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Alternative Approach to Sustainable Urban Mobility in Developing Countries

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ABSTRACT

Cities in developing countries are facing intertwined urban mobility challenges: urban sprawl and traffic jam. Having not enough reliable and standardized public transport supply means the residents are forced to opt for traveling by private vehicles such as cars or motorcycles. There is a swell of tailpipe emission and economic losses due to traffic jam. Overcoming urban sprawl and at the same time building massive public transport is not an easy feat to accomplish, as both require immense investments and years of construction. Therefore, cities must have innovative plans to increase public-transport coverage and articulate density through paratransit formalization & digitalization, demand management, and land consolidation.

Keywords: urban sprawl, urban mobility, public transport, paratransit

SARI PATI

Artikel ini membahas rencana inovatif yang perlu dirancang oleh kota-kota di negara berkembang dalam menghadapi tantangan mobilitas perkotaan. Setidaknya, ada dua tantangan, yaitu kemacetan lalu lintas dan pembangunan kota yang tidak terkendali (urban sprawl). Minimnya angkutan umum yang andal dan terstandar memaksa warga menggunakan kendaraan pribadi untuk bepergian. Akibatnya, muncul gelombang emisi knalpot dan kerugian ekonomi akibat kemacetan lalu lintas. Salah satu hambatan dalam mengatasi urban sprawl sekaligus membangun transportasi umum yang masif adalah besarnya investasi dan lamanya durasi konstruksi. Oleh karena itu, kota harus memiliki rencana inovatif untuk meningkatkan jangkauan angkutan umum dan mengartikulasikan kepadatan melalui konsolidasi lahan, manajemen permintaan, serta formalisasi dan digitalisasi paratransit.

Kata Kunci: urban sprawl, mobilitas perkotaan, transportasi umum, paratransit

CHALLENGE

Transportation sector accounts for 16% of global CO_2 emission. Particularly, road transport made 70% of that number (Ritchie et al., 2020). Most of the road transport activities take place in urban settings. This sets challenges to cities to achieve sustainable mobility goal and the Paris Agreement goal. The Paris Agreement or the Paris Climate Accords is an international treaty on climate change, adopted in 2015 (Wikipedia). In developing countries' cities, having not enough reliable and standardized public- transport supply means they are forced to opt for traveling by private vehicles such as cars or motorcycles. As a consequence, the tailpipe emission from the transportation sector is also increasing, as well as time spent in a traffic jam. In a country where the market plays a significant role in dictating housing price and insufficient coordination between transport and land-use policy, urban sprawl is likely to happen. Many cities in developing countries (e.g. Jakarta, Indonesia and Mexico City, Mexico) have been developing the dispersed densities type of built environment in sub-urban centers (Woltjer, 2014). Not to mention that cities also have been implying single-use zoning in certain areas. Both have led to inefficient land use and urban sprawl. This exacerbates congestion and pollution as urban sprawl prompts citizens to drive their private vehicles since the low-density residential area in peri-urban is often times barely covered by reliable public transport.

On the other hand, there is a demand for ageing downtown area to be regenerated. One of the several characteristics in global south cities is the declination of urban population at the core area or at least outpaced by the growth at the peri-urban area (Woltjer, 2014). This provides not only challenges, but also opportunities for the city government to transform downtown area into a more ideal urban design. An ideal density to be served by public transport is the articulated density, where dense development takes place in a certain radius from a mass transit station. Both require immense investments and years of construction to reach that ideal, which is unaffordable by many cities in developing countries. Transforming the city to an ideal articulated density along the mass transit corridors is time consuming (Bertolini, 2012; Suzuki et al., 2013). Therefore, cities in developing countries with limited fiscal capacity which are currently experiencing severe congestion must think of another approach to sustainable urban mobility.

Building ideal articulated density together with the mass transit corridor requires an immense investment, to which cities in developing countries are lacking. Also, collaborations with the private sectors under Public-Private Partnership (PPP) scheme on heavy infrastructure seems below expectation. From 1995 – 2004, only 55% of PPP projects were completed (Leautier & Kim, 2007). The Covid-19 Pandemic also made city government's budgets shift to health-related spending. As a record, other revenues for public-transport operations (e.g., dedicated taxes and government subsidies) have dropped (International Public Transport Workers Federation, 2020). In a ticking clock against the climate crisis challenges, cities in developing countries must think of another approach to providing mobility and accessibility to their inhabitants in a sustainable way besides massive & heavy investments of public-transport infrastructure.

PROPOSAL

This proposal comes in a sequential step. Initially, it starts from undertaking spatial-based assessment to map the location that needs public-transport supply the most. Paratransit formalization is important to tap the reliable public-transport supply into high-density areas in an economical way and less social conflict with existing operators. Digitalized information and integrated ticketing between

each different mode will benefit passengers; therefore ridership will increase consequently. On the other side, private vehicles should be hindered, stimulating people to shift to public transport. Another result from the assessment is the identified area to increase the density of the development around the station.

