CITY LOGISTICS: POLICY MEASURES AIMED AT IMPROVING URBAN ENVIRONMENT THROUGH ORGANIZATION AND EFFICIENCY IN URBAN LOGISTICS SYSTEMS IN ASIA

Hussein S. Lidasan*

ABSTRACT

Several recent studies have shown the impacts of the transport system on environment, particularly in urban areas. Urban logistics, including physical distribution and supply chains in urban areas, is a promising subject that can be looked at while developing a framework on addressing the issues in urban environment in the context of transport and land use. The environmental problems, brought in by freight traffic in urban areas, such as impacts on air quality and energy conservation, also have direct or indirect effects on climate change. Measures, involving transport planning and logistics in urban areas, called city logistics have promised to solve many traffic and transport problems. The concept of city logistics is not a new one. However, only recently it has caught the attention of transport planners and experts for its potential contribution to meeting the objectives of logistics from the efficiency, economic and environmental standpoints. This paper shows how logistics and transport initiatives can help in developing a framework, which may eventually contribute to alleviating the negative impacts of freight transport on urban environment.

Keywords: Urban environment, city logistics, low carbon transport system, green and reverse logistics

I. INTRODUCTION

A. Rationale

Freight transport contribution to deteriorating the urban environment has finally been noted. The growth of trucks in urban areas not only worsened the roads and highways and created traffic congestion but also contributed to an overall deterioration of urban environment. Traffic management schemes and measures restricting truck movements in urban areas, such as truck ban and similar vehicular volume reduction schemes have been implemented. Though such schemes seem to curtail truck movements, they have negative economic consequences and can become a regulatory impediment for the development of an intermodal logistics network system in urban areas. It is, therefore, imperative to formulate a holistic framework, addressing the environmental issues related to intermodal logistics system in urban areas.

B. Urban environment, logistics and transport systems

Logistics activities are more important in urban centres than in non-urban and agricultural areas. Urban logistics, involving physical distribution and supply chains in urban areas, is a promising area for developing a framework for addressing transport and land use issues. Environmental problems, brought in by truck traffic in urban areas, such as impacts on air quality and energy use have direct or indirect effects on climate change. Traffic management schemes alone could not alleviate such concerns. There is a need to consider other impacts on urban environment, apart from traffic congestion. The transport system, which is the backbone of a country's logistics system, plays an important role in economic

* School of Urban and Regional Planning, University of the Philippines-Diliman, E-mail: hussein.lidasan@up.edu.ph or thosl76@gmail.com

development and growth. However, if not properly managed, it can contribute to the worsening environmental condition.

The concept of city logistics, which is not necessarily a new one, has caught the attention of transport planners and experts in the recent years. The concept can contribute to meeting the objectives of logistics from the efficiency, economic and environmental viewpoints. The concept of city logistics combines transport planning and urban planning in addressing freight transport issues in urban areas. A positive aspect of city logistics is the active participation of the private sector. This ensures that all key players and stakeholders participate in the process. City logistics is also closely related to green logistics and reverse logistics that are relevant for mitigating environmental effects of transport. Both green logistics and reverse logistics can reduce the adverse impacts of logistics and transport systems on the environment and energy conservation. Properly applied city logistics initiatives could contribute to the economic and financial gains and promote a low-carbon intermodal transport system in urban areas.

II. THE CONCEPT OF CITY LOGISTICS

To understand city logistics, it is necessary to define the concept, policy objectives and key actors involved, and then determine the types of initiatives that are better suited to address the problems, associated with urban freight. Congestion levels on urban roads have been rising due to the increasing levels of traffic demand. A study by Taniguchi and others (1999), noted that the environmental problems, caused by the traffic, became serious issues in many cities, and that large trucks produced substantial amount of air pollution in urban areas by emitting NO_x, suspended particle materials (SPM) and other gases. The problem of energy consumption is an important consideration because natural resources conservation and CO_2 emissions reduction are crucial issues. The reduction in CO_2 emission is the key to limiting global warming and, thereby, reducing impacts on climate. Thus, efficiency gains in urban freight logistics through upgrading freight traffic operation could improve urban air quality and reduce the negative effects on environment.

