AN EMPIRICAL RESEARCH ON THE CHOICE OF INTERNATIONAL MULTIMODEL TRANSPORT ORGANIZATION FORMS – A CASE OF CHINA (CHONGQING) – SINGAPORE STRATEGIC INTERCONNECTION DEMONSTRATION PROJECT

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Introduction

Multimodal transport generally refers to the movement of cargo from origin to destination by several modes of transport but under a single contract or bill of lading and a single carrier during the whole journey. The same transport carrier is responsible for moving the shipment in all legs, in all modes. In simple terms, Multimodal is using various modes of transport but with one transport bill of lading. The key difference between multimodal transport and intermodal transport lies in the contract/ bill of lading and transport carrier responsibility/liability of the movement. In multimodal shipping, there would only be a single company bearing one contract that handles all legs of the journey. This means that the same company is going to responsible for moving your shipment in all legs, in all modes.

Depending on whether the shipment crosses different countries or geopolitical boundaries, multimodal shipping can be categorised into domestic multimodal transport or international multimodal transport. According to the provisions of the United Nations Convention on International Multimodal Transport of Goods, international multimodal shipment generally refers to the carriage of goods by the multimodal transport carriers from the place of takeover of a country to the designated place of delivery in the territory of another country by at least two different modes of transportation in a single international multimodal carriage contract. The effective use of integrating the various subcontractors in the multimodal transport network has the potential of increasing transport efficiency and service quality thus reducing overall transport costs.

The 'China-Singapore (Chongqing) Strategic Interconnection Demonstration Project' (hereinafter refers to as 'China-Singapore Project') is the third intergovernmental cooperation project between China and Singapore. Its goal and focus in logistics are to 'build comprehensive transportation network in the Southwest China region, inland international logistics hubs, and multimodal transport and logistics operations centres in Western China'. Therefore, multimodal transport plays an important role in the international cooperation of the "China-Singapore Project". It facilitates the trade and transport in China's Western region where the "Chongqing-Chengdu economic corridor" is the core. Using multimodal transport, cargo can be transported from Singapore and other ASEAN countries to China's Western region and vice versa. The project is a strategic development of the belt and road initiative, connecting Chongqing with Europe, western China and Southeast Asian countries through multimodal transport modes.

With the development of the China-Singapore logistics project and the Chinese government's focus on multimodal transport, international multimodal transport has achieved considerable growth in Chongqing. Several international multimodal transport lines have been opened since the initiation. These include Chongqing-Qinzhou-Southeast Asia, Chongqing-Ningbo-Northeast Asia that connects Chongqing to Europe and America, and Chongqing-Shenzhen-Europe/America rail-sea intermodal line, Chongqing-Shanghai-Europe/America river-sea intermodal line, Europe-Chongqing-Southeast Asia's rail-road intermodal channel, and finally YUXINOU railway that connects to all the respective intermodal networks.

Literature Review and Research Design

International multimodal transport involves a large group of actors: shipping lines, terminal operating companies, freight forwarders, hinterland transport companies, inland terminal operators, port authorities, etc. Coordination of these players is a key to form an integrated multimodal network. The different parties have to effectively organise themselves to complete the entire international multimodal shipment efficiently. Often, the total cost involved in such multimodal transport shipments includes not only the transaction costs, but also costs of communication and coordination within the organisation. Moreover, the different forms of organising the multimodal transport players will inevitably affect the quality and efficiency of the transport network. Therefore, a study on the possible organisation forms of multimodal transport market is expected to shed light on the appropriate approach of organising the large diverse group actors in the multimodal transport market to minimise organisation cost, improve service efficiency and service quality of the entire multimodal transport chain is a worthwhile research subject.

The term ‘‘transaction cost” is frequently considered to have been coined by Coase, who used it to develop a theoretical framework for predicting when products or services would be derived from market (classical contracting) or by firms (hierarchical coordination) [1]. Based on Coase’s work, Williamson (1985) further delimitated transaction costs in two categories: transaction costs arising from ex ante reasons (drafting, negotiating, and safeguarding agreements between the parties to a transaction) and ex post reasons (maladaptation, haggling, establishment, operational, and bonding costs). Further, transaction cost is characterised by three variables of the transactions: (1) asset specificity, (2) uncertainty surrounding the transactions and (3) frequency of the transactions [2].

