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Spatial Evolution and Governance Transformation of Cross-Border Regions in Institutional Transition: A Case Study of the Tokyo Bay

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Abstract: In the process of globalization, the transformation of production methods has triggered a restructuring of scales, resulting in the emergence of a new spatial phenomenon known as cross-border regions. Previous studies have focused on the coordination of cross-border regions, often concentrating solely on either spatial or governance aspects, and lacking a comprehensive exploration of the underlying mechanisms linking space and governance. This study examines the evolution of cross-border governance using the Tokyo Bay Area as a case study, taking into account the dual characteristics of space and governance. The findings of this research indicate a certain correlation between spatial evolution and governance mechanisms during different stages of development in the Tokyo Bay Area. Over time, the spatial configuration of the port cluster has undergone significant changes, while the governance mechanisms of the cross-border region have transitioned from informal to formal approaches. Additionally, the study summarizes both diachronic and synchronic characteristics, confirming the effectiveness of the space governance and providing an analysis of its underlying mechanisms. These findings provide valuable insights for promoting the modernization of national governance systems and governance capabilities.

Keywords: cross-border governance; spatial evolution; governance mechanisms; Tokyo Bay Area



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1. Introduction

In the context of globalization, the transformation of production methods has led to a reorganization of scales and the emergence of cross-border regions as a new spatial phenomenon. Previous studies have primarily focused on the coordination challenges within cross-border regions, often overlooking the intricate interplay between space and governance. This study aims to bridge this gap by examining the evolution of cross-border regions through the lens of both space and governance, using the Tokyo Bay Area as a case study. In the initial stages, the governance of the Tokyo Bay Area was characterized by informal arrangements, driven by the needs and interactions of various stakeholders. This informal governance approach allowed flexibility and adaptability in addressing emerging challenges. However, as the cross-border region evolved and matured, the governance mechanisms gradually transitioned towards more formal and structured approaches. The study identifies the diachronic and synchronic characteristics of the Tokyo Bay Area's governance evolution. Diachronically, the governance mechanisms shifted from ad hoc cooperation to the establishment of formal institutions and policy frameworks. The main objective of this paper is to investigate the interconnected evolution of spatial dynamics and governance mechanisms in cross-border regions, using the Tokyo Bay Area as a case study, and to elucidate the underlying mechanisms that shape this relationship, thereby

contributing insights for enhancing national governance systems and capabilities in the context of globalization.

The effectiveness of space governance can be attributed to the collaborative efforts and participatory decision-making processes among the stakeholders. These findings contribute to a deeper understanding of the underlying mechanisms linking spatial evolution and governance transformation in cross-border regions. Moreover, they have broader implications for the modernization of national governance systems and the enhancement of governance capabilities. By recognizing the dynamic interplay between space and governance, policymakers and stakeholders can adopt more holistic and integrated approaches to address the challenges and opportunities presented by cross-border regions in the context of globalization.

“Cross-border governance” is a concept that emerged in the context of globalization and is a geographical extension of “urban governance” [1–4]. Cross-border governance is a political decision-making process in which participants organize themselves through a relational structure, forming a set of principles, rules, etc. [5,6], for implementing the process (deliberation, negotiation, decision-making, etc.), in order to ensure better results. The participants in governance come from different levels of government, business, social teams, etc. In recent years, the main focus of cross-border governance has been on the coordination of urban metropolitan areas, regional governance on a large-scale, reorganization of regional governance on a large scale and cross-border integration and development studies [7–9]. However, studies on the cross-border governance of ports in the Bay Area, which spans multiple administrative units, are relatively rare.