Taniguchi and others (1999) defined city logistics as the process of totally optimizing the logistics and transport activities by private companies in urban areas, while considering traffic environment, traffic congestion and energy consumption within the framework of a free market economy. The main aim of city logistics is to globally optimize logistics systems within urban areas by considering costs and benefits of schemes to the public and to the private sector.

City logistics provides a holistic approach in addressing energy efficiency and environmental degradation while alleviating traffic problems in urban areas. The concept of city logistics includes both public and private sector, as transport and logistics service providers and as concerned organizations and stakeholders. All parties can benefit – the private shippers and freight carriers can reduce their freight costs, the government can alleviate traffic congestion and environmental problems and the end users, the consumers, can benefit from reduction in cost and improvement in urban environment.

The concept illustrates not only private participation in addressing urban problems but also transport planning, urban planning, information technology, economic modeling, management all combined in coming up with the strategies and initiatives.

A. Policy objectives of city logistics and key actors involved

To understand the objectives of city logistics, it is essential to know the key actors involved in urban freight activities. The key actors involved are: a) shippers; b) freight carriers (transport freight providers; c) residents; and d) administrators (Taniguchi and

others, 1999). Figure 1 illustrates the relationship of the key actors involved in urban freight transport and their respective interest. By knowing the relationships between the actors one could understan how the objectives of city logistics were established. Each of the key actors has their own interests in urban freight. They tend to behave in a different manner, and their behaviours should be considered in modeling city logistics.

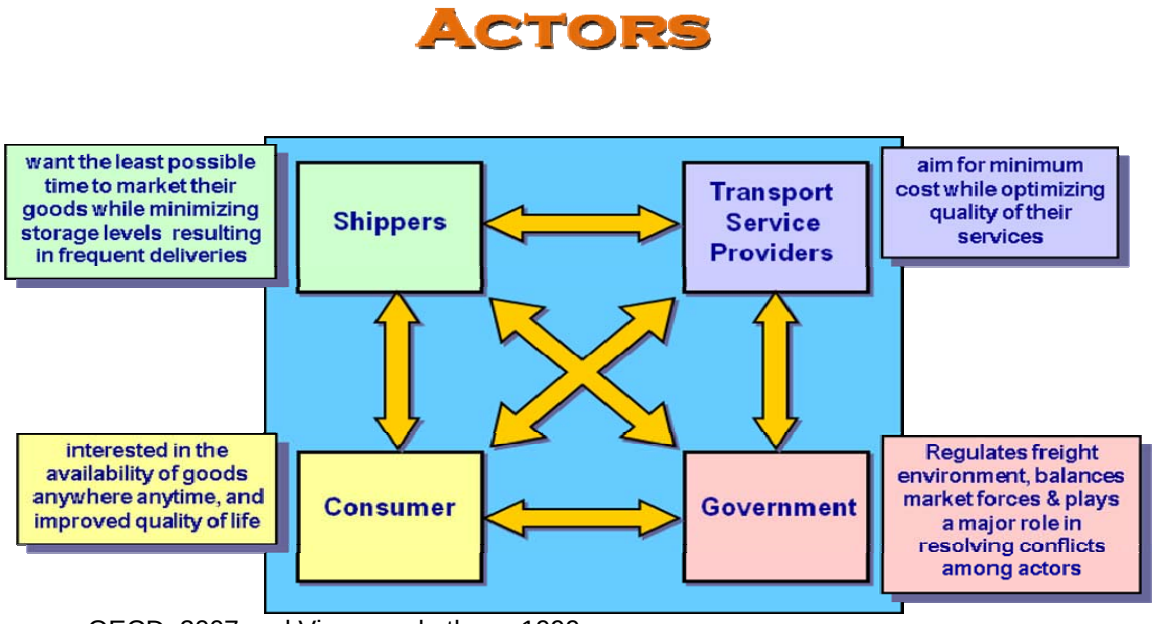
Shippers would like to have high levels of services (LOS) in order to meet their objectives, such as achieving just in time (JIT) requirement.

Transport providers, who are the freight carriers (forwarders) and customers of the shippers, would like to minimize costs of collecting and delivering commodities to customers (the consumers) in order to maximize their profits, but without jeopardizing the quality of their services. Thus, providing higher levels of services at minimal total costs to consumers are among the objectives of the freight carriers.

Likewise, the consumers (or residents) are the people being served who live, work and shop in urban areas. They have their own requirements and as much as possible would like to restrict the entry of trucks in their localities and would not like traffic congestion, noise, air pollution and traffic accidents near their residential and retail areas.

Finally, governments are responsible for enhancing economic development, increasing employment opportunities and, at the same time, alleviating traffic congestion, improving the environment and reducing traffic accidents in the urban area. Generally, the local governments formulate policies and provide infrastructure to achieve their objectives. Ideally, they should be neutral playing a critical role in resolving conflicts arising between the other stakeholders/actors involved in urban freight transport. Though the private sector leads in introducing city logistics initiatives, it is the government that coordinates and facilitates city logistics initiatives within urban logistics and transport policy framework.

Figure 1. Key stakeholders in city logistics



Sources: OECD, 2007 and Visser and others, 1999.

Key stakeholders interactions and their respective objectives should be taken into account when considering city logistics initiatives. To this end, the objectives of city logistics, which are considered comprehensive in nature, were defined to appropriately meet the

requirements of the respective stakeholders or actors in urban freight transport. As such, no single field of specialization can provide the strategies to meet these objectives.

Congestion, air pollution and noise, among others, are considered the most important adverse effects of freight traffic in urban areas. It is therefore in this context that logistics policies and corresponding strategies should be formulated and implemented. Table 1 provides a summary of some issues related to freight transport that are being addressed in selected cities.

Table 1. Summary of issues related to urban freight in selected cities

Key factors to be addressed	Monaco	Kassel	Zurich	Chester/ London	Winchester	Barcelona	Bologna
Congestion				◊		◊	◊
Environment	◊				◊		◊
Noise					◊		
Safety					◊		
Intrusion	◊				◊		
Political considerations	◊			◊			
Cost							
Lack of loading facilities						◊	
High percentage of in-house transport		◊	◊				◊
Poor utilization of vehicles		◊	◊				◊
High proportion of commercial traffic							◊
Restore balance between retail and transport practices				◊			◊

Source: Visser, and others, 1999.

City logistics initiatives, in addressing the impacts of urban freight transport, try to achieve a balance between sustainability and economic development. Table 1 presents wide and conflicting issues that are being addressed in these selected cities. A range of policy objectives, associated with city logistics, includes: a) efficiency; b) economy; c) road safety; d) environmental; e) infrastructure; and f) urban structure (Ogden, 1992).

The efficiency objectives address both the reduction of transport costs and improvement of the quality of transport services, including accessibility, reliability, travel time, flexibility and freight security. The improvement in efficiency contributes to national income and as such serves economic objectives. Gaining efficiency helps the society and has positive effects on income, business and profitability. The environmental objectives, on the other hand, are more focused and are intended to achieve (Visser and others, 1999):

a) Reduction in local air pollution, coming from carbon monoxide, nitrogen dioxide, ozone, aerosols, benzene and lead;

b) Reduction of traffic noise;

c) Improvement of general safety (reducing the number of traffic accidents);

d) Reduction of other forms of nuisance, such as risk, physical hindrances and vibration;

e) Reduction in urban space for transport infrastructures and delivery points;

f) Reduction of emissions, which influence climate change, such as carbon dioxide (CO_2), greenhouse gases (N_2O and methane (CH_4) and acidification (oxides of nitrogen (NO_x), sulphurdioxide (SO_2) and hydrocarbons; and

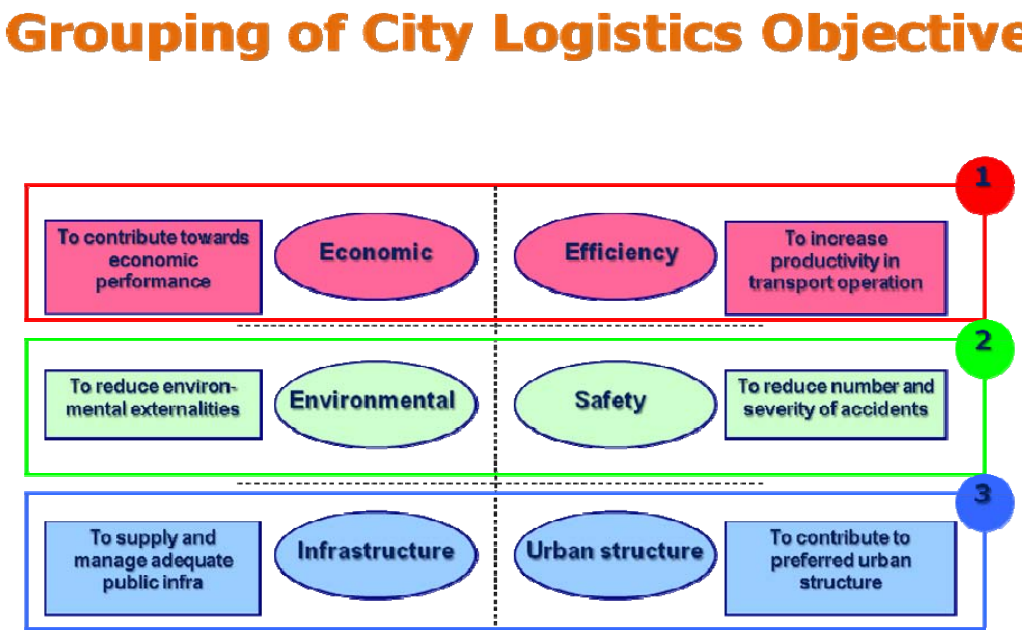
g) Slowing down the depletion of natural resources, such as materials and fossil energy.

The environmental objectives clearly illustrate that city logistics provide the tools for combating environmental degradation and improving air quality in urban areas. The last group of policy objectives of city logistics is related to preserving and maintaining the urban structures, notably those with historical and cultural importance. The policies aim to maintain a balance between infrastructure development and preservation of areas of historical and cultural importance. Figure 2 illustrates the groupings of the city logistics policy objectives.

B. Types of city logistics initiatives

The key point in defining city logistics initiatives is simple - the freight transport is considered to be urban freight transport as soon as it crosses the city borderline. One has to keep in mind that most of freight traffic originates outside city areas or comes from other urban areas. The note is essential since it can have impacts on the effectiveness of particular (localized) measures or schemes.

Figure 2. City logistics policy objectives



Sources: OECD, 2007 and Visser and others, 1999.

Table 2 below provides different strategies or policy measures that comprise the city logistics initiatives, as provided by Ogden, 1992. These groupings of initiatives, in some cases, differ from the classification in other literature on city logistics; however, they are basically the same and consistent with the policy objectives discussed in the previous section. Table 2 provides a menu of strategies, addressing environmental issues, for urban policy makers to employ. They can plan their environmental policy framework considering the strategies that are appropriate and responsive to the needs of their localities. Innovative strategies using the advantages of information and communications technology (ICT) and

improving the level of services of intermodal logistics systems and the transport systems in urban areas. These are summarized in table 3.

Highly urbanized areas and metropolises in Asia, especially in South-East Asia, have already started either employing most of the strategies or developing such strategies using ICT systems. However, other strategies, such as the non-ICT strategies can be initiated by smaller cities.

Table 2. City logistics initiatives or measures

Initiative	Description
• **Network strategies**	– Specific routes can be nominated for use by trucks, such as truck routes designated only for specific classes of vehicles
• **Parking or loading strategies**	– Provision of different facilities for parking, loading and unloading: curb-side use, off-street facilities and truck parking facilities
• **Location and zoning of land use**	– Considering spatial concentrations of transport generating or attracting activities near freight transport facilities
• **Licensing and regulations**	– Provision of a menu of traffic regulations or measures, such as allocation of curb space, loading time restrictions, truck routes regulations and truck access controls, transport regulations, like permits for entering certain areas, or vehicle regulations, to regulate vehicle sizes or emissions
• **Pricing strategies**	– Imposition of road pricing or charges on access or parking as means to allow market mechanisms solve traffic congestion
• **Terminals and modal interchange facilities**	– Introducing transfer points at borders of urban areas, providing transport optimization and limiting the number of truck movements in urban areas

Source: Visser, et al, 1999.

Table 3. New strategies in city logistics

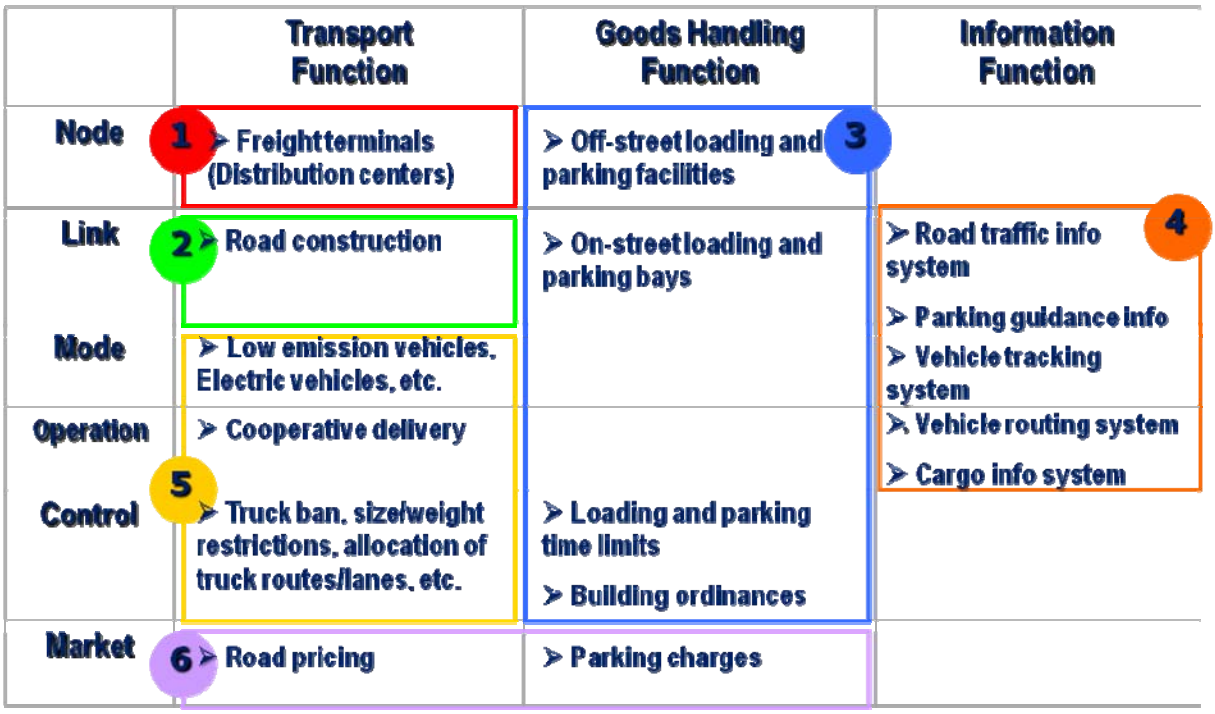
Initiative	Description
• **Traffic information systems**	– Provision of road traffic information through vehicle information communication system (e.g., in Japan: VICS) or through electronic traffic boards along the road
• **ITS (Intelligent Transport Systems)**	– Introduction of new vehicle control systems, maximizing movement of vehicles and commodities
• **(ETC) Electronic Toll Collection**	– Installation of electronic systems at limited access roads, such as tolled expressways, to improve performance of toll collection and decrease impediment
• **Logistics information systems**	– Employed in-company or between companies to improve distribution of goods or they can be

Initiative	Description
	employed between companies for cooperative pick-up and delivery or for cooperative operation of terminals
• **Vehicle technology improvements**	– Improvement of vehicles so as to obtain better performance or to reduce energy-use affecting engine, cargo handling or construction of vehicles
• **Voluntary co-operation**	– Employing various cooperative pick-ups and delivery or cooperative operations of terminals

Source: Visser, and others, 1999.

Figure 3 illustrates how the policy measures are related to the operation of urban freight transport.

Figure 3. Grouping of policy measures related to city logistics



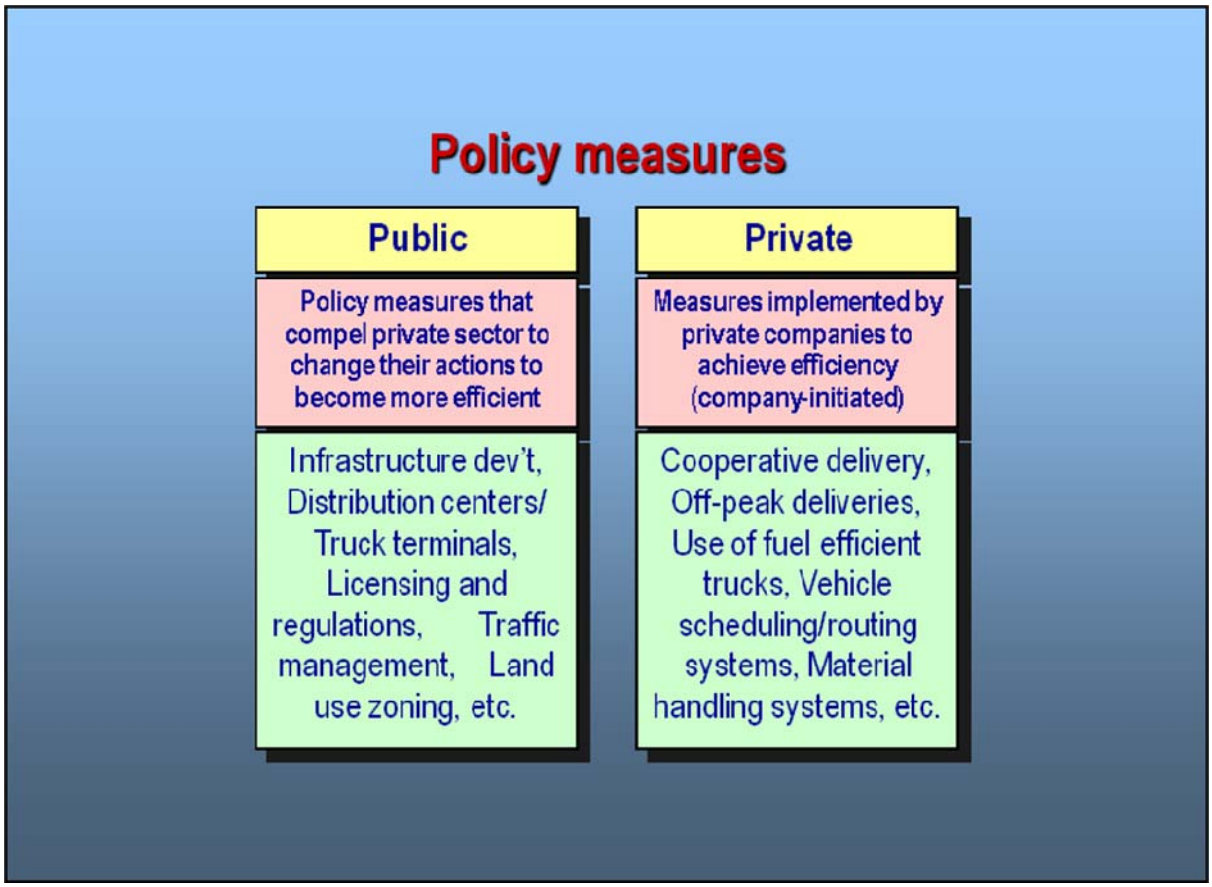
Sources: OECD, 2007 and Visser and others, 1999.

Figure 4 further suggests that the private sector and government need to coordinate their acts in coming up with policy measures so that the combined initiatives are indeed consistent with the city logistics policy objectives. Likewise, the initiatives formulated by the private sector and government have to be complementary so as to avoid conflict, as illustrated in figure 4.

Table 4 summarizes some policy measures, related to city logistics that are being formulated by governments. These measures are grouped according to types and application in addressing the requirements of the urban freight transport system. They provide the menu of infrastructure, regulatory and economic measures that the governments, particularly the local governments, can choose in addressing urban freight transport concerns. This indicates that no single group of measures can solve urban freight transport problems. The same can also be said of with city logistics initiatives that can

contribute to alleviating environmental problems from the viewpoint of urban freight transport.

Figure 4. Policy measures by private and public sectors



Source: OECD, 2007 and Visser and others, 1999.

Most of the policies, cited in table 4, are widely employed in developed countries of Europe and the United States. However, metropolitan areas in Asia, such as Tokyo, Singapore, Kuala Lumpur and Bangkok, have initiated their own policies similar to those mentioned in table 4. Manila and Jakarta, on the other hand, had just begun to formulate their own logistics policies. However, compared to cities in the developed countries, cities in South-East Asia, except Singapore, do not have advance ICT systems to support their logistics policies.

Table 4. Menu of policies related to logistics and transport that governments consider in formulating city logistics initiatives

	Infrastructure provision		Regulations		Economic measures	
	Physical/ Transport	**Information**	**Regulations**	**Standardization**	**Pricing**	**Subsidies**
Land use		Digital map, GPS	Zoning for logistics activities		Property tax	
Networks	Ring roads, freight networks	ETC, Road traffic info system	Truck route control, vehicle and time restriction		Road pricing	
Terminals	Distribution centres	Berth guidance system		Standards for intermodal terminals		Subsidies for cooperative facilities
Parking	On-street parking spaces	Parking guidance info system	Compulsory parking spaces, Parking time		Parking charge differentiation	Subsidies for off-street parking spaces
Vehicles/ Containers	Electric vehicles, low emission vehicles	Fleet management system, vehicle and cargo matching	Emission control, load factor control	Standardized containers, electronic tags	Vehicle tax, fuel tax, environmental tax	Subsidies for low emission vehicles
Cargoes		Cargo tracking, order entry systems				Subsidies for cooperative delivery

Source: Visser and others, 1999

C. Comparative assessment of city logistics initiatives in selected Asian cities

A collaborative research done by Japan Institute of Highway Economics for Organisation for Economic Co-operation and Development (OECD) undertook a preference survey of experts in selected cities in Asia in 2003 to ascertain how these cities considered city logistics policy objectives and initiatives. Employing weight scaling, Table 5 shows the results of the survey on their preferences of policy objectives.

Table 5. