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# Institutional Coordination of the Multimodal Logistic Transportation Systems at Tanjung Priok Port, Indonesia

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***Abstract*— The improvement of multimodal logistics transportation systems in developed countries has been developing rapidly to reduce transaction costs and increase competitiveness. However, the development of the multimodal logistic transportation system in Indonesia is still relatively slow. This study aims to assess the multimodal transportation institutional coordination of the multimodal logistics transportation system at Tanjung Priok Port. Institutional coordination analysis was assessed from the Transaction Cost Theory and Principal-Agent Theory (PAT) perspectives. Stakeholder Analysis and Q-methodology are chosen as an analysis tool based on the two theories above. Q-Methodology produces a simpler structure of actor perception called actor perception pattern (PP). The perception pattern represents several actors' main perception themes, which would help the analysis focus on the most significant perceptual themes regarding substantial elements of transaction costs. Stakeholder's analysis explains further the results of Q-methodology by mapping the actor, influence, urgency, and importance. This study found that the actor's perception, which is an element of transaction costs, has hampered the coordination in the logistics transport system at Tanjung Priok port due to conflict of interest and adverse selection of informal institutions. This situation becomes more complicated since a specific institution does not yet cover the coordination between actors in multimodal transportation. Therefore, the study suggests establishing the permanent institution as a coordination and management agency to facilitate the strategic concept of relational contracts in the long term, which is expected to expand and deepen institutional coordination.**

***Keywords*— multimodal transportation; coordination; institutional; Tanjung Priok's Port.**

## I. INTRODUCTION

Indonesia's geographical condition, as the largest archipelago in the world and its location between two continents and two oceans dominated by waters, requires a reliable logistics system to support an efficient and reliable distribution system of goods [1]. Recently, it is felt that Indonesia's national logistical system is still far behind when compared to other developed countries, which make price disparities between Java island and outside Java island. The high cost of port services has caused the low competitiveness of exports and imported products with lower prices than domestic products [2]. This statement is supported by the fact that Indonesia faces a high logistics cost of 23.5% of the Gross Domestic Product. Based on data from the Logistics Performance Report [3], the Logistic Performance Index (LPI) has been issued from 160 countries in 2018 based on six indicators, namely: the existence of customs, build infrastructure, international shipments, competencies of logistics, tracking & tracing, and timelines. Although Indonesia's LPI ranking has improved, Indonesia's ranking among ASEAN countries has dropped from rank 4 to rank 5 [3].

Based on empirical experience in many developed countries, one of the development strategies on the transportation system to support the logistics system's efficiency is the development of multimodal transportation, particularly at the vertices of import and export ports [4]. Multimodal transportation described as the transportation of things and goods with different modes of transportation with multi-actor network management and has different market forces in the logistics transportation system [4]–[6]. Multimodal logistics transportation, which has functions related to the development of containerization and aims to improve cargo security, reducing handling costs, standardizing, and accessibility to several modes of transportation [7], is also related to the aspect of sustainability [3].

Infrastructure as the main capital, which influences logistics performance, is very influential on logistics costs. The Indonesian government develops the programs "Pendulum Nusantara" since June 2012 to improve freight movement through Indonesian waters and reduce the cost of logistics ocean freight. The multimodal transportation system, as one of the solutions to improve the performance of the logistics system, requires 4 (four) core components in the development; which are 1) the existence of a transport

system/mode that is more than one type, 2) the existence of a single operator, 3) the availability of a single-document system and 4) the existence of a process of transfer of goods between countries. The development of these four components is a determining factor for the business transformation process's success in the logistics distribution of goods at the port from a segmented system to an integrated business process.

Multimodal logistic transportation implementation needs high-skilled resources and planning. Resources in multimodal logistic transportation management can integrate into management, control, and operation, so the distributions from origin to destination is efficient [8]. The dimension of the development of a multimodal transportation system has become very complicated and time-consuming [9]. In Indonesia, the development of a multimodal transportation system causes several issues. Some of those issues are: 1) the transportation network from the aspect of quantity and quality is not sufficient, so it has not been able to support the integration of the port, transportation, warehousing and hinterland area [10], 2) lack of cross-sectoral coordination and weak enforcement of laws and regulations [11] and 3) lack of high-skilled human resources which is considered still insufficient even to the level of ASEAN [12].

The discussion of multimodal logical transportation's institutional problem should be based on the concept of coordination in the institution because it requires an institutional approach that describes the cross-cutting relationship of multimodal transport [13]. The concept of coordination is used to identify the relationship of coordination as well as constraints and strategies for improvement. In other words, institutional coordination scenarios depend upon top-down approaches while others may happen more through individual bargaining and coordination among the actors [14]. Lack of coordination between actors on multimodal logistics should be full attention [15], because it affects the institutional arrangements.

The problem of logistic transportation coordination at the port can be explained from the perspective of relations between the actors who are involved and the mechanism for achieving agreements (transactions) that can be voluntary (regulation-based), or hybrid (combination between voluntary and regulated). Examples of issues in the voluntary arena is a situation where shippers are free to choose a mode of transportation, where shippers free to choose the agent freight forwarders to take care of the cargo, the shippers can manage their own whole set of delivery of goods, and the shippers pick directly to the Port or dry port for the cargo. Issues that are often encountered in this scheme are that the owners of goods cannot know the container's exact position, and the owners do not know the magnitude of the initial procedure's overall cost transparently.