Transaction cost economics has been applied in diverse fields to guide the selection of the appropriate corporate governing structure to facilitate the effective coordination of multimodal transport subcontractors that connects international boundaries. L. E. Henesey (2006) pointed out that in analysing the freight transportation systems and multimodal transport corridors, a key component to consider is the transaction cost [3]. Prior research in transaction costs and freight transportation systems includes both qualitative as well as quantitative, in which the measured variable is mostly based on surveys or interviews [4]. When assessing the governance structure of multimodal transport, besides considering transaction costs, production costs and strategic factors should also be considered. The evaluation of transaction costs will help to indicate which governance structure can lead to higher efficiency. Pierre Franc et al (2010) propose that there are three organizational forms of multimodal transport: market transactions, mixed forms, and companies; the mixed forms include two types, namely, long-term contracts and minority equity investments with risk sharing [5].

Prior studies on governance structures of multimodal transportation using transaction cost economics are mostly conceptual, lacking in specific measures of the transaction costs. There is sparse empirical research that make use of the operating multimodal transport subcontractors as the empirical context for the quantifying the empirical variables that might be indicative of the decisions on the appropriate organising form of the multimodal transportation.

This paper fills this gap by developing an analytical hierarchical process (AHP) framework by Saaty, 2008) [7] by decomposing complex and unstructured issue in the multimodal transport network into a set of components organized in a multi-level hierarchical form. The AHP framework is developed based on the earlier field observations and inputs on the local conditions by experienced multimodal practitioners. Based on these earlier inputs, we delimit that there can be four possible forms of organisation in the multimodal transport market. They are organised in the form of ① Own Subsidiary (when an actor invests more than 50% in another actor), ② Minority Investment (when an actor invests less than 50% in another actor), ③ Strategic Partnership in the forms of interfirm alliance and cooperation (e.g. Contracts with risk bearing commitments) and ④ Pure market transaction.

Based on the characteristics of multimodal transport and our review of prior literature, we established a set of corresponding decision criteria for the multi-criteria decision model. Panel of expert representatives from eight international multimodal transport companies and two industrial associations in Chongqing were invited to participate in the questionnaire survey and interviews. A total of 35

questionnaires were distributed, out of which 30 valid responses were achieved that were useful for our subsequent data analyses.

The Organizational Form of Multimodal Transport and Its Decision Factors

H A. Shelanski; P G. Klein (1995) proposed that enterprises have five governance structures: vertical integration, hybrid forms (long-term contracts, complex contracts with reciprocal agreements, contracts providing offsetting specific investments, equity linkages, exclusive transaction contracts), long-term business contracts, informal agreements and franchise contracts [6]. Pierre Franc et al. (2010) proposed that there are three cooperation forms between shipping lines and terminal operating companies in intermodal transport: own subsidiary, contract with risk-bearing commitment, minority investments [5].

A multimodal transport operator can own or operate the mode of transport or choose to arrange for these types of transport by subcontracting. They may also subcontract inland stevedoring, warehouse and other related logistics services. We term these parties whom the multimodal transport operators engage as service providers for related multimodal transport services as subcontractors in this study.

Considering above-mentioned research and based on our earlier field observations of relevant multimodal transport companies in Chongqing, we posit four possible forms of organising multimodal transport:

P1 - Own Subsidiary (when a multimodal transport operator owns more than 50% share of another multimodal transport subcontractor), which forms a vertical integration to multimodal transport subcontractors, is a hierarchical governance structure;

P2 - Minority Investment (when a multimodal transport operator owns less than 50% share of another multimodal transport subcontractor), which is an intermediate form between hierarchy and market;

P3 - Strategic Partnership (e.g., interfirm alliance and interfirm cooperation), an organization in the form of long-term partnership by signing an agreement for strategic cooperation with co-sharing of specific assets such as mutual investment. This is considered as another form of hybrid organisation;

P4 - Pure Market Transaction, an organization form that completely adopts contractual transactions to obtain multimodal services, which is a pure market governance structure.

