Trans Metro Bandung Conflict Resolution Using Graph Model for Conflict Resolution and Value Net Of Coopetition

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ABSTRACT
Trans Metro Bandung (TMB) is a mass transportation mode that was built as an alternative solution to Bandung traffic jam. The government felt that the TMB is the best transportation mode in order to solve traffic jam and pollution problem in Bandung city. Unfortunately TMB also became a source of conflict especially with the existing public transportation companies. This research purpose a combination of Graph Model for Conflict Resolution (GMCR) and value net of coopetition to analyze this conflict. Based on this analysis, possible steps in order to solve this conflict can be purposed.

INTRODUCTION
Congestion is a condition of obstructed traffic flow due to the number of vehicles that exceeds the capacity of the road. As one of the major cities in Indonesia, congestion is a major problem for Bandung city. The success of Jakarta in reducing congestion by operating the Trans Jakarta (mass public transportation mode using buses) has inspired the Mayor of Bandung city. He then introduces a mass transportation mode to reduce congestion in Bandung called Trans Metro Bandung (TMB), which is similar to Trans Jakarta.

TMB is considered as a suitable idea to reduce congestion in large cities in developing countries due to its affordable cost [4]. But the interesting thing in the formation of TMB is there is no master plan, both for operations, and transportation information to stakeholders. Miscommunication causes conflict between DISHUB (local government transportation agency) and ORGANADA (the organization of urban transportation (ANGKOT) companies). The conflict occurs since the newly introduced mass transportation mode has similar route with the ANGKOT and ANGKOT companies felt threatened if their customers will move to TMB.

This paper discusses the application of graph model to analyze the conflict among stake holders in the case of TMB. In this study observations and interviews are conducted to identify stake holders, options and positions of each stake holder in the TMB conflict. These information are then analyzed using Graph Model for Conflict resolution. The results of this analysis are strategies that could be employed to achieve the resolution of the conflict and solution that can satisfy all involving parties.

CONFLICT BACKGROUND
In 2006 TMB planned was in traduced by the Major of Bandung City. At that time, both infrastructure and regulation was not ready yet. On December 22nd 2006 DEPHUB gave DISHUB Bandung 10 buses to implement TMB plan. Those buses were then parked at DISHUB’s garage.

On January until April 2007 the trial of buses failed because the infrastructure still not ready yet. On June 18th 2007 DISHUB waited for licensing from the Infrastructure Department because the planned route for TMB will use state road. DISHUB of Bandung has allocated budgeted funds of 1.7 billion rupiahs for maintenance and bus-lane fuel purchases. On April 28th 2008 DISHUB finally got permission to use the left lane from Directorate General of Land Transportation but that lane is the same lane with 11 ANGKOT routes.

On July 24th 2008 DISHUB open auction for investments in TMB but did not receive any funds from province budget (APBD). The Auction is then won by DAMRI (local mass transportation) on December 17th 2008. The chief of ORGANADA conveyed the aspirations that TMB operate without plan and guarantees for ANGKOT. They threatened that thousands of ANGKOT drivers will protest the DISHUB in order to postpone TMB, because of the banded contract with DEPHUB and shelter sponsorship.

On December 22nd 2008 TMB operated for the first time while the ANGKOT drivers go protest. DISHUB were unable to meet the target minimalist shelter (8 of 15). On April 12th 2009 Bandung Mayor said that residents should be patient to wait for the TMB until presidential election at Mei 2009 due to unsafe route conditions.
MODELING PROCESS

Conflicts could happen anytime and anywhere in the real world. Conflict is defined as an incompatibility of goals or values between two or more parties in a relationship, combined with attempts to control each other and antagonistic feelings toward each other [2].

Graph Model for Conflict Resolution (GMCR) [1] is a methodological approach to frame an interactive decision situation, or conflict, in a formal stability analysis. GMCR serves as an assessment and simulation tool to analyze interaction and behavior of Decision Makers (DMs) that further can be used in the negotiation preparation and mediation.

GMCR assumes that a conflict arise among a number DMs. In TMB case, the conflict occurs among DISHUB, ORGANDA, DEPHUB (central government transportation agency), DAMRI (private bus operator) and the society as the public transportation users. These DMs are mapped using value net coopetition as shown in the following figure.

![FIGURE 1](image)

In the value net, DISHUB act as the center of value net, ORGANDA as competitor of TMB, DAMRI as complementer of TMB, and DEPHUB as supplier of TMB. This value net will then used to analyze the change in the game.