Meanwhile, the examples of problems in the regulated arena where the actors carry out their duties and functions based on existing regulations and/or regulations are not 24-hour service every day in the management of exports and imports, and the coordination and synchronization of programs between the parties implementing the port activities Indonesia Port Corporation (IPC), Port Management (Adpel), Customs, and Quarantine Agency.

The problems concerning institutional coordination in multimodal logistic transportation at Tanjung Priok are inefficient resource allocation on logistical transportation due to coordination problems due to the absence of multimodal institutions and/or logistical council as a regulator in coordination and integration among actors.

The voluntary-institutional coordination issues in the logistics system management at Tanjung Priok port above can be explained by using the theory of transaction costs (Transaction Cost Theory/TCT). Meanwhile, problems regulated side, which are characterized as procedural following existing regulations (clear, certainty, adverse selection, moral hazard, and contract design) can be explained by the Principal-Agent Theory (PAT).

This study aims to develop institutional coordination problem analysis in multimodal logistics transport at the Tanjung Priok's Port in the perspective of multi-actor's relationship patterns as described above. Through this perspective, it is emphasized to identify the hindering factors of efficient and reliable institutional coordination.

## II. Material And Methods

### A. *Transaction Cost Theory*

Transaction costs are the costs of determining and enforcing contracts and its approach assumes that human behavior is a form of bounded rationality and opportunistic behavior and the transacting parties would share the mutual interest in an efficient manner to increase value production [12]. The foundation to make effective management of transactions needs good governance, which consists of coordination and cooperation [16]. Limited rationality can be interpreted as human limitations in formulating and solving complex problems. Bounded rationality will cause problems when the environment is characterized by a state of uncertainty and complexity [17].

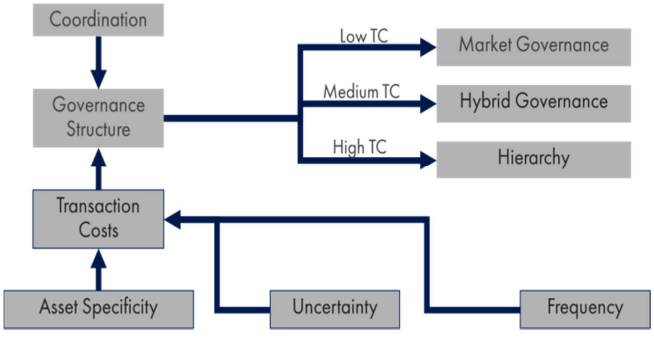


Fig. 1 Coordination Position in the TCT Analysis Framework [18].

These two behaviors assumptions formed to avoid losses, moral hazard, malpractice, and other forms of behaviors. The limited human rationality refers to the level and limits of an individual's ability to process information without errors [17]. As a result, every actor involved in the transaction will always face of incomplete information or uncertain information [19]. In contrast, opportunist behaviors mean as an attempt to gain an advantage through dishonest practices in transactions and appear or may occur

when information is asymmetrical [20]. Three attributes will affect transaction costs are (1) uncertainty, (2) asset specificity, and (3) in frequency. Transaction costs arise due to *ex-ante* reasons (i.e. negotiation, preparation, and security of agreements between parties to transactions) and *ex-post* reasons (i.e., bargaining, maladaptation, operation, formation, and bond costs) [18], and those attributes to a large extent will create transaction costs, due to frequently [21].

### *B. Principal-Agent Theory*

The explanation about Principal-Agent Theory [22] concluded that two actors take important roles: a principal and an agent. Contractual relations connect principals and agents. The Principal assigns certain tasks to other parties. The construct of agency theory is largely from the conceptual realm: it is about the design of contracts that need to minimize agency costs with incentives, monitoring, and policies. Principal-Agent relationship [22] is built on three assumption points, among other things:

- Assumptions that human nature is very selfish, risk aversion and have limitations in determining rational decisions (bounded rationality);
- Assumption of information asymmetry and conflicts between actors within the institution, and
- Assumptions about information as goods or commodities that have value and are traded.

Meanwhile, agency theory focuses on problems of information asymmetry, moral hazards, and adverse selection [23], which is at the foundation of principal-agent problems [24]. In monitoring the agent's performance and determining the structure of incentives and efficient monitoring, the principal must incur costs. In the principal-agent theory, information asymmetry, labor market and the incentive have a crucial role and helped in building the theory of ownership structure [25].

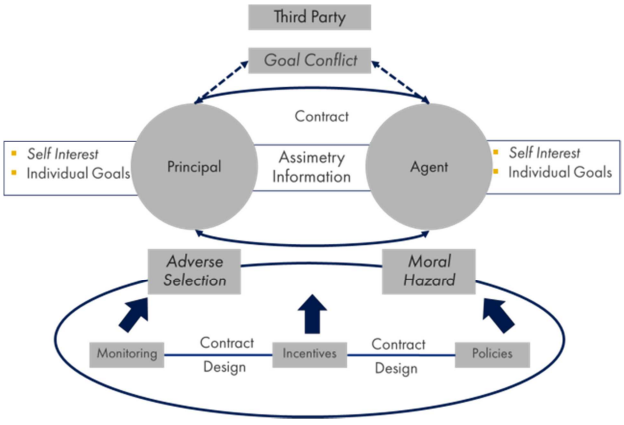


Fig. 2 PAT analysis framework [26]

The principal-agent relationship will be efficient if the expectation of benefits (reward) of both parties is balanced by each sacrificing the transaction cost in connection with making contracts or agreements. We can see that the analysis unit in principal-agent theory is a contract, and this is different from the unit of analysis from TCT. Human assumptions as self-interest/opportunism and rationality are the same constraints as TCT, while risk aversion is an additional assumption in this theory. From here, we can also see the importance of information in the principal-agent relationship, because it be a commodity that is purchased. The principal and agent risk preferences may differ partially, and this might lead to contractual problems of risk-sharing between them [27].