Decision Criteria for Selecting the Organisation Form of Multimodal Transport

International multimodal transport operation involves activities that involve a large group of actors, including loading/unloading of cargo, different modes of carriages/ shipments, customs declaration and insurance, etc. Therefore, it is pivotal to ensure and maintain good communication and coordination to integrate different actors into one efficient transport network to achieve a speedy completion of the transport task at a reasonable cost.

By the time when this study was carried out, the multimodal transport network in Chongqing has become a relatively mature market. In the operations of multimodal transport, the direct costs involving in the various types of transport services are essentially non-variant. In other words, regardless of the choice of subcontractor that one engages to provide the desired multimodal transport service, the per-tonne-kilometre freight, the handling costs per ton of cargo, every bill of goods declaration and other direct costs are essentially the same.

However, the organizational cost (including transaction cost and interior coordinating costs) and corresponding service quality and efficiency might differ vastly depending on the forms of engagement among the different actors in the multimodal transport chain. In this study, we assumed the direct operations costs involved in the multimodal transport network is non-variant among all the multimodal transport subcontractors. Therefore, the main decision criteria for determining the total cost

and quality of multimodal transport can be summarized by three key determinants/ decision criteria: - *Organizational Cost (B1), Service Efficiency (B2) and Service Quality (B3)*.

Composition of Organizational cost (B1) Criteria

Based on prior research, there can be four forms of multimodal transport. These include vertical integration that result in the formation of own subsidiary, hybrid forms of organising as minority share investors and strategic partnership, and pure contractual arrangements. In this study, we assume the direct transportation cost is non-variant and therefore is excluded in our analysis. We focused on evaluating organisation Costs (including transaction costs and interior coordinating costs) involved in the multimodal transport network that is a key determinant in the multi-criteria decision-making framework for decision on organisation forms.

Transaction costs include the costs of selecting subcontractors and the costs of making an agreement and implementing it. Internal coordinating costs emerge in vertical integration. The various cost components considered in Organisation Cost (B1) are described as follows:

Subcontractor Selection Cost (B11): the costs of collecting subcontractor information and selecting the appropriate multimodal transport subcontractors. They include the costs of bidding, information dissemination, subcontractor's information collection and subcontractor identification.

Administration costs of agreement signing (B12): the cost arising from initiating the contractual agreement among the multimodal transport subcontractors. These activities include contract negotiation, pricing request, drafting of contractual terms and signing the final agreement document.

Contract Implementation Costs (B13): the costs arising from overseeing the proper executing and completion of service tasks in accordance to the agreement. These include the cost of supervision and oversight, cost of mediating any differences, coordinating costs, disputes handling and other litigation costs. These costs mainly arise from specific investments, market uncertainty and the opportunism of the parties to the transaction caused.

Internal Coordination Costs (B14): the internal coordination costs resulting from the vertical integration of the multimodal transport chain. The internal coordination costs are necessary to ensure the proper execution and completion of the required multimodal transport tasks, include the cost of coordinating various internal functional departments, internal supervision, control and internal communication.

Composition of Service Efficiency (B2) Criteria

The efficiency of multimodal transport service will affect the final cost to the customer bears and the overall customer experience. Therefore, all multimodal transport subcontractors attach great importance to providing efficient services. Through preliminary research, the service efficiency of multimodal transport can be measured by the following indicators:

Response speed (B21): speed of the multimodal transport subcontractor handling customer complaints, responding to the requirements from other departments within the organisation, responding to the requirements of the partners in the upstream and downstream, responding and interacting with the relevant government departments.

Adjustment speed (B22): speed of adjusting to the changes in customer demands, delays in cargo, any other unexpected events, and the ability to adjust swiftly to the meet the schedules of the shipping lines or transportation organization.

Information dissemination speed (B23): speed of information transmission among the different operators within the multimodal transportation network when operating the multimodal transport.

Composition of Service Quality (B3) Criteria

Based on prior research, service quality should be an important decision-making criterion for multimodal transport operators. From the customer's point of view, the quality of multimodal transport services is mainly determined by five aspects, namely transport reliability, the convenience of information inquiry, the convenience of compensation, service accuracy and service diversity. Their respective meanings are as follows:

Transportation Reliability (B31): the safety and punctuality of cargo transportation during multimodal transport

Convenience of information inquiry (B32): the ease of cargo information tracking and the convenience of inquiring the information involved in document delivery, customs clearance, and export tax rebates.