Cross-border governance is mainly focused on co-location studies, large-scale regional governance, scaled reorganization of regional governance and cross-border integration and development studies. In general, the studies focus on regional cooperation and institutional construction in transportation, infrastructure, water basins, etc. [10,11]. However, studies on cross-border governance of ports in the Bay Area that span multiple administrative units are relatively rare. According to Healey et al., the social interaction of governance is a complex and contentious process that takes place through certain organizational forms, which make possible the participation of actors and their interests on different spatial scales. Organizational forms do not automatically guarantee a balanced governance process. Perkman proposes three dimensions of the construct of cross-border governance, namely, consensus building, channel building, and incentives [12,13]. Governance is understood as the “act of governance”, which is a political decision-making process that results in a set of principles and rules distribution. Cross-border governance is a widely studied topic, and plays an important role in local and regional cooperation in the context of European integration [14–16]. Cross-border governance is a complex process that plays an important role in promoting the rational distribution of resources and the economic revival and social prosperity of cross-border regions. As a multidimensional process, cross-border governance cannot be promoted through a single sector; it is a network of cross-border regional cooperation formed under a rational division of labor and collaboration of multi-sectoral functions [17–19]. In cross-border governance, consensus building for development is the foundation, channel building is the key to solving regional governance problems, and incentive mechanisms are the motivating factor for achieving allocation of various resources. The three promote each other in the realization of the flow of logistics and capital in cross-border areas and achieving regional synergistic development. The three are mutually reinforcing in achieving the flow of logistics and capital in cross-border regions and in realizing the synergistic development of the region [20–25].

The existing body of literature has explored various aspects of cross-border regions and their governance, primarily focusing on either spatial dynamics or governance mechanisms. However, a comprehensive examination of the interconnected evolution of these two dimensions and the underlying mechanisms remains conspicuously absent. This study seeks to address this gap by delving into the intricate relationship between spatial dynamics and governance mechanisms within cross-border regions. In the context of globalization,

the transformation of production methods has led to a restructuring of scales, giving rise to a new spatial phenomenon represented by cross-border regions. These regions, characterized by their unique spatial configurations and governance structures, represent a crucial nexus where economic, political, and social forces converge. Understanding the dynamic interplay between spatial arrangements and governance mechanisms in such regions is imperative, as it holds the potential to offer insights that can shape more effective national governance systems in the era of globalization.

To illuminate these dynamics, this paper takes the Tokyo Bay Area as a case study. This region stands as a compelling exemplar due to its prominent status as a cross-border hub. By scrutinizing the evolution of the Tokyo Bay Area's spatial layout and governance mechanisms, we aim to unravel the complex web of interactions that drive the development of cross-border regions. In doing so, this study aims to contribute not only to the theoretical understanding of the space–governance relationship, but also to offer practical insights for enhancing national governance capabilities. In order to lay the groundwork for our analysis, this section also discusses the stylized facts that underpin our research. These key empirical observations provide a foundation for investigating the correlation between spatial evolution and shifts in governance approaches, as we delve into the diachronic and synchronic characteristics of the Tokyo Bay Area's development. By elucidating these stylized facts, we aim to pave the way for a comprehensive exploration of the space governance and its underlying mechanisms.

2. Theoretical Framework

The theory of spatial governance is an essential theoretical framework that emphasizes the necessity of coordination and collaboration among various stakeholders, including governments, corporations, social entities, and citizens. It focuses on governance within and across geographical boundaries. In particular, efficient governance institutions must be established in transboundary areas where the intertwined interests and resources of several nations and regions are necessary to promote cooperation, coordinated development, and long-term prosperity. The analysis and use of cross-border areas provide significant applications for the notion of spatial governance. This theory offers practical guidelines for the establishment of effective governance frameworks within cross-border domains, resulting in wise resource allocation and sustainable progress. It does this by focusing on the multi-tiered strata of governance embedded within and transcending geospatial confines, and accentuating the harmonization and cooperation among vested parties. The discussion that follows elaborates on the significant benefits of applying spatial governance theory to cross-border locations.

In the process of globalization, cross-border regions have emerged as a new spatial phenomenon, involving exchanges, cooperation, and interactions among different countries or regions. Their emergence is primarily driven by the transformation of production methods and the needs of economic development, resulting in a reorganization of scales and the formation of new geographical, economic, and political patterns. Previous research has mainly focused on the coordination issues of cross-border regions, specifically on how to achieve coordination and cooperation among various stakeholders across national borders. These issues typically involve challenges in resource allocation, policy formulation, and planning management within the spatial scope. However, these studies often limit their focus to one aspect of space or governance, lacking a thorough exploration of the underlying mechanisms behind the spatial and governance dynamics. Firstly, from a spatial perspective, the formation of cross-border regions involves factors such as geographical location, transportation networks, and regional economic connections. The geographical proximity and accessibility between different countries or regions provide favorable conditions for the development of cross-border regions. Additionally, the strengthening of regional economic ties, such as the establishment of common markets and the signing of free trade agreements, also promotes the formation of cross-border regions. Secondly, from a governance perspective, the evolution of cross-border regions involves cooperation and