TABLE I
THE FOCUS OF THE THEORY AND DETAILS POINT OF THE TCT-PAT

| Focus | Theory | Details |
|---|---|---|
| The perception of transaction costs and the structure of the problems that occur affects the coordination of the multimodal transportation organization at the Port of Tanjung Priok | TCT | • Multi actor cooperation for multimodal transportation implementation<br>• Costs required for information exchange<br>• Interactor negotiation process<br>• Formulation of regulations governing the sustainability of multimodal transportation agency coordination.<br>• Trust in cooperation between factors in the sector<br>• The role of the coordinating Institution for Multimodal Logistics Transportation<br>• Strict law enforcement and clear regulations |
| The role of actors and governance mechanisms in the process of coordination to multimodal institutions at Tanjung Priok | PAT | • Common problems of multimodal transportation, especially from an institutional view<br>• Barriers to multimodal transportation specific problems of institutional coordination in multimodal transportation<br>• The actor's perception of the implementation of multimodal transportation at the Tanjung Priok's port<br>• Dry port's relations with the Port<br>• Interaction between public and private<br>• The role of multimodal transport special agencies<br>• The role of government and policy |

### *C. Methodology*

Q-Methodology and Stakeholder Analysis are the methods that will be used to empirically examine subjectivities of the structure of actors' perceptions by capturing respondents' perspectives with an exercise [40], which will serve as a framework for in-depth interview-based analysis in this research.

The suitability of TCT (transaction cost theory) and Q-sort technique is based on argument [28] stating that transaction costs must look for perceptions of decision-makers about them and it's limited in the social context. This research sits in the realm of perceptual, so the Q-methodology approach in this study becomes relevant. Research from [29, 30] describes Q-Methodology as a quantitative qualitative mid-ground method.

Transaction Cost Theory analysis of the institutional coordination problems of multimodal transport is related to the extent to which the institution in the arena of Tanjung

Priok's port logistics system plays a role. From here, we need a theoretical foundation that can complete in the role to understand more deeply about the contract in the relationship that occurs and how the contract design should be Principal- Agent Theory (PAT). The relationship between principal- agency and coordination is a higher level of trust will be causing a lower agency cost, and vice versa.

### *D. Data Collection*

The selection of interviewees for the Q-methodology interview and stakeholder analysis was carried out based on purposive sampling. In purposive sampling, the first step is to sort individuals intentionally based on their specialization to make greater confidence in analytical conclusions rather than a sample of certain groups [31]. Moreover, the sampling aims to select individuals representing a systematic variation of the most important actors regarding institutional coordination issues related to multimodal transportation costs. Purposive sampling is a requirement of Q- methodology to ensuring all respondents (*labeled as P*) as "sets of respondents who are theoretically relevant to the problems because it is closer to theoretical or dimensional from random or accidental "[29].

*1) Q-Sort Method:* The respondents in this study represent key actors from institutions involved in a multimodal transport implementation. Their perspective is relevant in the decision-making process related to multimodal transportation at Tanjung Priok. All respondents participated in the semi-structured interview. Although it very few samples for methods involving statistical procedures, the data set remains valid. The Q-sort method is requiring respondents to make sets of statements rank relative to each other. It operated to produce a pattern configuration when the statement was given along the scale of preference a continuum of "strongly agree" until "strongly disagree," as in this example of twenty-one sort.

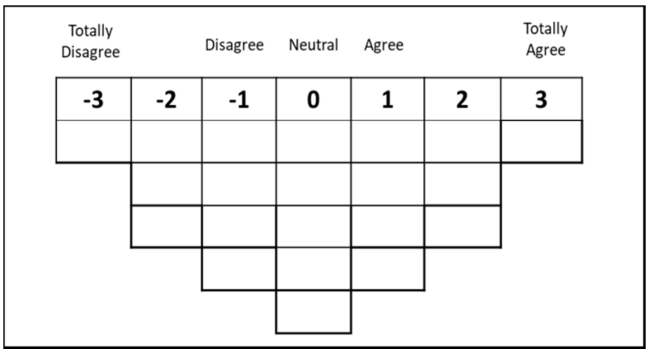


Fig. 3 Q-method pattern configuration

As a first step, the Q-set presented to the respondents in the Q-sample was extracted from the "concourse" which originated from literature reviews, expert opinions, and mass media. In this study, 90 statements were collected, and then 21 statements were chosen, based on their strong correlation to the research questions. Then, the next step is to analyze by making an overall interrelation of Q-sort and significant factors extracted with the factor analysis method. Although operating in statistical methods, Q-sort techniques are "social construction research tools in qualitative traditions" because it aims to identify participants' key perceptions and statements and simpler to be understood with sufficient qualitative details holistically [32].