Convenience of compensation (B33): the support and assistance rendered to facilitate customers' claim to be processed when the goods are damaged. This helps the customers to quickly verify any loss and provide relevant evidence and information to facilitate customers to get fast and convenient claims services.

Service Accuracy (B34): the accuracy of information transmission and the accuracy of generating documents such as orders and bills of lading, etc. necessary in the multimodal transport process.

Service Diversity (B35): the ability of the multimodal transport network to provide a diverse range of value adding services leading to enhanced customer satisfaction. Such value adding services include assistance in payment collections, container loading/unloading, cargo inspection services, etc.

Methodology

The complexity of multi criteria decision-making process is handled by the AHP which is known for handling both qualitative and quantitative data [7]. The use of the AHP method is useful for this research as the number of relevant companies that represent the overall landscape of the multimodal transport market in Chongqing are not many at the time when this study is carried out. Moreover, AHP allows us to collect both qualitative and quantitative data for meaningful analysis. The panel of experts who had participated in the survey are authoritative in the respective multimodal transport companies and are well informed of multimodal transport landscape of the China-Singapore Project.

Research hypothesis

We made the following assumptions in developing the Analytical Hierarchical Process (AHP) Framework for the multi-criteria decision making of organisation form of the international multimodal transport network:

Assumption 1: Organizational cost refers only to the communication and coordination costs of the organization of international multimodal transport, including external transaction costs and internal coordination costs, excluding the direct operating costs of completing multimodal transport activities.

Assumption 2: In any organization form, direct transport handling and other operating costs are the same.

Assumption 3: The acquisition and shareholding relationship can be either a multimodal transport operator holding a stake in a subcontractor or a large subcontractor holding a stake in a multimodal transport operator.

Assumption 4: The goods being transported are container goods of relatively high value.

Analytical Hierarchical Process (AHP) Framework

Figure 3.1 shows the Analytical Hierarchical Process (AHP) Framework for the decision-making framework for International multimodal transport organizations.

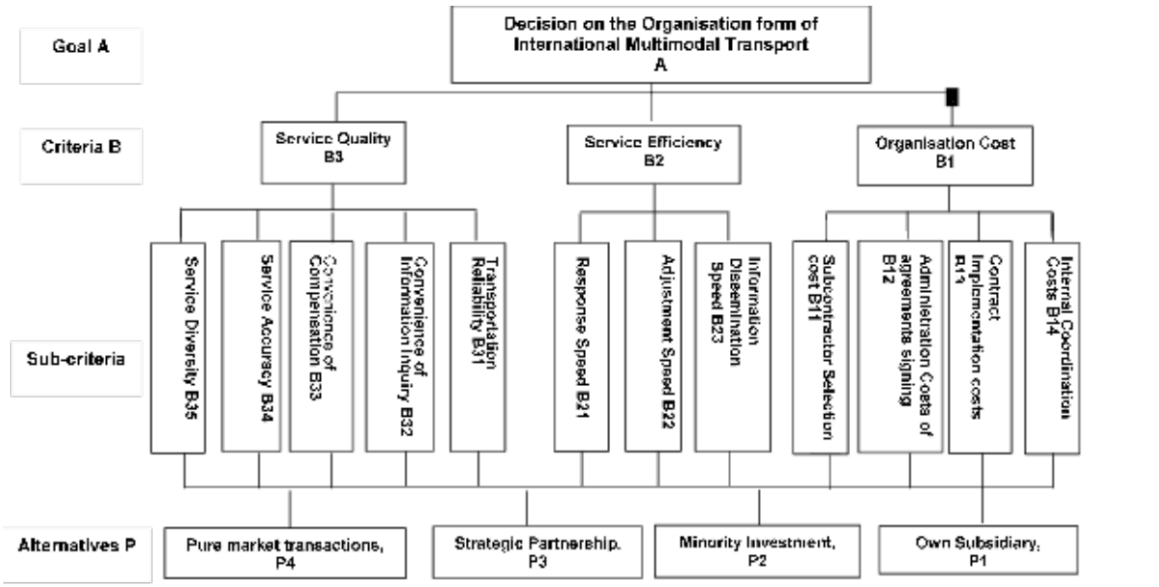

Figure 3.1 Analytical Hierarchy Framework for Decision on the organization form of International Multimodal Transport

Data collection

Experts from eight major international multimodal transport companies and two industry associations in Chongqing were invited to complete the survey questionnaire. In total, 35 copies of questionnaires were distributed, and 30 valid responses were collected. The first author visited the respective companies in person to explain objectives and scope of the study to ensure the validity of the responses.

