UNU-IAS Working Paper No. 168

Policy Elements to Upscale the Contribution of Urban Transit Initiatives on Sustainable Urban Transport: The Case of Bus Improvement Initiatives in Indonesia

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February 2012
Abstract
Promoting public transport use is one of the entry points towards sustainable urban transport, on the condition that the public transport system is planned and developed in a sustainable manner. This study develops a conceptual framework, based on a critical review of transit policy elements, to ensure sustainable urban transit projects. The framework is applied to review the progress of bus improvement initiatives in Indonesia, by looking at four cities as case studies. The analysis suggests that the integration of transit policy instruments (physical and “soft” measures) and regulatory reform to create a cost-effective transit industry is essential in gaining larger benefits from urban transit projects.

Keywords
public transport governance, bus system, regulatory reform, sustainable urban transport
1. Introduction
A well functioning and efficient public transport system is an important element in building sustainable urban transport (SUT). It falls into the “shift” strategy of the holistic “avoid-shift-improve” policy framework for achieving SUT (see Dalkmann and Brannigan, 2007). In order to achieve greater impact, ideally, the “shift” strategy should be integrated with the other two strategies. However, in developing countries where in most cases transit systems are poor and have not adequately served their cities, it is quite challenging to prevent public transport users from leaving public transport and shift to private modes. Given this consideration, this study argues that making a transit system stand out among other transport modes can be realized on the condition that the public transport system is planned and developed in a sustainable manner.

This paper aims to review the progress of public transport improvement projects in Indonesia as the first step to evaluate their sustainability. It looks at bus improvement initiatives implemented in four Indonesian urban areas as case studies: Jakarta Metropolitan Area, Greater Yogyakarta, Palembang City and Bogor City. The rest of the paper is organized into four sections. The following section provides a critical review as the basis of the paper to develop a framework conceptualizing transit policy elements that would ensure a sustainable public transport project, which will be covered in the third section. Finally, it concludes with lessons learned both specifically for sustaining the whole bus improvement project in Indonesian cities and generally for other developing cities.

2. Delivering a Sustainable Urban Transit System: A Literature Review
The sustainability of urban transit system covers the entire span of input (transit policy instruments), process (how transit is governed: the regulatory framework), and the materialization of direct and indirect benefits (Takyi, 1993; Gwilliam, 2008). If these elements are well considered from the initial stage of project implementation, urban transit system improvements can be carried out cost effectively.

2.1 Transit Policy Instruments
There are generally two types of policy instruments adopted in the transport sector: physical and “soft” measures (Steg and Tertoolen, 1999; Santos, Behrendt and Teytelboym, 2010; Bamberg et al., 2011). The former measures modify the objective environment, which includes the provision of public transport infrastructures and services, while the latter alter both users and non-users’ perceptions towards the objective environment, or the complexity of taking transit trips.
2.1.1 Physical Measures: Transit Technology and Network Design

Cities with good transit planning generally make use of a greater variety of modes forming a citywide transit network, since each mode type satisfies certain capacities and functions as listed in Table 1. The network design affects customers’ satisfaction regarding travel times, travel cost, comfort and safety (Vuchic, 2005). Both chosen technology and network design should serve the municipal’s vision of its city development, influence the city’s economic efficiency, secure its social equity, and, most importantly, also dramatically affect municipal finances (Wright and Hook, 2007; Tang and Lo, 2008).

Table 1 Comparison of Public Transport Technology Options

<table>
<thead>
<tr>
<th>Technology</th>
<th>System Capacity (passenger per hour per day)</th>
<th>Amount of Investment (million USD/km)</th>
<th>Energy Source</th>
<th>CO₂ Emissions Reduction Potentials¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy Rail: Underground Metro, Commuter Rail and Elevated Rail¹</td>
<td>30,000–80,000</td>
<td>45–350</td>
<td>Electricity, Diesel</td>
<td>64–75%</td>
</tr>
<tr>
<td>Light rail transit (LRT)²</td>
<td>10,000–30,000</td>
<td>15–45</td>
<td>Electricity</td>
<td>57%</td>
</tr>
<tr>
<td>Bus Rapid Transit³</td>
<td>3,000–45,000</td>
<td>0.5–14</td>
<td>CNG</td>
<td>0–10%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hybrid-electric</td>
<td>5–20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fuel-cell</td>
<td>30–75%</td>
</tr>
<tr>
<td>Conventional Bus Services</td>
<td>500–5,000</td>
<td>n/a</td>
<td>Diesel, Natural Gas, Hybrid</td>
<td>32%</td>
</tr>
</tbody>
</table>

Note:
¹ e.g. monorail and maglev train technologies
² LRT is electric rail-based technology operating at the surface level. Trams can also be considered a type of LRT but typically utilize smaller-sized carriages
³ Rubber-tired vehicles running on dedicated right of way (ROW) for all or part of a transit route. There are various types of BRT systems (see Levinson et al., 2003; Wright and Hook, 2007)
⁴ In the case of heavy rail, LRT and conventional bus, the emissions reductions are compared to private car based on estimated CO₂ emissions in pound/passenger-miles, with 40% load factor (FTA, 2009). As for the BRT, based on estimates of total CO₂ emissions reduction (tonne over 20-year project life) (Wright & Fulton, 2005).