competition among different political entities. The governance mechanisms of cross-border regions typically involve multiple levels and the participation of various stakeholders, including governments, businesses, and social organizations. The effectiveness and degree of cooperation in governance mechanisms play a crucial role in the development and evolution of cross-border regions. At the same time, competition among different political entities can lead to imbalances and conflicts within cross-border regions (Figure 1).

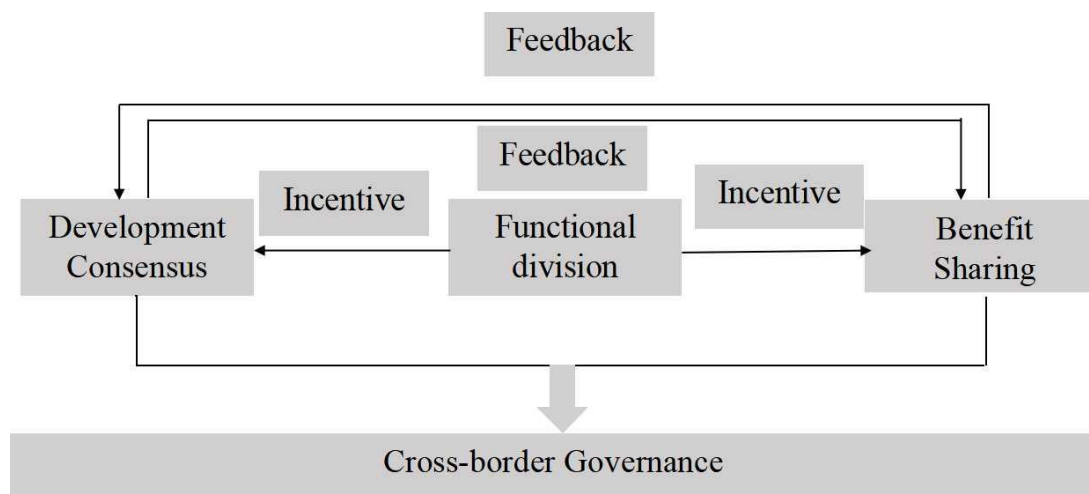


Figure 1. Cross-border governance theoretical framework. Source: authors' own drawing.

3. Research Methodology

The research methodology for this study will be a case study approach, utilizing the Tokyo Bay Metropolitan Area as the specific case for analysis. The study will draw upon various sources of data, including official statistics and reports from government bodies and industry organizations, to analyze the import and export trade flows through the ports in the region. To supplement the qualitative data obtained from the interviews, quantitative analysis techniques will also be employed. This will be utilized to conduct a comprehensive statistical analysis of the trade flows through the ports in the region, focusing on the volumes and types of goods imported and exported. In addition, secondary data sources will be used to support and validate the findings of the study. These may include academic literature, government policies, and official statistical data on trade flows and port management practices.

The quantitative data will be analyzed using statistical analysis to identify patterns and trends in the trade flows and to provide validation for the qualitative findings. Overall, this research methodology aims to provide a detailed understanding of the challenges and opportunities associated with cross-border governance in achieving effective port management in the Tokyo Bay Metropolitan Area. Through the application of qualitative and quantitative analysis techniques, the study seeks to build an evidence-based foundation for policymakers, industry practitioners, and other stakeholders to collaboratively develop and implement more effective cross-border governance strategies in the future.

The scope of this study area is the port of the Tokyo Bay Area (Figure 2). Tokyo Bay is a standard breeding ground for good natural harbors, and its narrow mouth and wide bay make it the best place for ports to gather. From the mouth of the Sumida River at the top of the bay, six major ports have been formed on the west and east coasts, namely, the ports of Tokyo, Kawasaki, Yokohama and Yokosuka on the west coast, and the ports of Chiba and Yokosuka on the east coast. This led to the formation of what would become known as the Keihin and Keiyo industrial zones.