Data Analysis

AHP data analysis and consistency checks of all the pairwise comparison matrices were carried out using excel spread sheet. Table 3.1 shows the pairwise comparison matrix for the first level decision criteria; B1, B2 and B3.

Table 3.1 Relative Importance of the first level decision criteria with respect to the Goal

A	Priority weight	Principal Eigen value, λmax	Consistency Ratio C.R
B1	0.411	3.054	0.046
B2	0.261		
B3	0.328		

Table 3.1 shows the most important factor influencing the decision on international multimodal transport organization is the organization cost (B1), followed by the service quality (B3) and the service efficiency (B2). Overall, the surveyed experts believe that if the organization costs are high, the corresponding service quality and service efficiency will be affected.

The higher priority weight given to organizational costs is mainly due to the higher transaction costs and internal coordinating costs arising from difficulties in communication and coordination among the multimodal actors when carrying out the required transport or logistics activities to ensure service quality and efficiency in the international multimodal transport network. Table 3.2 shows the pairwise comparison matrix for the Organization Cost Criteria (B1).

Table 3.2 Pairwise comparison matrix of each sub-criteria for Organization Cost Criteria (B1)

B1	Priority weight	Principal Eigen value, λmax	Consistency Ratio C.R
B11	0.238	4.261	0.097
B12	0.280		
B13	0.280		
B14	0.202		

The weights of each factor show no significant difference. The cost factors relating to agreement signing and implementation B12 and B13 are weighed slightly higher than the cost of subcontractor selection and internal coordination cost B11 and B14. This is because the multimodal transport market in Chongqing is relatively transparent by the time of this study. Therefore, subcontractor selection is not difficult. In general, the size of most multimodal transport firms in Chongqing is not large so internal coordination costs is not high. In comparison, the costs involved in agreement signing and implementation are relatively more important.

Table 3.3 shows the pairwise comparison matrix for Service Efficiency Criteria (B2). The most important factor affecting the efficiency of international multimodal transport service is response speed (B21), followed by adjustment speed (B22) and information dissemination speed (B23).

Table 3.3 Pairwise comparison matrix of each sub-criteria for Service Efficiency Criteria (B2)

B2	Priority weight	Principal Eigen value, λmax	Consistency Ratio C.R
B21	0.411	3.054	0.046
B22	0.328		
B23	0.261		

The ranking in Table 3.3 corresponds with our field observations. Through our conversations and interviews at site, experts related that the speed of response often determines the overall efficiency of the transport process. In contrast, the speed of adjusting to unexpected events and the speed of information dissemination are weighed lower as the experts consider the probability of unexpected events occurrence as low and they do not see information access as a barrier with the wide reach of internet connectivity.

Table 3.4 shows the pairwise comparison matrix of each sub-criteria under the service quality criteria.

Table 3.4 Pairwise comparison matrix of each sub-criteria for Service Quality Criteria (B3)

B3	Priority weight	Principal Eigen value, λmax	Consistency Ratio C.R
B31	0.262		
B32	0.320		
B33	0.141	5.378	0.086
B34	0.162		
B35	0.115		

The factors relating to the quality of international multimodal transport service are weighted with the convenience of information inquiry (B32) being the highest, followed by transport reliability (B31), while the other sub-criteria B33, B34, B35 are almost equally weighted. This result is slightly contradictory with our observations gathered from the earlier interviews when most experts believe transport reliability should be the most important driver what determines service quality. We reasoned that transport reliability (B31) is scored relatively lower since it is deemed as a basic service guarantee that should be fulfilled by transport subcontractor. In comparison, the convenience of information inquiry (B32) is more important as it is often critical to the customer to understand the status of the shipment within the complex network of connections and transhipment points in the multimodal system.

Among all the sub-criteria that are considered under service quality, the degree of service diversity or the ability to meet the diverse needs of customers is scored lowest. Service diversity is often viewed as additional value-added services that are provided to customer, usually without charge and this sub-criterion is not deemed as a key expectation on the multimodal transport subcontractors yet.