TABLE II
Q-SET SAMPLING

| Num | Q Set |
|---|---|
| 1 | The problems of multimodal logistics transportation are very complex to be overcome through inter-actor coordination. |
| 2 | Special institutions that have strong authority are needed in handling multimodal transportation logistics. |
| 3 | Coordination between actors in the implementation of multimodal logistics transportation at the port is not crucial |
| 4 | Port Operators and Port Authorities in developing their multimodal transportation regulations are quite complete, but they have not run optimally in their implementation. |
| 5 | There are high costs for exchanging information, including information on the profit and loss. |
| 6 | Asymmetry information and the lack of networking related to multimodal transportation, in the delivery of goods, results in high costs. |
| 7 | Lack of shared understanding of the importance of multimodal transportation. |
| 8 | There are high costs of running multimodal transportation. |
| 9 | There is a high cost to establish and develop specialized institutions that manage the coordination of multimodal transport institutional arrangements. |
| 10 | There are high difficulties in implementing regulations that govern the way multimodal transportation. |
| 11 | There are high costs in monitoring the implementation of multimodal transport institutional coordination. |
| 12 | Limited resources owned by the actor will increase transaction costs. |
| 13 | There no level of trust between the actors informing sustainable multimodal transport institutional coordination. |
| 14 | The actor's experience in building trust is not enough to support the coordination of multimodal transport institutions. |
| 15 | The role of the Multimodal Logistics Transportation Institution in developing and supporting the coordination of multimodal transport institutions is less relevant. |
| 16 | In implementing multimodal transport institutional coordination agreements, there is the possibility of neglect of collective agreements by actors |
| 17 | There is no strict law enforcement and clear regulations that make the actors remain consistent with the agreements that have been agreed |
| 18 | There is a conflict of interest regarding the implementation of multimodal transportation causing stagnation in the coordination of multimodal transport institutions. |
| 19 | The flexibility of authority will shift if there are multimodal agreement and coordination |
| 20 | The benefits of multimodal transport institutional coordination are only felt in the long term so that it is not easily agreed by some parties. |
| 21 | The benefits of comprehensive multimodal transport institutional coordination are only felt by some who have a focus in that area |

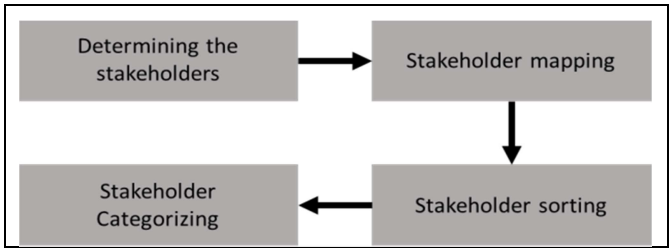


Fig. 4 Step analysis of Q-sort [30, 32]

The number of selected informants is 12, due to until that number can be extracted and explored, there is a saturation

point where the information dug up is a mere repetition of the previous source and there is no deep information that can obtain. The advantage of qualitative sampling is the amount of information acquisition with a variety of diversity, not located in the number of samples. The resource person will be chosen based on consideration of the institution's functions and role in the current logistical system and the potential role of multimodal transport institutions.

TABLE III
LIST RESPONDENTS

| No | Actor Group | Actors Involved | Total |
|---|---|---|---|
| 1 | Government | • Ministry of Transportation<br>• Ministry of Trade | 2 persons |
| 2 | Port Authority | • The Authority's Port of Tanjung Priok<br>• Pelindo (BUMN)<br>• Customs | 3 persons |
| 3 | Third-Party Logistics Provider / 3PL) | • Forwarder/ Warehousing Company<br>• Transporter<br>• Shipping Line (SL) | 3 persons |
| 4 | Association | • Consignee<br>• ALFI | 2 persons |
| 5 | Academic | • Tarumanegara University Specialist | 1 person |
| 6 | MTO Operators | Cikarang Dry Port | 1 person |
| Number of respondents | | | 12 persons (12 Actors) |

*2) Stakeholder Analysis:* The combination of Q-methodology and stakeholder analysis is to complement the perspective of Transaction Cost Theory (TCT) and Principal-Agent Theory (PAT). These methods aim to obtain a deeper understanding regarding the patterns, and roles of the actors in institutional coordination. The stakeholder's analysis technique, given transaction costs [33] suggest using knowledge mapping, matrix relations actor, and analysis stakeholder to examine the relationship among the actors. The stakeholder's analysis has the aim of identifying individuals or groups that are influenced and prioritizing in various fields by an action to be taken [34]. The information used to evaluate the action and the preventive strategies can be taken. A stakeholder is any individual or organization that has a positive or negative impact or those affected by what is done by a company, institution, or government (organization).

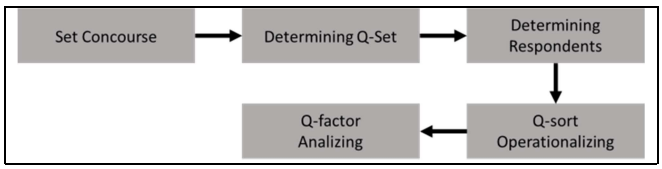


Fig. 5 Step stakeholder analysis [35]

The stakeholder analysis technique is used to analyze the involvement, the role of the actors, the leading stakeholder, and the main causes for the creation of best practice and stakeholder interests [22, 36, 33].

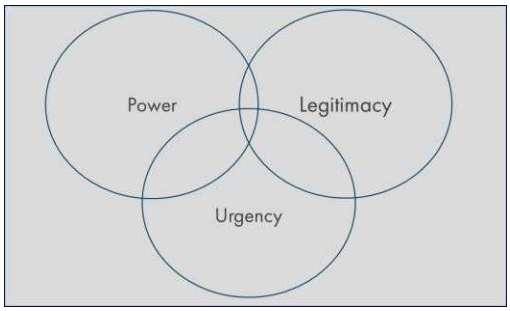


Fig. 6 Stakeholder categorization salience model [37].

