ex-ante feasibility assessment.

PAS as a Feasibility-Oriented Outcome

In this study, PAS is conceptualized as a potential outcome rather than an already realized operational system (Rodrigue, 2024). This perspective differs from conventional approaches that evaluate PAS through performance indicators such as efficiency, throughput or connectivity (Raimbault & Nicolas, 2019). Instead, the focus is placed on whether the necessary institutional conditions are in place to enable PAS to emerge.

The feasibility of PAS implementation depends on the alignment of governance arrangements, coordination mechanisms and stakeholder expectations (Magnan & van der Horst, 2020). Without such alignment, even well-developed infrastructure may fail to support effective integration between ports and airports. This perspective is particularly relevant in inland non-provincial capital logistics hub cities, where governance fragmentation and coordination constraints are more pronounced (Li et al., 2023). It explains why PAS does not emerge automatically, even in the presence of policy support and infrastructure investment. By redefining PAS as a conditional and feasibility-based outcome, this study provides a more appropriate analytical framework for understanding its development in governance-constrained contexts.

Conceptual Framework

Based on the above analysis, this study proposes a conceptual framework linking institutional coordination readiness to PAS implementation feasibility. The framework conceptualizes PAS as a function of institutional readiness rather than as a direct outcome of infrastructure development (De Martino, 2020). Institutional coordination readiness is structured as a multi-dimensional construct reflecting governance alignment, information interoperability and policy consistency (Li et al., 2023).

Within this framework, institutional conditions act as a mediating mechanism between operational foundations and PAS feasibility (Raimbault & Nicolas, 2019). While infrastructure provides the necessary basis for logistics development, it is the level of institutional

coordination readiness that determines whether these resources can be effectively integrated.

More specifically, higher levels of governance integration are expected to facilitate cross-agency coordination and reduce institutional fragmentation, thereby enhancing PAS implementation feasibility. Similarly, greater digital interoperability improves information sharing and operational synchronization across transport nodes, which supports more efficient coordination. In addition, policy consistency across institutional actors reduces regulatory uncertainty and strengthens alignment in implementation processes.

Taken together, these relationships suggest that governance integration, digital interoperability and policy consistency are key determinants of PAS feasibility, providing a structured basis for analyzing PAS development in inland contexts.

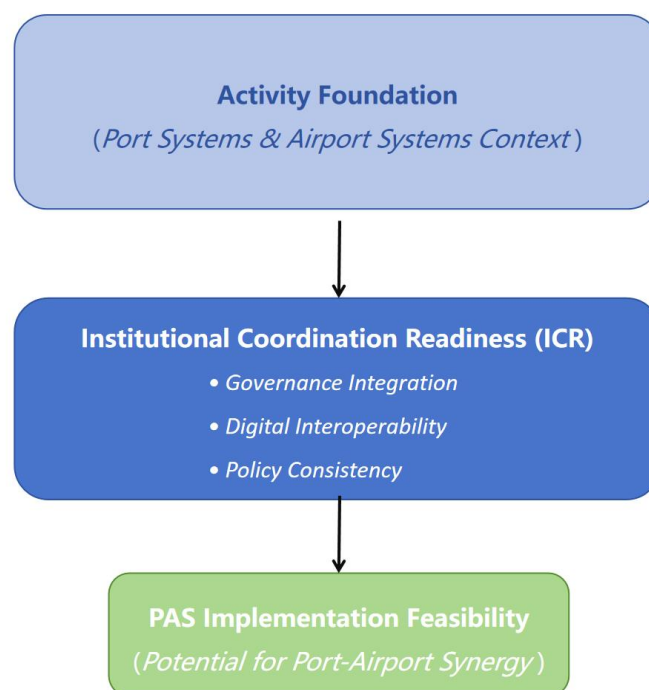


Figure 1 Conceptual Framework Linking Institutional Coordination Readiness to PAS Implementation Feasibility

Conclusion

This study identifies institutional coordination readiness as a key precondition for PAS in inland non-provincial capital logistics hub cities. It highlights critical limitations in existing research, including insufficient attention to institutional factors, spatial bias and the lack of feasibility-oriented analytical frameworks (Li et al., 2023).

By conceptualizing PAS as a feasibility-oriented outcome and positioning institutional coordination readiness as a measurable construct, this study shifts the analytical focus from infrastructure and performance to institutional preconditions (Rodrigue, 2024).

The proposed framework contributes to the literature by offering a theoretically grounded explanation for the limited emergence of PAS in governance-constrained inland contexts. More broadly, this study advances a feasibility-oriented perspective on PAS and establishes institutional coordination readiness as a key determinant of its emergence, thereby providing a foundation for future empirical and policy-oriented research.

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