The final stage of our analysis is presented in the synthesized Table 3.5 on the optimal alternative selection for the organisation form of multimodal transport. The alternative with the highest value is, in fact, the most acceptable or optimal alternative. The last procedure of the AHP method application is presented in Table 3.5. All the pairwise comparison and AHP analysis were also checked for consistency by evaluating the consistency ratio. C.R. C.R ≤ 0.10, the calculation of relative criteria importance (weighted priority of alternatives) is considered acceptable by Saaty, 2008 [7].

Table 3.5 Ranking of the Weighted Alternatives with respect to the goal (P)

Alternatives	Weighted Priorities
P1	0.462
P2	0.266
P3	0.169
P4	0.101

As shown in Table 3.5, Alternative 1 (own subsidiary) is weighted highest at 0.462 as the most preferred option in deciding the multimodal transport organisation form in the China (Chongqing)-Singapore Strategic Interconnection Demonstration Project. The most preferred form is one that bears the lowest organizational costs, highest service quality and service efficiency. Alternative 2, organising as minority investment, is weighted the second highest with a score of 0.266. Alternatives 3 and 4, strategic partnership and pure contractual agreement, were weighted at 0.169 and 0.101 respectively.

Results and Discussion

To verify and corroborate the results of our AHP data analysis, we identified two companies that are involved in Chongqing multimodal transport business for in-depth case explanatory analysis. The two case companies are CCI Eurasia Land Bridge Logistics Development Co., Ltd. (CEL) and YUXINOU (Chongqing) Logistics Co., Ltd.

Case Study 1: The CCI Eurasia Land Bridge Logistics Development Co., Ltd. (CEL)

The CCI Eurasia Land Bridge Logistics Development Co., Ltd (hereinafter referred to as CEL) is a mature multimodal transport company in Chongqing. It offers a sea-rail combined transport line operating from Chongqing-Qinzhou-Southeast Asia in the form of a government platform. The company is jointly owned by four large state-owned enterprises - Guangxi Beibu Gulf International Port Group (hereinafter referred to as GBG, accounting for 41% of total shares), Chongqing Railway Port Logistics Development Co., Ltd. (hereinafter referred to as CRPL, accounting for 39% of total shares), Minsheng

Shipping Co., Ltd. (hereinafter referred to as MS, accounting for 10% of total shares), Sinotrans Chongqing Co., Ltd (hereinafter referred to as Sinotrans, accounting for 10% of total shares).

GBG and CRPL who held key monopolistic resources own majority shares and controlling position in the company. At present, CRPL is responsible for the railway transport segment from Chongqing and GBG oversees the port operations. The companies held less monopolistic resource in the maritime segment have no share of CEL. CEL has formed strategic partnership with 15 major global shipping companies by signing contractual agreements for services relating to container shipping and shipping agent. CEL engaged in an entirely market-oriented relationship with customs clearance and cargo handling operations.

Therefore, we postulate that in scenarios when there is a presence of a large international multimodal transport subcontractors with monopolistic power, the multimodal transport operators should engage with shareholding relationships to ensure the stability of the international multimodal transport. Moreover, when monopoly is absolute, there should be a controlling relationship with share between the international multimodal transport subcontractor and the operator. This is somewhat consistent with the results of our earlier AHP analysis. Reflecting our final synthesised results presented in Table 3.5, corresponds partially with the formation of CEL, where the two companies with an absolute monopoly of resources and services (Guangxi Beibu Gulf International Port Group and Chongqing railway crossings Logistics Development Co., Ltd.) both form the majority shareholding relationship in CEL while the other companies that do not have the resource monopoly of resources engage in the form of pure market pure market transactions. For instance, a pure contractual relationship was formed with 15 other shipping companies for activities relating to customs clearance and cargo inspection and handling operations.

Case Study 2: YUXINOU (Chongqing) Logistics Co., Ltd.