## III. RESULTS AND DISCUSSION

### A. Research Findings

Based on Principal Component Analysis (PCA) results, four factors were identified as having eigenvalues of more than 1.00. The four factors identified, or perception patterns (PP), defines for 73% of the total variant of actor perceptions. In this case, there are two different groups, namely government and non-government. The table below explains the respondents who have a significant loading factor in a particular perception pattern (the criteria with a loading factor must be higher than 0.60). A high loading factor in a particular PP means that their respective perception patterns determine each resource person. The four axes are representing four perception patterns (PPs) while each row represents a group of actors, i.e. government and non-government. The longer the node from the center's axis, the loading factor average on the perception pattern for each actor is higher. The calculation results are shown in Fig. 7.

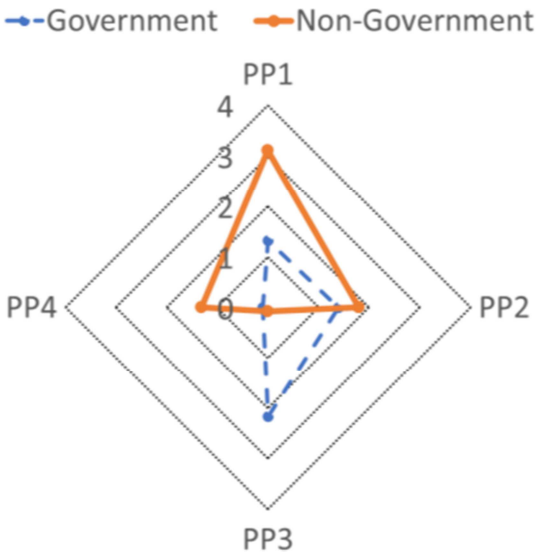


Fig. 7 The average distribution of loading factors per resource group in the Four Patterns of Perception. Source: Analysis Results

Both government and non-government contribute to PP1 and PP3. The Perception Pattern 1 (PP1) contributing is the non-governmental group, while for the Perception Pattern 3

(PP3) which contributes a lot to the government. However, the results are quite different in perception pattern 2 (PP2) and perception pattern (PP4). In both perception patterns, the two groups' loading factor average is very different, looking at the loading factor between the government and non-government groups in PP1 and PP3. This result concludes that the two groups have different interests that cause differences in understanding the multimodal transport institutional coordination's transaction costs.

### *B. The Pattern of Perception Analysis*

This result reflects the perception of actors that their primary perception of the importance of institutional coordination in the management of multimodal logistic transportation. Data processing with Q-methodology produces 5 Perception Pattern (PP) with actors of different on each PP.

TABLE IV
LOADING OF SIGNATURE FACTORS IN EACH OF PP'S

| PP | Actor Category | Loading Factor |
|---|---|---|
| PP1 | Forwarder1 (NP)<br>CDP (NP)<br>Expert 1 (NP) | 0.8313<br>0.8238<br>0.7216 |
| PP2 | Association 1 (NP) R&D<br>Ministry of Transportation (P)<br>Expert 2 (NP) | 0.8168<br>0.7411<br>0.5273 |
| PP3 | Pelindo (P/BUMN)<br>Ministry of Transportation (P)<br>Port's Authority (P) | 0.8654<br>0.7896<br>0.5113 |
| PP4 | Association 2 (NP)<br>Ministry of Trade (P) | 0.8356<br>0.6235 |

*1) PP1: Conflicts of Interest and Inequality of Purpose:* Five significant statements that affect the actor's perceived costs establish a significant first perception pattern (PP). These dominant statements are shown and classified into "Conflict of Interest and Inequality of Purpose". Furthermore, PP1 also contains strong attention to the similarity of objectives between government agencies and across the public-private sector based on the confirmation in statement number 16. Combined with the issue of legal certainty as stated by the respondent that there needs to be a clear legal umbrella, clear coordination, even law enforcement in the field, this increases transaction costs from coordinating multimodal transport institutions. The implementation of the regulation in statement number 4 indicates both aspects of the actors' transaction costs. Legal uncertainty arises from the inability of the current legal and regulatory system to cope with opportunistic behaviors. The Multimode Transport PP has been enacted even though the coordination of actors is not going well. Linked to statements 7 and 16 which are significant, it can be interpreted that the actors see the cost of coordination clashed with a shared understanding of multimodal transportation and still befell their skepticisms about legal guarantees or the neglect of agreements. The general perception of coordination will ultimately depend on shared goals and consistency at the implementation stage since the lack of law enforcement is very prominent will cause transaction costs perceived by the actors.

TABLE V
DOMINANT STATEMENT IN PP1

| No | STATEMENT | Z-SCORES |
|---|---|---|
| 18 | There is a conflict of interest regarding the implementation of transport, causing stagnation in multimodal transport institutions' coordination. | 1.773 |
| 4 | Port Operators and Port Authorities in developing their multimodal transportation regulations are quite complete, but they have not been running optimally in their implementation. | 1.387 |
| 7 | Lack of shared understanding of the importance of multimodal transportation | 1.387 |
| 16 | In terms of implementation of multimodal transportation agreement institutional coordination is a possible waiver agreement by actor | 1.045 |
| 5 | High costs are not required to get information exchange including information on the profit and loss that will be experienced | -1.572 |

*2) PP2: Strengthening Institutions and Application of Regulations:* The second perception (PP2) contains five important statements and is grouped under the theme of "Institutional Strengthening and Application of Regulations". In PP2, disagreement with statement 1 reflects that the resource person indicated that multimodal transportation problems could be overcome through coordination.

TABLE VI
DOMINANT STATEMENT IN PP2

| No | STATEMENT | Z-SCORES |
|---|---|---|
| 18 | There is a conflict of interest regarding the implementation of transport, causing stagnation in multimodal transport institutions' coordination. | 1.658 |
| 5 | Special institutions that have quite strong authority is needed in handling multimodal logistics transportation. | 1.466 |
| 20 | The benefits of long-term multimodal transport institutional coordination are therefore, not easily agreed by some parties. | 1.429 |
| 17 | There is no rule of law which expressly and regulations clear to make actors remain consistent with the agreement has been agreed upon. | 1.081 |
| 1 | The problems of multimodal logistics transportation are very complex to be overcome through inter-actor coordination. | -1.466 |

Based on the suitability of a high Z score, statement 20 "The benefits of multimodal transport institutional coordination over the long term so that some parties do not easily agree on it." especially building PP2. The long-term achievement of multimodal logistical transportation has not been a priority from the government and private actors because they are more interested in doing business with

short-term goals. On the other hand, difficulties, and barriers to finding a general understanding of multimodal logistics transportation's long-term benefits can cause asymmetric information, which causes the increase of transaction coordination costs.

The results from perception pattern 2 (PP2) also suggest the opportunism activities as shown by the high z-score of statement number 17. This issue is very similar to the uncertainty of the long-term commitment to multimodal transportation (shown in statement 20). This issue also reinforced by the absence of law enforcement to ensure long-term commitments between actors.

*3) PP3: Asymmetry About the Benefits of Coordination and There Is No Trust Between Actors.* Five important statements, which stated in the Table, perception pattern 3 (PP3). The five-statements are grouped on "There Is No Interactor Trust and Asymmetry About the Benefits of Coordination". PP3 is very much formed by the affirmation of statements 6, 21, and 13. Perception is strongly influenced by statements number 14 that one group will earn the benefits of comprehensive multimodal logistics transportation while others will receive less profit. This mistrust of mutual benefits can trigger high transaction costs. Furthermore, the lack of benefits where business actors can obtain in certain modes can frustrate the realization of coordination. Besides, the z-score of statement 20 shows that the groups hardly understand the long-term advantages of multimodal logistic transportation.

TABLE VII
DOMINANT STATEMENT IN PP3

| No | STATEMENT | Z-SCORES |
|---|---|---|
| 19 | The flexibility of authority will shift if there are multimodal agreement and coordination | 1.748 |
| 12 | There is an assumption that the actor's limited resources will increase the high transaction costs that need to be spent in carrying out coordination. | 1.406 |
| 14 | The actors' experience in building trust is not enough to support the coordination of multimodal transport institutions. | 1.065 |
| 16 | At the level of implementation of multimodal transport institutional coordination agreements, there is a possibility of neglect of collective agreements by actors | 1.045 |
| 3 | Coordination between factors in the implementation of multimodal logistics transportation at ports is not in the interests of other actors besides the Port Operators, Port Authorities and Logistics Actors | -1.929 |

Furthermore, as destination mismatches continue, conflicts over “how to evaluate the outcomes and impact of multimodal logistic transportation?” can occur and make monitoring costs higher than expected. The significant agreement to statements 19 and 14 shows that actors are aware of the implications of coordination where the authority to develop their sector and create their policies will be disrupted. Negative perceptions of those who must coordinate statement 3 are influential aspects that produce transaction costs that are felt by coordination and subsequently affect.

*4) PP4: Flexibility and Domination of Sectoral Interests and Lack of Coordinating Experience:* In this perception pattern (PP4), there are five important statements as shown in table VIII, which are then grouped on the theme “Domination of Sectoral Interests and Lack of Coordinating Experience”.

TABLE VIII
DOMINANT STATEMENT IN PP4

| No | STATEMENT | Z-SCORES |
|---|---|---|
| 6 | Information asymmetry and the lack of networking related to multimodal transportation in delivering goods results in high costs. | 1.786 |
| 21 | The benefits of comprehensive multimodal transport institutional coordination are only felt by some who have a focus in that area | 1.654 |
| 13 | There is no trust between the actors informing sustainable multimodal transportation institutional coordination. | 1.023 |
| 20 | The benefits of institutional transportation multimodal coordination are only felt in the long term so that some parties do not easily agree it. | 1.023 |
| 11 | There is an assumption about the high cost of monitoring the implementation of multimodal transport institutional coordination. | -1.725 |

The respondents acknowledged that different objectives among actors could make the asymmetric information in coordination, planning and the implementation stages, which ultimately resulted in high transaction costs. Lack of agreement on multimodal transportation destinations can also make the process of negotiation and decision making in coordination more difficult, which in turn can increase negotiation costs. The low motivation level of actors to support the coordination of multimodal transport institutions. Multimodal transportation should be able to reduce logistics costs because MTO acts as a principal that carries transport from shipper to recipient of goods and carries out all activities ranging from transportation to customs which means also using a single tariff, but which is happening now. After all, the tariff is left to the mechanism the market is a tariff war between the transport companies which results in overloading, especially for road modes. This needs to be a concern so that multimodal transportation can be implemented optimally.

### *C. Mapping of Acts or Related to Urgency, Influence, and Interest*

*1) Influence and Urgency Mapping:* The analysis begins by examining the level of support among actors in multimodal transportation and its strengths in the implementation. The actors are grouped based on the influence and the urgency in Multimodal Transportation. The variables are described on a 4-point scale. The lower-left actors on the matrix contain actors who share relatively low urgency and have low influence. The actors in the lower-left are the actors with the low urgency and the potential to make limitation to the implementation of multimodal transportation. The actors have a passive position because they feel do not need multimode transportation logistics, whereas they have a big influence

on it. These actors need to be convinced of the importance of multimodal transportation and the possible benefits they can get from implementing multimodal transportation.

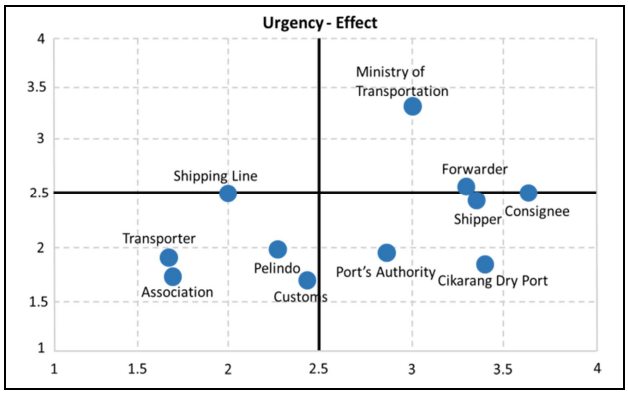


Fig. 8 Urgency and Effect of Actors. Source: Analysis Results

The upper left-hand corner actors are actors who want multimodal transportation coordination to continue and want positive results. But these actors have relatively low direct influence, for example, because they are not the owner of the goods. These actors can be a little more involved in the development of multimodal transportation; they want to contribute to the development of new systems. The actors in the upper right-hand corner, are actors who want multimodal transportation coordination to continue and want positive results. These actors have been identified with high influence and can contribute to the development of the multimodal logistic transportation system and willing to be able to engage another actor.

*2) Mapping Urgency and Interest:* The difference with the previous analysis means that actors can change the implementation of multimodal transportation and means that actors are needed to complete multimodal transportation coordination. The actors in the upper right-hand corner are actors who have an interest in implementing multimodal transportation. This actor needs to invite other actors to get involved in multi-stakeholder involvement. This actor is the driving force for multimodal transport coordination and must be part of an effort to involve other actors in developing a risk-based and system-based approach. The lower-left corner actors have low urgency and interests (i.e., transporters and port authorities). These actors can get involved in specific issues but are not part of the actors in implementation. In contrast, the actors in the lower-right represent actors with urgency but low interests.

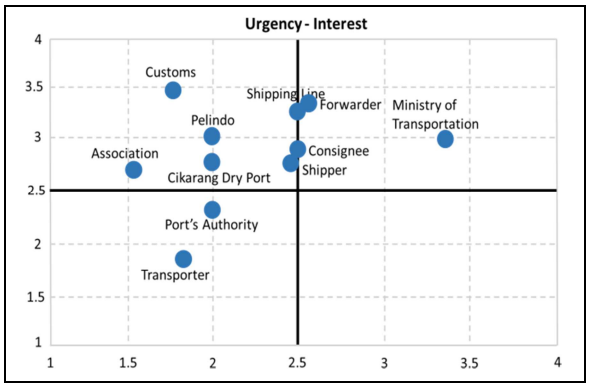


Fig. 9 Urgency and Interest of Actors. Source: Analysis Results

*3) Effects and Interest:* A comparison of influences and interests shows actors who necessary to achieve successful implementation. The actors in the upper right corner are the actors who have the highest influence and importance on the passage of multimodal transportation. Actors who play an important role in multimodal transportation coordination need to be convinced to be able to participate and actors who have high influence need to be involved in the implementation of multimodal logistics transportation. Actors who can be considered movers (actors in the upper right-hand corner) need to involve other actors (quadrants 2, 3, and 4) because they need to reach a consensus on how to implement because they have a large influence and interest in actual results.

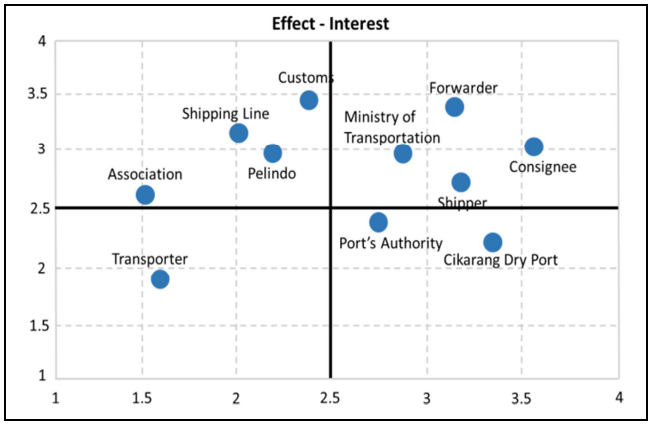


Fig. 10 Effects and Interests of Actors

The upper left-hand corner actors are actors who have high urgency but low interests (association, Pelindo, customs, CDP, sender, and SL). They believe that making multimodal transportation is also in their hands. These actors have low interests; therefore, their involvement in supporting the implementation of multimodal transportation is crucial.