1. **Accessibility analysis**

   It is a general check-up for a city to identify and classify areas based on their density and accessibility. In doing so, relevant and accurate measures can be designed and implemented. It identifies the prioritized areas for additional supply of public transport. One of the tools that measure accessibility analysis is LUPTAI (Pitot et al., 2006). This tool has helped Gold Coast in measuring the potential locations to be densified and served by public-transport services. For cities in developing countries that are aiming for more sustainable mobility, this tool could assist the political leaders and policy makers in both making quick wins and also long-term changes.

   Providing reliable public-transport services to dense residential area is the quick win that could gain public support and consequently provide greater opportunities in securing bigger budget for public-transport subsidizes. For quick wins, the type of public transport is not necessarily rail-based that need heavy investments and long-time construction process. Providing road-based public transport such as bus or minibus is easier, less complicated and it requires less upfront costs. At the beginning, the bus/minibus functioned as feeder services that facilitate first-mile and last-mile journey. Therefore, it connected the passengers to the trunk/back bone services run by Bus Rapid Transit (BRT), Tram, Mass Rapid Transit (MRT), or Regional Train. Public-transport coverage area has also improved which increases the number of commuters served by the public transport. Eventually, when the demand increases, the road-based public transport could be upgraded to a more massive means of transportation with bigger capacity (per passenger per hour per direction). It could be in the form of BRT with special lane, tram, or even MRT.

   Accessibility analysis also provides insights on the long-term housing policies. Residential area located within a walking distance from public-transport stops should be densified. This means zoning law should be amended accordingly in order to make the property developer and asset owners to adjust their long-term business plan.

2. **Paratransit formalization**

   In many developing countries, public-transport services are operated by private companies with little to no government intervention on subsidizes and minimum service level obligation. Therefore, the public-transport services follow the market/demand. For example, the stops and the schedules are not fixed. Even sometimes the route is not fixed. Those mentioned above are the characteristics of a paratransit service. It has a broad spectrum ranging from legally incorporated service with global business model (taxi) to local wisdom services (jitneys/matatus/angkot). Nevertheless, they all have similarity in terms of capacity where almost of all types of paratransit could only accommodate maximum 15 passengers in a vehicle (less than a regular bus).

   The flexibility and small-vehicle capacity could benefit the government by expanding public-transport services, particularly in a low-articulated density residential area where land-use and transport planning

fail to interact with one another. Not only applicable to developing countries, cities in developed nations could also maximize the advantages of paratransit combined with the burgeoning advancement in technology such as on-demand public transport (see below – digitalization) and electric-driven autonomous bus.

The term paratransit formalization means the government supports the paratransit operation in a form of a regulatory framework and financial means. Formalization aims to increase the level of service of paratransit and consequently formalized paratransit acts as a feeder to the trunk line. The formalized paratransit that has little to medium capacity possibly serves better and more efficiently in a low-density development. Arguably formalizing paratransit is cheaper and faster to increase public-transport coverage than it is on mass transit. Hence, the formalization of paratransit would create a contractual and reciprocal relationship between paratransit operators, public-transport management company (government-owned enterprise), and the government, that would bring advantages to the public, especially passengers. The operators will receive payment based on the distance travelled, the government will receive services that meet the standard-level agreement, and the public will receive convenient and reliable public-transport services. For instance, the route, the stops, and the schedule of formalized paratransit services would be fixed and standardized, which leads to more reliable service. Travel time could also be expected due to zero additional waiting time for the vehicle to be completely occupied. From the safety end, formalization would eliminate reckless driving style as it is a common practice in paratransit to race for the potential passengers.

3. **Digitalization**

   Digitalization and information distribution of formalized paratransit will benefit both the operators and the passengers. For passengers, the term Mobility-as-a-Service (MaaS) revolves around integrating the information and payment from different modes of transport. Passengers will instantly get information on how to get from their origin point to their destination seamlessly through the journey planner in MaaS application. The anxiety of waiting will decrease as the MaaS application provides live tracking and Estimated Time Arrival (ETA) for each vehicle in certain stops. The combination of fixed routes, schedules, and stops with digitalization will create a convenient user experience during the trip for the passengers.

   On the other side, operators will benefit from the digitally kilometer-traveled counting. It gives fairness to both sides, the operators and the bus management company. Furthermore, this will open opportunities to a more efficient daily operation, where fleet can be assigned to several routes in a day. On the contrary with paratransit formalization, in this digital age we have the opportunity to consolidate demand. Technology allows public-transport fleet to operate in a flexible route and virtual bus stop, following the demand. Demand-responsive transport is perceived helpful for operators in covering more demands and increasing passengers, especially in the less dense area. There is also a possibility to explore the usage of self-driving electric-bus for demand-responsive transport operation, which will lead to cost reduction due to zero drivers' wage expenses.