YUXINOU (Chongqing) Logistics Co., Ltd., a joint venture between 5 corporations - China Railway International Multimodal Transport Co., Ltd. (10% of total shares), Russian Railways Logistics Co., Ltd. (16.3% of total shares), D.B. Schenker (China) (accounting Shares of 16.3%), Kazakh Transport Services Co., Ltd. (16.3% of shares) and Chongqing Transportation Holdings (Group) Co., Ltd. (41.1% of shares). It mainly engaged in the two-way station-to-station railway freight transportation business along Chongqing and Europe. At the same time, it is expanding the rail and sea combined transport business from the Yangtze River to Shanghai Port.

YUXINOU is established with stakes in the respective monopolistic rail networks in various countries that connects Chongqing to the European Continent. In contrast, in the road transport and water transport segments where the market is traditionally more fragmented with no one monopolistic power, it has chosen to operate under the pure contractual or market transaction form. Therefore, this observation corroborates our AHP synthesised results presented in Table 3.5.

From the above two cases, the results of our AHP analysis are basically effective. Therefore, we postulate that multimodal operators should be cognizant of the degree of monopolistic power and the extent of competitiveness in the respective transport market segments that they are operating in to select the most appropriate mode of association with the other players.

Effects of monopolistic power and market competition on the organization form of international multimodal transport

Based on the survey responses and conversational exchanges with the experts, the multimodal transport operators should treat the organization form with multimodal transport subcontractors in different transport segments differently based on the market conditions.

If the services provided by the subcontractors are irreplaceable (monopoly), higher transaction costs will be incurred. To achieve better service efficiency and service quality, the multimodal transport operators should engage in a closer shareholding relationship. Because the subcontractors owning monopolistic resources often are large companies with substantial fixed assets, the multimodal transport operator integrating resources often has no ability to purchase or control them. Therefore, in such a

scenario, we postulate that the appropriate organization form is to have the large subcontractors owning monopolistic resources control or co-control the multimodal transport operator.
If the services provided by the subcontractors who do not have monopoly resources, the multimodal transport operators should choose the appropriate organizational form depending on their market position. For subcontractors with higher market power, they should form a relationship with minor investment or strategic cooperation to reduce transaction costs in the entire transportation chain and improve service efficiency and service quality. For perfect competition subcontractors with lower market power, multimodal transport operators can consider engaging in the form of pure market transaction.

The impact of Government Participation on international multimodal transport organisation form

The Chinese government has participated actively in the development of multimodal transport network systems that support the China (Chongqing) – Singapore project, which can be viewed as a part of the China's Belt Road Initiative. The main multimodal transport operators involved in this strategic project are essentially multimodal transport platform enterprises formed under the Chinese government's advocacy. As a result, situations relating to anti-holding arise in the multimodal transport market. The subcontractors conversely control the multimodal transport operator. The situation may be different, if there has not been active government participation from the onset and is completely market-oriented. For example, river-sea combined transportation from Chongqing to Shanghai has operating for many years in a relatively competitive market where most of the multimodal transport operators are free to choose the engagement forms with other relevant operators and decide on the right level of cooperation with their strategic partners. In such a market scenario, the advent of anti-holding issues is relatively unlikely.

Conclusion and Future Research

Based on the above analysis, the following conclusions can be drawn:

(1)The multimodal transport operator should treat the transport organization of different transport segments and different subcontractors differently and cannot be generalized.

(2)Monopoly resources and market position have a great influence on the choice of organizational form of international multimodal transport. Multimodal transport operator should be close cooperative relationship with subcontractors who have a monopoly of resources; forming a strategic partnership with subcontractors who have a higher position in the market; and forming a relatively pure market transaction relationship with subcontractors who have a lower position in the market and are full competitive.

(3)Government participation has a greater impact on the choice of organizational form of international multimodal transport.

This research is one of the first that examines the multimodal transport network organisation forms under the China-Singapore Project. However, our research suffered from several limitations, which can be enhanced by future research. First, this research did not consider the market shares and levels of competition among the multimodal transport subcontractors in the empirical context, which results in some difficulties in evaluating the relative importance of each factor. Future studies can include the level of interfirm competition in the market as a variable to enhance the findings we have presented on the multimodal transport network in Chongqing. Second, the impact of governmental participation in the macro environment of the China-Singapore Project may also be considered for future comparative research. Finally, further work can also be explored to understand how the group of diverse multimodal transport subcontractors can effectively coordinate among themselves in the different organizational forms (P1, P2, P3, and P4) to add on the learnings from this study.

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