Actors who are considered key actors need to be involved because they have a strong interest and they need to be involved in consensus on policy implementation. The consensus among policymakers will facilitate further coordination processes because, without a consensus among these actors, implementation of a multimodal logistics transportation system will be difficult.

TABLE IX
SUMMARY OF INFLUENCE, URGENCY, AND INTEREST

| Characteristics | Actor Group |
|---|---|
| High influence and high urgency | Ministry of Transportation and Forwarders |
| High urgency and high importance | Ministry of Transportation, Forwarder, Consignee |
| High influence and high importance | *Consignee, Forwarder, Shipper, and Ministry of Transportation* |

From determination, some parties have high determination and support 100% of the existence of multimodal, including expert group actors (academics), MTO operators, associations such as ASPERINDO and ALFI as well as the Multimodal Research and Development

Directorate of the Ministry of Transportation. While some parties appear "grey" in their support for implementing this multimodal transportation, some of them include the Ministry of Transportation, Pelindo, the Ministry of Trade, and the Port Authority and Port Authority (KSOP).

TABLE X
DETERMINATION'S SUMMARY AMONG ACTORS

| Characteristics | Actor Group |
|---|---|
| High determination and full support of multimodal transportation | Experts (academics), MTO Operators, Associations (ASPERINDO and ALFI), Directorate of Research and Development of the Ministry of Transportation. |
| Medium determination | Ministry of Transportation, Pelindo, Ministry of Commerce and Port Authority and Port Authority (KSOP) |
| Determination is low and does not fully support multimodal transportation | |

The analysis results show that the implementation of multimodal transportation at the Tanjung Priok Port did not run as it should. As a result, the Tanjung Priok Port management became less efficient and complex, which caused uncertainty in the process of shipping goods. This research analyzes the problem of multimodal logistic transport coordination from the perspective of transaction theory by identifying and exploring the perception pattern (PP) as the element of transaction costs.

PP1 represents the actor's most important perceived transaction cost element that lack of clear and consistent law enforcement has reduced the actor's willingness to support coordination. Furthermore, PP1 also contains strong attention to the similarity of objectives between government agencies and across government-private institutions in institutional coordination. Combined with the problem of legal uncertainty, it has significantly increased the transaction costs of institutional coordination multimodal transportation.

PP2 shows the actor's disagreement with the statement (z-score -1.466), reflecting that the transportation problem could be overcome through coordination. At present, weak law enforcement comes from the lack of implementation of regulations in Indonesia's transportation activities. The weak role of the central government in coordination causes non-compliance with existing regulations at a lower level.

Furthermore, PP3 shows a lack of understanding of the long-term advantages of transporting goods. The absence of multimodal logistic transportation has led substantially to higher transaction costs and creates negative perceptions concerning short-term interests. The actors deal with asymmetric information because each of them is related to the transportation of competing goods, which is reinforced by a statement from one of the sources which states all actors have understanding difficulties on the long-term advantages of multimodal logistics transportation. They carry out their views based on their interests; in terms of government institutions, this situation is closely related to the problem of fragmentation within the government itself. The absence of an understanding of multimodal logistics transportation's long-term advantages leads to transaction costs that are perceived to be higher by the actors and negative perceptions of such coordination.

PP4 shows that lack of agreement on the purpose of multimodal transportation can also make the process of negotiation and decision making in coordination more difficult, which in turn can increase negotiation costs.

The results from the Principal-Agent Theory perspective show that the asymmetric information issues accompany the difficulty in obtaining multimodal coordination commitments at the Tanjung Priok Port in policy actions and political decisions multimodal transportation unpopular. The regulatory commitment that is not enough to enforce coordination further triggers feelings of being threatened by uncertainty and opportunism. The government, as the principal itself, must determine the structure of incentives and efficient monitoring to monitor the performance of agents and the risk of moral hazard (i.e., actions where the agent's interests lead to an unwillingness to share the information with other agents and an agent's motivation to send false information [38, 39]).

## IV. CONCLUSIONS

Despite strategic role of Tanjung Priok Port to support Indonesia export-import, the multimodal transportation institutional structure at Tanjung Priok Port includes the urgency of institutional coordination between stakeholders is not running very well. The weak implementation of multimodal logistics transportation is closely related to the coordinative obstacles experienced by regulators, operators, logistical actors, and multimodal users at Tanjung Priok Port. From the transaction cost theory perspective, there are four actor's perception patterns that hinder good coordination, i.e. conflicts of Interest and inequality of purpose, the need to strengthening institutions and application of regulations, asymmetry benefits of coordination and lack of between actor's trust, flexibility, and domination of sectoral interests and lack of coordinating experience.

The biggest obstacle to multimodal transport institutional coordination comes from the fact that private power is many times more dominant in the application of the logistics transportation system. While regulations have opened space to mandate cooperation and coordination between actors through enacting various regulations, having an attitude of "waiting for instructions" impedes the downward and upward approach forms a coordination network. The identified obstacles are rooted steadily in the formal institutional aspects and require a long time to change. This situation becomes more complicated since a specific institution does not yet cover the coordination between actors in multimodal transportation. Therefore, forming *ad-hoc* institutions in the short term and a permanent institution is necessary. The focus of coordination within the networks must be broadened and deepened to increase coordination on multimodal logistics transportation policies. It is necessary to strengthen regulations at the same level as the Law to establish the Multimodal Transportation Logistics Board (MTLB).

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