The other consideration in choosing transit technology is its potential in reducing emissions — both air pollutants and greenhouse gas emissions. Rail transit obviously promises larger impacts, but in the end the efficiency largely depends on the patronage. The Delhi Metro, an underground rail with regenerative breaking system, is an example. The system has resulted in 28,800 tons of CO₂ reduction annually (Leather, 2009). However, it was lower than expected due to a lower-than-forecast level of modal shift (Grüitter, 2007). Another example is Bogota’s Transmilenio BRT phase II project developed as one package with TDM and non-motorized transport (NMT) improvement.¹ From the estimated 318 tons per day CO₂

¹ TDM stands for “Travel Demand Management”. There are two kinds of TDM measures that have been implemented in Bogota: (i) by restricting license plates that end with a certain number to be used on a particular day during the morning (6:00–9:00) and evening (16:30–17:30) peak period; (ii) by controlling parking by eliminating on-street parking.
emissions reduction, only 10 per cent was gained from the bus renewal itself, while 90 per cent was attributed to modal shift (Grütter, 2007). Therefore, a good combination of technology and network design plays an important role in inducing more modal shift, and thus, larger benefits.

2.1.2 “Soft” Measures: Managing Users’ Barriers from Using Transit
As mentioned above, “soft” measures are aimed to alter both users’ and non-users’ perspectives towards using public transport. There are two types of “soft” measures: one is by reducing the convenience of using private modes to push people out of their private modes and use public transport, while the other is by improving the convenience of public transport to pull people to use public transport. The former belongs to the “avoid” strategy, which involves wider aspects of transport policy including land use management and other travel demand management strategies. This paper focuses on the latter considering that it lies within the scope of public transport service delivery, but it puts emphasis on its proper positioning against other transport policies at the strategic level of policy-making processes.

The most influential factor that often makes people reluctant to using public transport is its complexity associated with having to interchange between modes. No matter how optimized the network design is, it remains difficult to avoid making transfers, at least walking from origins to the nearest transit stop, transferring between transit lines, and walking from transit stop to the destination. Such complexity likely triggers three barriers that deter travellers from taking transit trips.

The first barrier is the unavailability of access/egress modes. The willingness to accept access/egress stage largely depends on the overall trip distance and travel time itself (Krygsman, Dijst and Arentze, 2004). The second barrier is that perceived travel time is greater than the actual time and transfer penalty tends to be higher, particularly for those in the more vulnerable categories of urban population, including those with physical constraints, those accompanying children, the disabled and the elderly. This is imposed by walking time, waiting time, inconvenience, uncertainty, or other external conditions, such as unsafe or insecure locations and unfriendly weather (Hine and Scott 2000; Wardman, Hine and Stradling, 2001; Guo and Wilson, 2007; Iseki and Taylor, 2009). The third barrier is individual trip inflexibility, such as the need to carry out complex trip or trip-chaining comprising several intermediate stops, for instance, to drop-off/pick-up children at school.

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2 Both modes are also termed feeder modes. For areas within the catchment area of transit terminal, non-motorized modes, including walking and cycling, can be the ideal choice of modes, whereas for areas outside catchment areas, smaller-sized buses or, in developing countries, para-transits (e.g. rickshaws, three-wheelers, motorcycle taxi) are ideal. Private modes are also options for access modes (e.g. park-and-ride, kiss-and-ride).

3 Indicating how much travellers are willing to pay (in monetary term) or travel (in minutes) to save a transfer.
and to run some errands in between trips (Hensher and Reyes, 2000; Gorham, 2002; Bhat and Sardesai, 2006; Ye, Pendyala, and Gottardi, 2007; Currie and Delbosc, 2011).

Considering even only one of these three barriers, using public transport would significantly compromise travel time, cost affordability, as well as the overall trip reliability and convenience. Therefore, increasing transit patronage is no longer “merely” about providing good quality service but about providing convenient door-to-door connectivity between modes and services or “intermodality”. Failure to address these three factors will favour private modes.

Thus, this study identifies three “soft” measures to ease those barriers and offer a higher degree of “intermodality”. First is the hardware: interchange physical design including access amenity, transfer path environment and waiting amenity. In view of the need for trip-chaining, hardware design should also offer opportunities to carry out productive activities while transferring by aligning transit stops’ connectivity with various public and commercial services along the transit corridors. The second component is software: traveller information systems including signage, timetable (Ceder, Golany and Tal, 2001) and traveller information: unimodal or multimodal, pre-trip and at-stop, static or dynamic (Kenyon and Lyons, 2003; Rehrl, Bruntsch and Mentz, 2007; Grotenhuis, Wiegmans and Rietveld, 2007; Dziekan and Kottenhoff, 2007). The third is finware: fare structure (integrated or co-ordinated), collection process, and media such as the use of electronic smart-card ticketing systems (TCRP, 2006).

Although the effects of their improvements on people’s behaviour towards transit use are still lacking (Iseki and Taylor, 2009), the application of at least one of these components has the potential to, among others, enlighten the physical effort, reduce waiting time attributed to real-time at-stop information systems (Dziekan and Kottenhoff, 2007), save time for purchasing a ticket by using electronic ticketing (Cheung, 2006) or increase patronage by the introduction of integrated fare systems (Abrate, Piacenza and Vannoni, 2009).