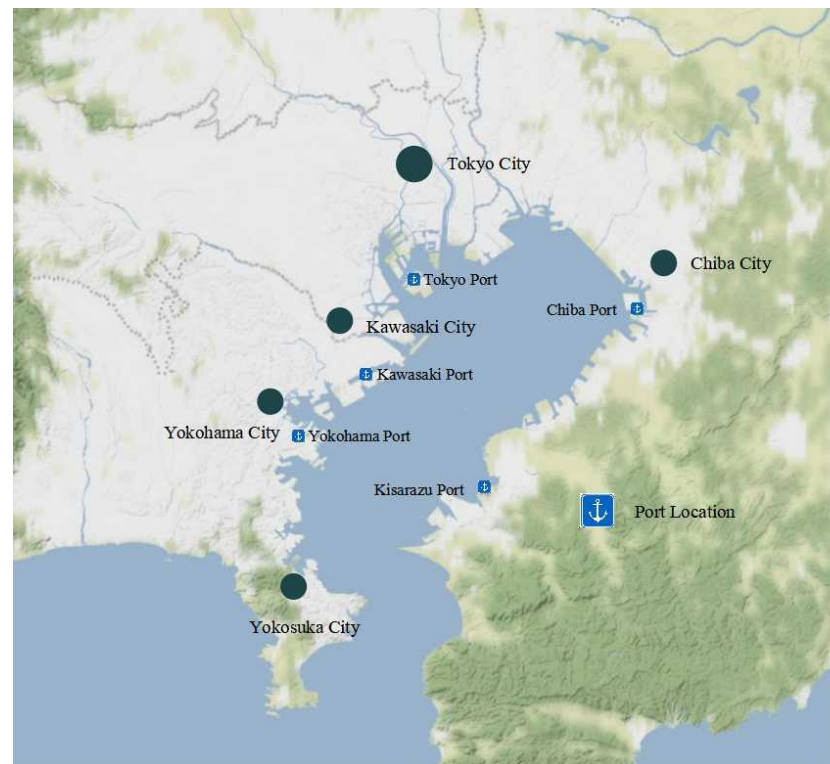


Figure 2. Study area. Source: authors' own drawing. The map is from stamen terrain.

To perform the study, in this paper, we primarily use a documentary analytic method. The governance structure of the ports in the Tokyo Bay Area was sorted and summarized using policy papers, government reports, academic studies, and other sources. Furthermore, data on each port's statistics were gathered, and the data were then evaluated using visualization techniques.

4. Evolution of Spatial Patterns in the Tokyo Bay Port Cluster

4.1. Stage 1: Initial Formation Stage

During the initial formation stage of the Tokyo Bay port cluster, the ports were primarily concentrated in the southern and western regions of Tokyo Bay, including cities like Yokohama, Kawasaki, and Chiba. These ports were initially small in scale and mainly served the local trade demands. The spatial pattern during this stage exhibited a decentralized and limited characteristic.

After the Second World War, industrialization became the main theme of Japan's rapid development, and the two industrial zones of Keihin and Keiyoha, which are the core areas of Japan's industrial zone, developed rapidly in Tokyo Bay. In the 1950s, Japan's rapid economic development led to the rapid expansion and differentiated development of two industrial zones on the west and east coasts of Tokyo Bay: the Keihin Industrial Zone (Tokyo, Kawasaki and Yokohama) on the west coast developed industries such as precision machinery, publishing, printing and auto parts, while the Keiyo Industrial Zone (eight cities in Chiba Prefecture) on the east coast engaged in power generation, petrochemicals, oil, shipbuilding, modern logistics, shipping and steel. The two industrial zones combined with Tokyo's resources and functions in the areas of finance, research and development, and corporate headquarters have made Tokyo Bay a major advanced manufacturing center in the world. The Keihin industrial zone is located on the west coast of Tokyo Bay and is the earliest seafront industrial zone in Japan, where the East Asia Oil in Emisui-cho, the Togane Oil in Tsunami, and the JFE steel cluster in Ogishima are located, and the Keiyo industrial zone is distributed in an "L" shape along the east coast of Tokyo Bay [26–29].

The Japanese government attached great importance to the development of ports and raised the development of ports to the strategic level of regional development. In 1951, the Port and Harbor Law was enacted to strengthen the government's role in port development, stipulating that the central government (the Ministry of Transport) would formulate a five-year plan for the nation's ports, determine the number, scale and policy of port development for the entire country, and formulate a long-term plan. In 1967, the "Basic Concept of the Tokyo Bay Port Plan" was proposed to integrate the ports of Tokyo Bay into an organic group with different divisions of labor to form a "wide area port". The Tokyo Bay Port Group has developed a distinctive division of labor in the management of the port group based on its own foundation and characteristics. The development of the port cluster management structure emphasizes the macroeconomic control role of the government and the integration of Tokyo Bay ports to form an orderly and coordinated system of division of labor to promote the development of the Tokyo Bay port area [30–35].

4.2. Stage 2: Functional Differentiation and Optimization Stage

In the stage of functional differentiation and optimization, the spatial pattern of the Tokyo Bay port cluster underwent further evolution. Each port gradually developed specific functions and advantages, leading to a division of labor among the ports. For example, Yokohama Port became an important hub for international trade and shipping, while Chiba Port focused on handling oil and chemical products. This functional differentiation further strengthened the overall competitiveness and status of the Tokyo Bay port cluster.

The sizes of the six major ports in Tokyo Bay are tiered. First of all, in terms of the level of ports recognized by the Japan Ports and Harbors Bureau, the Ports of Tokyo, Yokohama, Chiba and Kawasaki are recognized as ports of specific importance, and the ports of Kisarazu and Yokosuka are recognized as important ports, with the Port of Kisarazu being a local port until 1968, before being recognized as an important port in 1968 [36–38]. The second echelon comprises the Ports of Chiba and Kawasaki, both of which are industrial cities in their hinterlands. Although they are equal to the first echelon in terms of the number of ships and annual throughput, they are far behind the Ports of Tokyo and Yokohama in terms of ship tonnage and, in particular, the value of goods transported. The third echelon consists of Yokosuka Port and Kisarazu Port, which are far behind the other ports in terms of the number of ships, number of ship tonnage, annual throughput and value of transported cargo. In terms of port hinterland, Kisarazu Port is only attached to the Juntsu Steel Plant, and although Yokosuka Port is also attached to the industrial city of Yokosuka, it developed from a military port, and its commercial use is therefore relatively weaker.

This is most evident in the steady decline in the number of incoming vessels and the slowdown in the growth rate of the total tonnage of vessels. The number of incoming ships and the tonnage of the ships declined during this period, as evidenced by the fact that passenger transportation, commercial offices, tourism and leisure functions began to play a role. The study found that the Tokyo Bay port area went through three stages: expansion, containerization, and diversification, and the port area will adjust the functions of the port in accordance with economic development (Figure 3).

The core functions of the six Tokyo Bay ports are closely related to those of their hinterlands: first, in terms of the scale of transportation, the more central the hinterland, the larger the port; second, in terms of the type of core products the type of transportation of the ports is mainly influenced by the core industrial sectors. For example, ports in the Keihin Industrial Zone serve more manufacturing industries such as automobiles and machinery, and ports in the Keiyo Industrial Zone serve more medium chemical industries; third, the mega-cities have a significant impact on ports, and unlike other ports, the Port of Tokyo serves more of the mega-city of Tokyo. As can be seen from the figure, the sources of import and export of goods for the six ports are categorized into four types, namely, import and export, moving in (transporting goods from other regions of Japan to the local area), and moving out (transporting goods from the local area to other regions of Japan). It

can be seen that each of the six ports focuses on a different source of goods transportation, realizing cooperation and division of labor among the ports. (Figure 4).

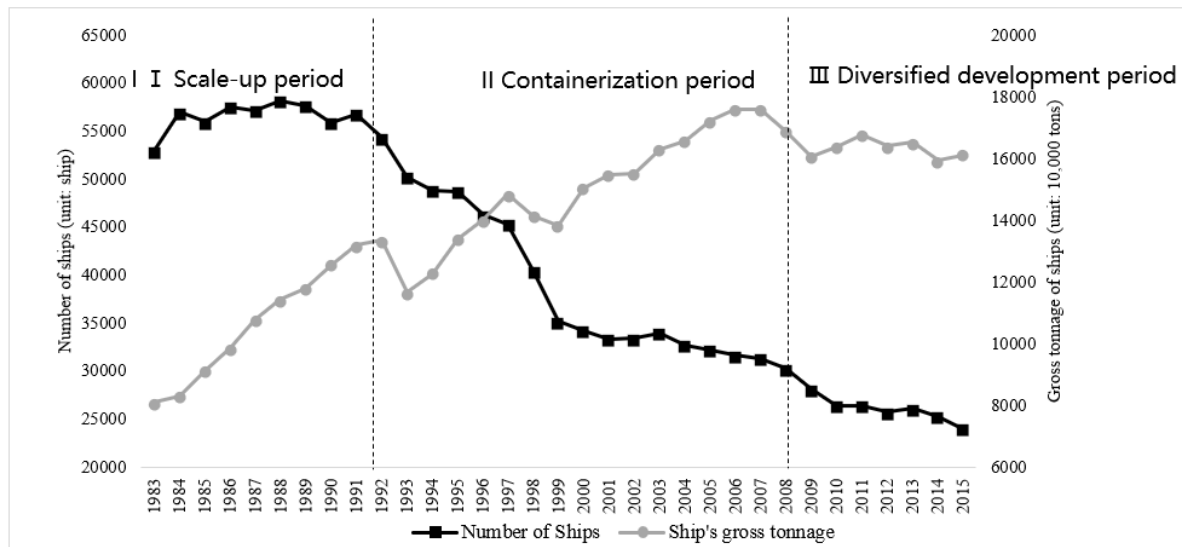


Figure 3. Trend of incoming vessels at Tokyo port Source: authors' own drawing. Data source: Tokyo Metropolitan Port Authority official website (www.kouwan.metro.tokyo.jp) (accessed on 27 May 2017).

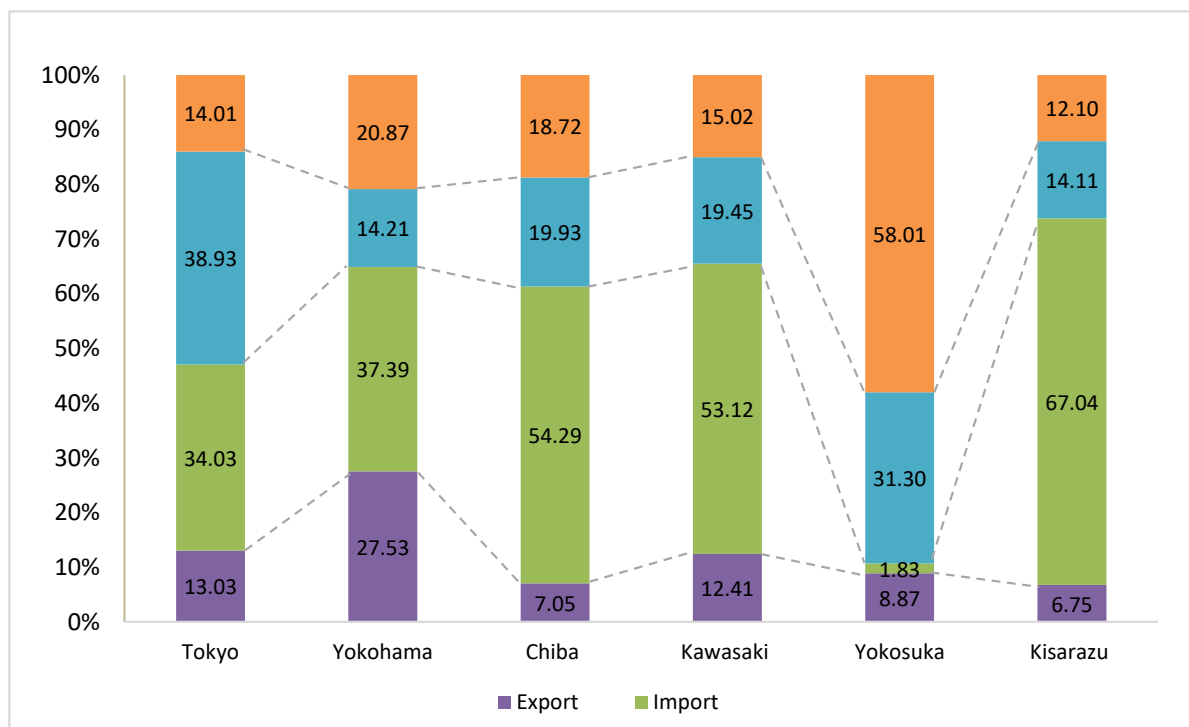


Figure 4. Comparison of the breakdown of the six major port transportation types in Tokyo Bay, 2015 Source: authors' own drawing.(data source: Tokyo Metropolitan Port Bureau official website (www.kouwan.metro.tokyo.jp) (accessed on 27 May 2017), Kawasaki Port Statistical Yearbook (www.city.kawasaki.jp) (accessed on 27 May 2017), Yokohama City Harbor Bureau official website (www.city.yokohama.lg.jp) (accessed on 27 May 2017), the official website of Chiba Prefecture (www.pref.chiba.lg.jp) (accessed on 27 May 2017), Yokosuka City official website (www.city.yokosuka.kanagawa.jp) (accessed on 27 May 2017).

The transport functions of these six ports in fact differ significantly due to factors such as hinterland functions and types of industries. A comparative analysis of the proportion of foreign trade export and import volumes and domestic trade emigration and immigration volumes, as well as the types of cargoes transported by the respective ports, reveals the existence of a clear division of functions among these ports. The macro environment of the hinterland is the fundamental driving force for the transformation of port functions. In the 1980s, the demand for the rapid growth of the macroeconomy and the industrial sector in the Tokyo area prompted the Port of Tokyo to expand its scale and rapidly reclaim land. In the 1990s, influenced by the economic crisis and the rise of the container trend, the Port of Tokyo controlled the expansion scale, on the one hand, and took the containerization route in order to reduce costs on the other. In recent years, in order to meet the needs of the recent expansion of the urban scale of the Tokyo area, multifunctional centers such as the Rinkai sub-center have been developed to achieve further growth of the entire city of Tokyo.

The complementary division of functions promotes the coordinated development of ports. The Tokyo Bay Area, led by the government, the cross-regional Tokyo Bay Area was established, and a joint government agency was set up to handle the planning and management of the port and to formulate port development policies. The coordinated governance mechanism of the multi-entity and multi-port area has been able to realize the division of functions and cooperation of ports.

5. Collaborative Mechanisms of the Tokyo Bay Port Cluster from a Spatial-Governance Perspective

5.1. Setting Up Cross-Regional Port Cluster Management Agencies

In terms of institutional supply, the Tokyo Bay Area emphasizes the macro-regulatory role of the government and builds a port management institution with a clear division of functions through the legal system, thus optimizing the industrial spatial layout of the economic zone of the Bay Area and undertaking an orderly and coordinated division of labor among ports to jointly promote the development pattern of the Tokyo Bay Port Area. The dislocation and synergistic development of ports plays an important role. In the future, the synergistic development of ports in the Greater Bay Area should be promoted in a multi-dimensional and multi-level manner, and a cross-regional, cross-sectoral and multi-level cross-border synergistic mechanism and efficient institutional arrangements should be established [39–45].

5.2. Clarification of the Division of Labor and Functions of the Six Major Ports

The competitive advantages of each port need to be defined in order to achieve differentiated cooperation. First, the scale of the ports and the port functions need to be determined with reference to the scale and industrial types of the hinterland. The scale of specific ports in Tokyo Bay Area needs to be determined according to the scale of the cities and industrial belts, while the functions of ports need to be determined according to the types of leading industries in the cities served. Second, the macro background of the hinterland is an important reference standard for the transformation of port functions. Third, the development of container ports does not apply to multiple ports in the Bay. Among the six world-class ports in Tokyo Bay, only the Port of Tokyo and the Port of Yokohama have primarily created container ports, while the Port of Chiba and the Port of Kawasaki, which form the second echelon in terms of transportation scale, have extremely low container traffic, and the Port of Kawasaki is unsuitable for the development of container terminals due to the shallow depth of the berths. For this reason, in the process of port development in Tokyo Bay Area, it is necessary to combine aspects such as berth water depth, economic development strength and others when weighing the construction of container ports [46–49].

5.3. Interaction between the Port and the Hinterland

The realization of a division of labor in the port cluster promotes the upgrade of industries and supply chains, and together they facilitate the shift to capital and technology in the Greater Bay Area port cluster. With the port cluster as the window of external transportation, the Tokyo Bay Greater Bay Area improves the market network, transportation network and information network, building a multi-level diversified global logistics chain. Coordinating the development functions of different port areas allows the industrial agglomeration and urban agglomeration of the Tokyo Bay Area to produce global effects [50,51].

6. Discussion and Conclusions

This study has examined the evolution of cross-border regions from a dual perspective of space and governance, with a specific focus on the Tokyo Bay Area. By integrating spatial dynamics and governance mechanisms, the research has shed light on the interplay between these two dimensions and their influence on the evolution of the region. The analysis of the Tokyo Bay Area has revealed several key findings. Firstly, the study highlights the intricate relationship between spatial transformations and governance mechanisms. It is evident that changes in the physical landscape and spatial organization of the region have been closely intertwined with the governance structures and policies implemented over time. The effective coordination between spatial planning and governance has played a crucial role in shaping the development trajectory of the Tokyo Bay Area. Secondly, the research identifies important factors that have influenced the evolution of the Tokyo Bay Area. These include economic dynamics, cultural diversity, and geopolitical considerations. The economic significance of the region, driven by industries such as finance, manufacturing, and trade, has attracted both domestic and international investments, leading to spatial transformations and governance adjustments. Additionally, the cultural diversity and geopolitical importance of the area have also influenced its evolution, with policies and initiatives implemented to foster inclusive growth and address regional disparities. The findings of this study underscore the importance of adopting a holistic approach that integrates spatial and governance perspectives in understanding the evolution of cross-border regions. The space governance analytical framework employed in this research provides a valuable tool for comprehending the complexities inherent in such regions. It emphasizes the need for policymakers and planners to recognize the interdependence between spatial dynamics and governance structures, as well as the significance of effective coordination and collaboration between different stakeholders.

This study delves into the phenomenon of cross-border regions that have emerged due to the globalization-driven transformation of production methods, shedding light on the intricate relationship between spatial dynamics and governance mechanisms. While previous research has often focused solely on either spatial or governance aspects of cross-border regions, this paper addresses the literature gap by comprehensively examining their interconnected evolution. By utilizing the Tokyo Bay Area as a case study, the research demonstrates a correlation between spatial evolution and governance mechanisms across various developmental stages. Notably, the study highlights the transition of governance approaches within the cross-border region from informal to formal methods, aligning with the shifting spatial configuration of the port cluster. Additionally, through diachronic and synchronic analysis, the research underscores the efficacy of the space governance and unveils its underlying mechanisms.

This study examines the phenomenon of cross-border regions that have emerged due to the globalization-driven transformation of production methods, elucidating the intricate relationship between spatial dynamics and governance mechanisms. While previous research has often focused solely on either the spatial or governance aspects of cross-border regions, this paper fills this literature gap by comprehensively investigating their interconnected evolution. From a theoretical perspective, this research holds significant importance in delving deeper into the formation and development of cross-border regions under the

impetus of globalization, as well as understanding the complex interplay between spatial dynamics and governance mechanisms. By uncovering the mutual influence of governance approaches and spatial layouts, this study enriches the relevant theoretical framework, providing a fresh perspective for the study of governance and development in cross-border regions. From a practical standpoint, this research offers valuable guidance to governments, businesses, and other stakeholders involved in the governance and development strategies of cross-border regions. In particular, the exploration of the correlation between shifts in governance approaches and changes in spatial configurations, as highlighted in the study, provides valuable insights for decision-makers in real-world applications. Additionally, for policymakers and practitioners seeking to promote collaboration and sustainable development in cross-border regions, this study offers beneficial practical insights. In summary, this research contributes significantly both theoretically, by enhancing the understanding of cross-border regions' complexities, and practically, by offering valuable guidance for governance and development strategies, thereby aiding in the advancement of cooperation and sustainable development in cross-border regions.

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