Each DMs are assumed to have options of course of action that they can make. Based on the observation and interviews, the following options of DMs are identified.

**DISHUB options:**
1. Implement ORGANDA claim
2. Implement suggestions from ITB Transportation expert
3. Operate TMB

**ORGANDA options:**
4. Anarchy demonstration
5. Soft demonstration
6. Looking at customer comfort

**Society options:**
7. Support the TMB program
8. Using private vehicles

**DEPHUB options:**
9. Give DISHUB 10 buses for TMB program

**DAMRI option:**
10. Sign the contract with DISHUB

Combination of all logical and practical options of DMs will then form a collection of states. Based on the interview and observation states that can occur in the TMB conflict is summarized in the following table.

**TABLE 1**

<table>
<thead>
<tr>
<th>Options</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISHUB</td>
<td>1</td>
</tr>
<tr>
<td>ORGANDA</td>
<td>2</td>
</tr>
<tr>
<td>SOCIETY</td>
<td>3</td>
</tr>
<tr>
<td>DEPHUB</td>
<td>4</td>
</tr>
</tbody>
</table>

In GMCR framework each DM are also assumed to have preferences toward each state. The preferences of each DM are summarized in the following table. In that table the > sign indicates that the DM more prefer toward the state on the left side than toward the state on the right side.

**TABLE 2**

<table>
<thead>
<tr>
<th>Preferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISHUB</td>
</tr>
<tr>
<td>ORGANDA</td>
</tr>
<tr>
<td>SOCIETY</td>
</tr>
<tr>
<td>DEPHUB</td>
</tr>
<tr>
<td>DAMRI</td>
</tr>
</tbody>
</table>

Using the above states and preferences stability analysis can be performed. The purpose of the stability analysis is to identify equilibrium states, states in which DMs have no further incentive to move to another state. There are two concepts of stability that are used in this study namely, Nash stability and sequential stability.
According to Nash stability concept [3], a state $k$ is called Nash stable for player $i$ if and only if player $i$ cannot improve its payoff by changing his own strategies. In the other words,

$$S^*_i (k) = \{ \emptyset \} \tag{1}$$

Where $S^*_i (k)$ is possible moves that can improve player $i$’s payoff from state $k$.

According to sequential stability concept [3], a state $k$ is called sequential stable for player $i$ if and only if for every player $i$’s movement from state $k$ ($k_i \in S^*_i (k)$), there exists a movement of other player from state $k_1$ ($k_2 \in S^*_j (k_1)$) that will cause player $i$ obtain less payoff than if player $i$ stay at state $k$.

$$P_i (k) > P_i (k_2) \tag{2}$$

Based on this analysis state 16 and 17 are identified as equilibrium states.

**DISCUSSION**

From the analysis in the previous section we find that state 16 and 17 are equilibrium states. The first equilibrium (state 16) occur is when DISHUB rejects to implement any claim from ORGANDA and suggestions from ITB Transportation expert, DISHUB do not operate TMB anymore, and when ORGANDA do not do both soft or anarchy demonstration, and also do not looking customer comfort. Society support TMB program, and using private vehicles, DEPHUB withdraw 10 buses from DISHUB, and DAMRI sign the contract with DISHUB.

The second equilibrium (state 17) occur when DISHUB rejects to implement any claim from ORGANDA and suggestions from ITB Transportation expert, DISHUB still operate TMB by inviting new supplier. ORGANDA do not do both soft or anarchy demonstration, and also do not looking customer comfort. Society do not support TMB program, and do not use their private vehicles. DEPHUB withdraw 10 buses from DISHUB, and DAMRI sign the contract with DISHUB for other business beside TMB.

Both of equilibrium situations capture the possible resolution of TMB conflict.

**CONCLUSIONS AND FURTHER RESEARCH**

The conflict is still in progress. It seems that the conflict structure be further modified to identify other players and their role in this conflict. The conflict is more crucial from the official of Transportation city of Bandung and ITB Transportation Expert point of view because Conflicts between DISHUB with ORGANDA more directed to what is desired by ORGANDA, while differences of opinion with ITB expert, more prolonged because it comes to good for all levels of society. Further research, we want to develop a method that could provide a win-win result, by altering the game, where the new game, can give added value to DISHUB as official for TMB.

**REFERENCES**