4. **Transport demand management (TDM)**

   After giving options to citizens for their mobility needs by increasing the coverage

of reliable public transport, it is important to limit their private motorized vehicle usage using push measures in TDM. Otherwise, in a culture that was built alongside urban sprawl development, people will always have the necessity to use their private vehicle.

Good public-transport provision requires proper public-service obligation (PSO)/ subsidy, which is expected to come from the government. As the government sets minimum service level and public-transport tariff to the operators, the government should also bear the deficiency if the fare box revenue could not cover the operational expenses through subsidy mechanism. It is important to increase the public-transport ridership (this is also the reason why the government needs to build denser residential & mixed-use area), in order to make the fare box revenue increased. However, revenue from ticketing would not be sufficient to return the investment, let alone operational expenditure.

In order to increase ridership, the government should hinder private-vehicle usage through the implementation of push measures in TDM, which consists of fiscal and physical restraint. There are many examples of physical restraint implemented worldwide, such as number plate restriction, pedestrianization (converting vehicle roadway into active-mobility-only street), and emission standard restriction.

From the fiscal point of view, the government should make private-vehicle usage more expensive than taking public transport. Increasing parking tariff and implementing congestion charges are two of the most common best practices implemented in many livable cities. Not only shifting passengers to public transport, the earnings coming from the parking tariff and congestion charges could also be the revenue stream for government subsidy for the public-transport investment and operation.

5. Land consolidation

According to the result of accessibility analysis, areas with high accessibility of mass public transport but low in density should be transformed into highly concentrated densities within walking distance from the mass transit stations. Transit-oriented Development is the common approach to increase concentrated (articulated) densities within mass transit stations surrounding.

Designing and building a transit-oriented development is much easier if it takes place in an empty, vacant land (Greenfield development) area. However, many cities in developing countries are built in unplanned sprawling way and most of the times the land parcels have irregular shape. These situations create challenges for implementing transit-oriented development and increase articulated density. Land consolidation could support the government in achieving dense and diverse transit-oriented development by grouping landowners in the planning area. Afterwards, the landowners will either get smaller yet organized shape land parcels or an ownership in vertical housing. This will lead to more available land for developing public amenities or public infrastructure. The redevelopment will increase the value of the land/building of landowners. Moreover, extra vacant lands to be sold to the government/private sectors will benefit landowners.

Similar to landowners, the government could benefit from land consolidation. It potentially brings quality of life betterment

and economic benefit for the residents. For example, more people live within walking distance from the mass transit stations, better residential area with proper public services, more public parks to be built, and others. However, the government should incentivize land consolidation and urban regeneration, so the landowners and private sectors are interested in supporting this project. The government should also translate the policy into the regulation that supports the land consolidation and urban regeneration, including establishing governance for the entire project cycle.

However, this five (5)-step proposal requires budget allocations from the government. This translates into a robust political will to allocate the requisite budget for acquiring and converting paratransit into reliable public-transport services. which naturally The services fall into public goods category with various economic advantages for the city and society. Hence, the government should bear the fundamental financial needs for paratransit formalization. Covering operational expenditure in running paratransit at the minimum service level (formalized) will require a certain fare level, which most likely is not affordable to the lower-income bracket.

The gap between fare box revenue and the operational expenditure according to the minimum service level should be subsidized by the government. Therefore, it is less likely that the private sectors could benefit from the operation of formalized paratransit. In the bigger picture, the government could pursue revenue from the demand management, or generate new revenue streams from public-transport digitalization and land consolidation. Both revenue streams could support the required budget for paratransit formalization (see demand management, digitalization, and land consolidation above).

Once the government secures the allocated budget for paratransit formalization and the betterment of public-transport services, they could start developing alternative financing mechanisms creatively. The endowment fund has the opportunity to provide options for public-transport operators, especially paratransit owners, in earning lower interest rates for fleet rejuvenation. Furthermore, it will reduce the number of contractual agreements between the public-transport management company and the formalized paratransit operator. This endowment fund could come from an unspent budget from the previous fiscal year or any investment thrown by the government. The formalized paratransit operator should repay the loan from the endowment fund in a more comfortable tenure. Another instrument that could lower the interest rate for fleet purchasing/rejuvenation is debt crowdfunding. The public-transport management company could be the guarantor for the debt crowdfunding since it has the bidirectional contractual agreement, both with the government and the paratransit operators. The prominent investors for fleet rejuvenation debt crowdfunding are those interested in contributing to carbon-emission reduction and those positively impacted by paratransit formalization. Similar to the endowment fund, the repayment tenure of crowdfunding should also be comfortable for the formalized paratransit operators.

This alternative approach is intended to provide more affordable and comprehensive options for cities in developing countries to achieve sustainable mobility. When ride-hailing is still waiting for positive cash flow, this alternative approach can disrupt the mobility services market, especially in cities in developing countries. Limited budget for sustainable mobility in developing nations could still yield high coverage and reliability public-transport services through this approach. However, this proposal still requires financing and political

support. It is important to have a champion government with strong political will and persistent spirit to deliver this five (5)-step approach.

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