2.2 Urban Transit Governance: Regulatory Framework
The public transport industry involves a large number of stakeholders who are not always aiming for coherent objectives, trading-off between commercial profitability and social services. For example, from the perspective of private operators, modal shift to public transport might not be their main concern. Instead, they are interested in attracting more passengers from competing transit modes, not necessarily by drawing in private mode users, and gaining financial security or at least minimizing financial risk from the business. In order to achieve this, private operators may prefer to serve profitable lines, increase the fare in
return for increased service quality or even disregard rider safety and comfort to maximize profit. It results in fragmented services as was quite evident during the western deregulation period in the 1980s reflecting failure in providing protection and benefits to the public at large (Sohail, Maunder and Cavill, 2006). Unsurprisingly, many public transport systems in the world are financially unsustainable with low productivity, high costs and the need for large government subsidies. In view of this, cities worldwide are in search for an appropriate governance mode. They seek an economically rational regulatory framework that can address the potential market failures that might plague the transit industry, including pollution and congestion externalities, network effects, the need to co-ordinate a large number of agents involved, and interactions with other urban planning issues (Estache and Gómez-Lobo, 2005).

Building a sustainable public transport industry involves two directions of governances: vertical and horizontal dimensions (Sørensen and Gudmundsson, 2010); and three levels of decision-making processes: strategic, tactical and operational (or the STO framework developed by van de Velde, 1999). The vertical dimension considers the framework of multi-level government in strategic decision-making processes, for instance, in terms of metropolitan-area multimodal integration as well as integrating between traffic management and transit policy or transit policy and urban planning. The horizontal dimension covers tactical and operational decision-making processes at the local level, which involves co-ordination among public sector entities, public transport operators and other stakeholders.

Current regulatory frameworks of transit industry in developing countries have gradually evolved from deregulated/unregulated to a hybrid model introducing competition for the market (see Estache and Gómez-Lobo, 2005; Barter, 2008; Gwilliam, 2008). This hybrid model typically contracts out public transport procurement to the private sector to gain greater managerial efficiency and introduces competition mainly in order to sustain efficiency improvement (Ongkittikul and Geerlings, 2006), while a standardized level of service quality set up by the regulator and affordability can be maintained. It is obviously a serious challenge.


The review above suggests the importance of putting intermodality measures and a regulatory framework in place, in addition to thorough transit technology and network design planning, for sustaining a public transport improvement project. It is also clear that to achieve a synergic transit governance, the transit industry cannot be thrown into the market mechanism and must be subject to some government intervention. Taking this into consideration, a

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4 The hybrid model is a public-private partnership model with various degrees of regulation touch from the regulator (public sector) involving operators (private sector) in the provision and management of public transport.
conceptual framework (Figure 1) that integrates the technical and institutional dimensions of public transport service delivery is developed.

The framework identifies a spectrum of policy instruments at STO decision-making levels. The effectiveness of a public transport improvement programme relies on its positioning within urban transport systems at the strategic level. It involves local and higher authorities in managing three interconnected elements of urban transport systems: flow, network and activity. This framework suggests that public transport improvements should be placed at the heart of urban transport policy-making which will not only affect the transport network but also how the city manages travel flow and urban activities. Such positioning is expected to give room to other supporting measures in the policy-making process, including public transport priority system or other traffic management policy as well as stations upgrading and further integration with travel demand and land use management policy.

![Figure 1 Integrating Transit Policy Instruments and Governance: A Conceptual Framework](image)

Furthermore, this framework separates the regulator and the operator role as a part of regulatory reform. At the tactical level, the public transport regulator facilitates multimodal integration both in terms of physical and “soft” measures. It sets up detailed public transport service standards to be met by the selected operators. The form of horizontal separation and the intensity of regulations (e.g. light touch or highly regulated) should vary depending on
local circumstances. At the operational level, the operators are responsible for one or more task(s) including fleet procurement and operation, infrastructure operation, fare-box revenue collection, and information system management through a contracting system between the regulator and the operator for a certain length of period.

A further question is what to expect from such framework. This study highlights four model cities: London, Singapore, Seoul and Santiago. London, Singapore and Seoul are examples of cities that have adopted good multimodal networks coupled with intermodality measures which were followed by or carried out in parallel with regulatory reform (see Table 2). As a result, London’s public transport share increased by 5 per cent since 2000. While in Singapore, by 2003, 60 per cent of its inhabitants’ trips were made by public transport. Seoul’s bus reform since July 2004 has resulted in higher penetration of low-floor CNG buses and, more importantly, higher bus ridership of 100,000 passengers per day. It should be noted, though, that London and Singapore’s achievements are also due to their travel demand management measures (London’s congestion charging; Singapore’s Electronic Road Pricing and Vehicle Quota System), and the existence of multimodal bodies (London’s Transport for London and Singapore’s Land Transport Authority) that enabled integrated approaches to manage the circulation of people, goods and services across both cities.

Similarly to Seoul, Santiago also introduced a radical change in its bus system, the Transantiago, and adopted fare integration with the metro system. The difference is in their business models. In Seoul, the business scheme was transformed into a semi-public operation through a route tendering system and joint revenue management between the city and bus companies based on vehicle-km records. Here, the Seoul Metropolitan Government (SMG) is responsible for network management and facilities provision, while the private sector operates the service. SMG provides subsidies for possible shortage in revenue. But in the case of Santiago, Transantiago is expected to maintain the existing fare levels while meeting the policy requirement to be self-financing (Muñoz and Grange, 2010). This led not only to the cutting of capital budget but also cuts in surface transit infrastructures. As a result, based on Santiago Panel survey (Yáñez, Mansilla and Ortúzar), it was found that the bus market lost 17.3 per cent mode share. The increase of bus-Metro share by 14.3 per cent is believed to be attributed to the integrated fare and the fact that Metro routes, stops and frequencies did not change.
Table 2 The Relations between Physical Measures, ‘Soft’ Measures, and Regulatory Reform with the Direct Benefit: Review of Cases

<table>
<thead>
<tr>
<th>Case</th>
<th>Initial Driver</th>
<th>Physical Measures</th>
<th>Soft Measures</th>
<th>Regulatory Reform</th>
<th>Direct Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>Failure of deregulation: fare hikes, fragmented serviced</td>
<td>Rail (metro, overground rail, light rail, tram) - Bus</td>
<td>Transport for London (TFL): integrated approach in planning and delivery of London’s public transport</td>
<td>iBus (vehicle locations system) - Interactive maps</td>
<td>Multimodal Smartcard (Oyster card) : 80% of journeys</td>
</tr>
<tr>
<td>Singapore</td>
<td>Visionary multi-pronged approach aiming to have 75% transit modes share (1996)</td>
<td>MRT, LRT, Bus</td>
<td>Integrating central planning of bus, MRT and LRT system reduces wasteful duplication of services</td>
<td>Annual TransiLink Guides - Travel Information System</td>
<td>Integrated Bus Operating System</td>
</tr>
<tr>
<td>Seoul</td>
<td>Congestion, air pollution, traffic injuries, financial crisis of metro operations</td>
<td>Metro, Median-lane Bus and Bus</td>
<td>Hierarchical and integrated bus route design</td>
<td>High-amenity BRT bus stop - Barrier-free</td>
<td>Bus Management System</td>
</tr>
<tr>
<td>Santiago</td>
<td>Congestion, increase car modal split from 18.5% in 1991 to 38.1% in 2001, street-level rivalry of bus industry</td>
<td>Metro, segregated corridors of Transantiago BRT</td>
<td>Feeder and trunk BRT services operate in conjunction with Metro as structural backbone</td>
<td>GPS control in all the new buses</td>
<td>Integrated fare system of feeder and trunk buses</td>
</tr>
</tbody>
</table>

Source: Seoul (Pucher & Kim, 2005; Kim & Dickey, 2006; Cervero & Kang, 2011); London (Amaral, Saussier, & Yvrande-Billon, 2009; TfL, 2010); Singapore (Ibrahim, 2003; May, 2004); Santiago (Yañez, Mansilla, & Ortúzar, 2010; Muñoz & Grange, 2010); Barter, 2008.
4. **Bus Improvement Initiatives in Indonesia**

Aiming to tackle the increased motorization in Indonesian cities, particularly motorcycles, the Ministry of Transportation (MOT) of Indonesia enacted a decree No. 51/2007 promoting pilot cities for land transport improvement. The decree mandates the pilot city candidates to reflect their commitments by providing documents declaring their preparedness in terms of institutional capacity, funding capacity, human resource availability and transportation master plan.

![Figure 2 Locations of 11 Cities Adopting Bus System Reform: 2007 – 2010](source)

Source: Public Transport Improvement Programme by 2014, Ministry of Transportation

Afterwards, the initiatives gained stronger regulatory support by the enactment of the New Traffic Law No. 22/2009. The law specifically promotes pro-public transport policy development in cities. In Article 158, it explicitly states that the government must ensure the availability of land-based mass transit system to meet urban mobility needs.

As the implementation of the law, MOT provides technical assistance to promote smart bus-based urban transport systems in order to gradually replace the old buses and restructure the existing bus routes to create a more efficient city bus network. MOT funds several bus vehicles and supports some of the infrastructures. From the target of 20 pilot cities by 2014, to date, 10 cities have signed MOUs with MOT and launched such systems, in addition to Jakarta as the pioneer of the programme (see Figure 2).

The following subsections provide a progress review of bus improvement in four cities: Jakarta, Yogyakarta, Bogor and Palembang. Data regarding the system’s characteristic, performance and management were collected from questionnaire surveys to Trans Pakuan (August 2010), Trans Jogja (February 2011), and Trans Musi’s (August 2011) transport authorities and operators, the presentation materials of BLU Trans Jakarta and
Palembang Municipal Government at the KLRTC Training Course XXI on 11–13 April 2011 provided by Citynet; and reports from Sustainable Urban Transport Improvement Program (SUTIP). The findings are summarized in Table 3.

4.1 Transit Policy Instruments: Physical and “Soft” Measures

The physical and “soft” measures include at least four main elements. First, bus route restructuring and bus renewal relating to the aim of scrapping old buses with the new system’s buses were implemented. In response to this scrappage policy, Yogyakarta, Bogor and Palembang set up clear targets of scrappage ratio (see Table 3), following the enactment of local regulation to stop issuing new bus licenses. In the case of Jakarta, along with the development of 15 Transjakarta corridors, some overlapping large bus routes have been abolished and/or restuctured.

The scrappage policy is considered a win-win solution that benefits both the government and the operators. On one side, the initiative assists incumbents to replace their old vehicles as mandated by local regulation and secure their revenue. On the other side, it accelerates the process of public transport reform. However, in general, vehicle procurement is financially challenging, as it depends on political commitment and financial capability of the local government. Even in the case of vehicles funded by the MOT, some administrative issues occured. For instance, there were prolonged legal problems in changing the functional status of the buses from “red-plate” (government vehicle status) to “yellow-plate” (public transport vehicle status) in the case of Trans Jogja. Such problems significantly affect the system optimization and reliability, particularly in cities with limited public funds.

Table 3 System Performances of Transjakarta, Trans Jogja, Trans Musi, and Trans Pakuan

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Urban Area</td>
<td>Jakarta Metropolitan Area</td>
<td>Greater Yogyakarta</td>
<td>Palembang City</td>
<td>Bogor City</td>
</tr>
</tbody>
</table>

5 http://www.citynet-ap.org/media-room/events/scifal-klrtc-xxi-sustainable-urban-transport/
6 Sustainable Urban Transport Improvement Program provides methodological and technical support in the development and implementation of measures to improve urban transport in selected medium-sized and large cities over 100,000 inhabitants including in Indonesia. It is a partnership between German Technical Cooperation (GIZ) with the Ministry of Transportation, Government of Indonesia and in close cooperation with several local governments. The output of this project can be accessed at http://www.sutip.org/Home/outputs.
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Area (km²)</td>
<td>661.25</td>
<td>234</td>
<td>400.61</td>
<td>118.5</td>
</tr>
<tr>
<td>Population (people)</td>
<td>8,523,157</td>
<td>1,900,000</td>
<td>1,417,047</td>
<td>905,132</td>
</tr>
<tr>
<td><strong>Physical Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year of establishment</td>
<td>2004</td>
<td>2008</td>
<td>2010</td>
<td>2007</td>
</tr>
<tr>
<td>No. of corridors (target)</td>
<td>8 (15 by 2014)</td>
<td>4 (15)</td>
<td>5 (8 by 2013)</td>
<td>3 (7 by 2020)</td>
</tr>
<tr>
<td>Length (km)</td>
<td>170</td>
<td>120</td>
<td>27–35</td>
<td>28.5</td>
</tr>
<tr>
<td>Shelters (provided by)</td>
<td>(Province)</td>
<td>(Province &amp; City)</td>
<td>(City &amp; PPP)</td>
<td>(City)</td>
</tr>
<tr>
<td>Fleet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>Large &amp; Articulated</td>
<td>Medium</td>
<td>Large &amp; Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Fuel</td>
<td>CNG, Euro-II</td>
<td>Euro-II</td>
<td>CNG</td>
<td>Hybrid (biofuel)</td>
</tr>
<tr>
<td>Operating Vehicles</td>
<td>524</td>
<td>54</td>
<td>85</td>
<td>18</td>
</tr>
<tr>
<td>Provided by</td>
<td>Province, Operator</td>
<td>MOT, Operator</td>
<td>MOT</td>
<td>MOT</td>
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<tr>
<td>CNG stations</td>
<td>6</td>
<td>None</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td><strong>‘Soft’ Measures</strong></td>
<td></td>
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<tr>
<td><strong>Hardware: Transfer Facilities</strong></td>
<td></td>
<td></td>
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<tr>
<td>Shelters</td>
<td>High-floor, on-median, interchange points</td>
<td>High-floor, roadside shelters</td>
<td>High-floor, roadside shelters</td>
<td>High-floor, roadside shelters</td>
</tr>
<tr>
<td>Multimodal integration</td>
<td>P&amp;R</td>
<td>Airport, P&amp;R, Bicycle rack on bus</td>
<td>River bus</td>
<td>None</td>
</tr>
<tr>
<td><strong>Software: Information System</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timetable</td>
<td>Route map at shelter, leaflets, security/information offices, signage</td>
<td>Scheduled</td>
<td></td>
<td></td>
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<tr>
<td>Information system</td>
<td></td>
<td>Electronic board</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Finware: Fare and Ticketing System</strong></td>
<td></td>
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<tr>
<td>Fare structure&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Flat (single trip, morning peak hour 5–7 AM discount), free transfer</td>
<td>Flat (single trip, regular public &amp; student), free transfer</td>
<td>Flat (single trip), free transfer</td>
<td>Flat (single trip), free transfer</td>
</tr>
<tr>
<td><strong>Regulatory Framework</strong></td>
<td></td>
<td></td>
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<tr>
<td>Regulator</td>
<td>BLU</td>
<td>UPTD</td>
<td>Dishub</td>
<td>Dishub</td>
</tr>
<tr>
<td>Bus Operator</td>
<td>8 consortiums/private companies</td>
<td>1 consortium</td>
<td>BUMD</td>
<td>BUMD</td>
</tr>
<tr>
<td>Revenue Sharing</td>
<td>Gross-cost contract</td>
<td>Gross-cost contract</td>
<td>Capital sharing</td>
<td>Capital sharing</td>
</tr>
<tr>
<td>Scrappage Programme</td>
<td>Restructuring overlapping routes</td>
<td>2 old buses with 1 Trans Jogja bus</td>
<td>474 conventional bus with 275 Trans Musi bus&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3 angkot with 1 Trans Pakuan bus</td>
</tr>
<tr>
<td><strong>Operational Performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load factor (%)</td>
<td>47.83&lt;sup&gt;2&lt;/sup&gt;</td>
<td>42</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>Interval headway (mins)</td>
<td>5–15</td>
<td>5–10</td>
<td>5–10</td>
<td>n/a</td>
</tr>
<tr>
<td>Average speed (km/h)</td>
<td>18</td>
<td>28</td>
<td>20–40</td>
<td>n/a</td>
</tr>
</tbody>
</table>
The new vehicles are air-conditioned and more fuel-efficient (Euro-II compliant diesel bus). Some systems use environmentally friendly fuels such as CNG in Jakarta and Palembang, and hybrid (a mixture of diesel and 20 per cent of used cooking oil) in Bogor. The availability of city gas networks and CNG stations remains the major limitation in expanding the deployment of CNG buses.

Second, the new bus system operates on dedicated lanes. To date, only Transjakarta operates mostly on dedicated lanes, while others run in mixed traffic due to, among others, technical barriers, such as narrow streets in Yogyakarta and Bogor. As an alternative, the cities installed bus priority systems at intersections with traffic signals in co-operation with local traffic authorities or applied colour-painted curbside bus lanes.

Third, designated shelters where off-board fare collection takes place were established. The availability of shelters forces passengers to board and alight only at the designated high-floor stations. These stations are located in the middle of the road as adopted by Transjakarta’s system or on both roadsides as found in the other 10 pilot cities. This type of shelter usually consists of an end-terminal where a corridor starts and ends, intermediate shelters every 300–400 meters along the corridors, and some transfer points connecting one corridor to another. Due to land availability concerns, instead of building permanent shelters, some cities provide semi-permanent or portable mobile shelters. The shelters are mostly equipped with off-board ticketing systems either electronic or manual (e.g. ticket booth, e-card reader or ticketing officers, except systems that apply on-board ticketing), simple information systems (e.g. real time displays, route maps or security/information officers), and waiting amenities (e.g. seating facilities). These shelters’ financing is shared between the municipal and the central governments (through provincial government) and/or private-public partnerships.
schemes in return for commercial advertisement.

Fourth, each city is supposed to provide a feeder system that feeds passengers from wider parts of the city to the new bus system and introduce multimodal integration. Unfortunately, in this matter, most cities are still at the planning stage. Transjakarta has long been operating without a functioning feeder system, although plans have been made. Resistance from incumbent operators has been one of the reasons. Three feeder routes are scheduled to start operating in 2011. In terms of multimodal integration, Transjakarta has been integrated with several park-and-rides, Yogyakarta has integrated Trans Jogja with airport, bicycle and pedestrian facilities, and will soon operate some park-and-rides, while Palembang integrates Trans Musi with its river buses.

4.2 Regulatory Reform Progress

The regulatory reform is the bus industry reform. The bus industry in 11 cities is currently in a transition period from an unregulated structure (Cervero and Golub, 2007; CDIA, 2011) to a formal and efficient industry. They continue to search for the most appropriate type of institutional arrangement to be established, which fits local circumstances, aiming for improving the efficiency and productivity of public transport service delivery.

Historically, in Indonesian cities, private operators have played a dominant role in urban bus industry with little control by the government. Through the reform, a horizontal coordination between the regulators and the bus operators is developed through the so-called “buy-the-service” scheme. Here, the role of the regulator in planning, programming and managing the entire bus system, including other supporting services, is strengthened. The regulator (i) selects the operators preferably through tendering processes to award quality licensing; (ii) monitors the implementation of minimal service standards (SPM) by the selected operators based on the periodic contract of five and seven years between the two parties and if the operator fails to fulfil the agreement or violate rules, penalties will be applied.

The regulator is usually a local governmental unit. There are two types of entities that have been introduced: local technical implementing unit (UPTD) and local public service unit (BLUD). The two entities are different in terms of their flexibility in managing their budget and adopting necessary business strategies. As a UPTD, it reports to local transport agency (Dishub), while BLUD reports directly to the governor.
or mayor under the monitoring of Dishub. In short, BLUD is more independent than UPTD and, therefore, is expected to be more efficient in making decisions. Among the 11 cities, only Transjakarta is managed by a BLUD.

For Transjakarta’s case, the regulator has evolved from a non-structural managing body (*Badan Pengelola*)\(^7\) in 2003 to a structural UPTD in 2006\(^8\) and, currently, it is transforming gradually towards a full BLUD, which is a working unit under a government institution that has the obligation to provide public services without aiming to earn profits, but has the flexibility to manage its budget and fund, as well as to adopt healthy business strategies to improve its efficiency and productivity.\(^9\) In the future, to eliminate the subsidy, BLUD TransJakarta perhaps will be upgraded into a local government-owned company (BUMD). As some requirements to be a full BLUD have not been fully met, it is currently operating as a public service unit (BLU) under the Dishub. Although it has a separate budget and is able to utilize the operating revenue directly, the management is still less flexible.

Regarding the selection of operators, although it is intended to carry out tendering processes, Jakarta and other cities prioritize invited incumbents, particularly those whose bus services overlap with the new bus corridors, to join the Transjakarta consortiums. This is a countermeasure to ease resistance from the conventional bus incumbent operators who often perceive the new bus system as their competitor. If more operators are needed, new entrants are then invited to participate in the tendering system.

To date, four consortiums and two operators are currently operating the ten corridors.\(^10\) Their services are compensated per vehicle-km to cover fleet procurement, operational, maintenance, overhead costs, and some profits, except corridors 1, 9 and 10 whose fleets were purchased by the government. The level of payment varies across corridors according to the negotiated contracts. In principle, the level of payment should guarantee the return on bus operators’ investment and reflect the level of service performance. BLU Transjakarta also contracts out supporting services operators (ticketing and revenue collection, provision of security services at the shelters, provision

\(^7\) Governor of Jakarta Provincial Government Decree Number 110 Year 2003.

\(^8\) Governor of Jakarta Provincial Government Regulation Number 48 Year 2006.

\(^9\) Government Regulation Number 23 Year 2005 regulates BLU’s financial management.

\(^10\) Namely Jakarta Express Trans, Ltd. (PT JET), Trans Batavia, Ltd. (PT TB), Jakarta Trans Metropolitan, Ltd. (PT JTM), Jakarta Mega Trans, Ltd. (PT JMT), Prima Jasa Perdana Raya Utama, Ltd. (PT PP), and Eka Sari Lorena Transport, Ltd. (PT ESL).
of feeder services, and infrastructure maintenance) and co-operates with DKI Jakarta Bank as a trustee.

Figure 3 Fare Revenue and Subsidy of Transjakarta Busway, Jakarta, Indonesia

Source: Analysis from BLU Transjakarta data 2011.

The total number of Transjakarta passengers is increasing year by year, reaching 82,377,659 in 2010. However, the number of passengers per km decreased from 3.4 and 3.8 in 2004 and 2005, respectively, when only the first corridor was operating, to 2.4 in 2009 when all 8 corridors were operating. Figure 3 shows the financial situation of Transjakarta Busway system where the share of fare-box revenue continues to decline. The cost recovery rate decreased to 62.56 per cent and the subsidy is expected to increase higher. In 2011, the total subsidy including payment for supporting services was estimated to reach 52 per cent.

Trans Jogja system adopts a similar scheme to Transjakarta. Given that the system is operating beyond Yogyakarta City’s administrative area, it is being developed under close co-operation between the provincial government of Yogyakarta Special Region, Yogyakarta Municipal Government and its neighbouring regencies (Sleman and Bantul Regency). Each party shares the role of establishing the shelters, park-and-ride, and other supporting infrastructures to optimize the system.
In terms of bus operation, the current four corridors are operated by one consortium, Jogja Tugu Trans, Ltd. (PT JTT), consisting of four co-operatives and one state-owned bus company. UPTD Trans Jogja, under the authority of provincial transportation agency of Yogyakarta Special Region, pays fee per vehicle-km travelled to the operator. Trans Jogja’s fare levels are different for single-trip users, regular public users, and for regular student users, with free transfers to the entire system. With this arrangement, the ridership is quite high, reaching 13,000 passengers per day. Nevertheless, the main costs remain higher than fare-box revenue and, by 2010, the cost recovery rate was only 31 per cent.

Different from Jakarta and Greater Yogyakarta’s scheme, Bogor’s Trans Pakuan bus system and Palembang’s Trans Musi bus system are operated by local government-owned company or BUMD instead of a consortium. Here, local government plays the shareholder. BUMD is expected to become a local revenue source, and, thus, earn profit.

Bogor’s Trans Pakuan operator, PD Jasa Transportasi (PDJT), was established in 2007.11 The company deals with transportation service businesses, covering not only the operation of Trans Pakuan bus system but also other transport service divisions, such as garage, tow truck, mobile toilet and parking services. So far, aside from the public transport service division (Trans Pakuan), the other divisions have not been fully operational. In the future, it is expected that cross-subsidy from those profit-oriented divisions to finance public transport division will occur. Bogor municipal government does not provide annual subsidy, but it shares a total amount of basic capital, as stated in the local regulation No. 11/2008. By 2010, according to local regulation No. 7/2010, more than half of the designated budget allocation had been paid to PDJT in form of bus fleets, a tow truck and Trans Pakuan’s operational costs, while the remaining amount will be paid within a five-year period.

Until 2009, the annual ridership of Trans Pakuan showed an increasing trend from 935,035 passengers in 2008 to 1,102,542 passengers in 2009. The daily ridership reached almost 3,000 passengers. However, the three corridors have not been optimized yet. From 30 vehicles available, only 18 buses are in operation, resulting in lack of reliability, declining number of passengers per km. As the fare-box revenue is decreasing, the subsidy further increased from 9 per cent in 2008 to 35 per cent in 2010.

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11 Based on Local Regulation of Bogor City Government Number 5 Year 2007 which was amended by Local Regulation Number 11 Year 2008.
The Sarana Pembangunan Palembang Jaya, Ltd. (PT SP2J) which operates Palembang’s Trans Musi has been established since 2006 with a vision to improve local economic growth as the main reference for chanelling infrastructure investments in general, not only transportation. Before being appointed as the managing body of Trans Musi in 2009, it was dealing with a wide array of business sectors, including public housing (rusunawa), water transport (Kapal Putri Kembang Dadar) and environmentally friendly hydrocarbon refrigerant (musicool).

Palembang municipal government played a significant role in accelerating its bus improvement programme, on account of its strong leadership, reflected in the rapid progress in expanding the system. In one year (2010–2011), the city managed to operate 68 of the 85 available buses, serving 5 out of the 8 corridors planned by 2013. As a result, the load factor reached 75 per cent and the annual ridership increased from 2,130,000 passengers to 2,500,000 passengers this year. On average, the daily ridership is 7,500 passengers. The operational cost recovery rates were quite high at 94 per cent in 2010, although it decreased to nearly 75 per cent during the first semester of 2011. To cover the operational costs of which drivers’ salary constitutes the largest cost share, the authority plans to increase the fare level by 30 per cent.

5. Conclusions
This study developed and applied a conceptual framework highlighting three transit policy elements—physical measures, “soft” measures, and regulatory reform—to review the progress of bus improvement initiatives in Indonesian cities. The three elements are considered critical in ensuring the effectiveness and sustainability of public transport improvement initiatives. As its case studies, this study observed four cities: Jakarta, as the pioneer of bus improvement initiative, and three pilot cities of a nationwide bus improvement programme initiated by the central government (Yogyakarta, Palembang and Bogor).

In general, Jakarta’s independent initiative and the stimulus given by the central government through nationwide bus improvement programmes to the other three cities have laid the groundwork for better land transport management at the local level, even

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12 Based on Local Regulation of Palembang City Government Number 4 Year 2006.
13 Based on Mayor of Palembang City Government Decree Number 1745 Year 2009 regarding route licensing of Trans Musi BRT.
though the performance of each city varies widely and there are many shortcomings with which to deal. Regarding the physical measures, the four cities are encountering difficulties in expanding the service capacity in terms of increasing the number of vehicles, providing bus priority systems, and optimizing the network. Financial sharing among multi-level governments and public private partnerships (e.g. shelter construction) are among the solutions taken to tackle this issue. Nonetheless, technical barriers such as land availability, narrow roads, among other issues, remain a challenge, particularly in providing dedicated lanes, which are a crucial element for bus-based transport in ensuring punctuality in travel time. In response to this dedicated lane issue, some cities installed traffic signal priority systems as an alternative measure, but better co-ordination with traffic authorities is necessary. Whilst social resistance from the citizens against shelter locations can be solved through technological innovation, such as portable shelters, it may disadvantage the system image. Participatory approaches to obtain people’s co-operation have also been carried out. Such negotiated approach is also adopted in managing resistance from incumbent operators who foresee the new bus system as a competitor, by prioritizing them in the operator selection process for the new bus system at an earlier stage.

The implementation of “soft” measures is still lacking, particularly multimodal integration and improvement in “intermodality”. The bus system has been seen as an effective entry point, particularly towards restructuring and scrapping the conventional public transport, considering Indonesian cities’ circumstances. However, more efforts to integrate the bus system with other modes of transport are needed as a key element to enhance the system capacity through expanding service coverage as shown by London, Singapore, Seoul and Santiago. More importantly, the positioning of each new system within the urban transport system at the strategic level remains weak, and, thus, the initiatives seem more incremental in nature rather than a part of a comprehensive and long-term planning. A good positioning is demonstrated by Curitiba’s experience in Brazil in relation to land use planning and traffic management policy (Rabinovitch, 1992; Santoro and Leitmann, 2004). Such clear vision is needed to enable bus systems to reach higher capacity through citywide system coverage.

Despite this, the current fare structure seems to be quite effective in attracting passengers for using the new bus system since it is relatively lower than the other conventional bus fares due to subsidy, flat rate, and free transfers to the entire system. In the short-term, such fare structure might have been useful for gradually influencing
public perspectives towards public transportation. In the long run, as the network expands, maintaining such fare structure may risk the system’s financial sustainability due to the need for increasing subsidy.

In response to the challenges encountered, the four cities explored regulatory reform from unregulated to a hybrid model, introducing competition with a certain degree of regulatory touch. Such change is essential, particularly in managing financial barriers to improve service reliability and wider system coverage. The reform strengthened the capacity of regulators in land transport planning and management and allowed the operators to focus on improving the service to meet standards. The capacity of bus operators in delivering standardized services of one or more bus lines improved and the prevailing daily sublet system between bus owner and bus crews (driver and conductor) was abolished. Local governments became fully responsible for the provision of their new bus networks and, basically, bear all the risks associated with it. Hence, it minimizes the operators’ financial risks since they no longer have to pursue more passengers to earn more revenue.

In conclusion, effective transit governance is critical to ensure smooth delivery of both physical and “soft” measures as demonstrated by Indonesian cities in an attempt to improve their urban mobility. The lack of one of the elements imposes higher risks in jeopardizing the effectiveness of the whole system. It also determines the capability of providing reliable transit services and, thus, to what extent a public transport improvement initiative can actually contribute to sustainable urban development. To provide more evidence, an application of the framework to similar initiatives in other developing countries would be useful to comprehend the effects of other locality settings. Further work should identify performance indicators beyond the project implementation scope and evaluate the intangible co-benefits of the initiatives at the city scale.
References


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ISSN 1564-8427
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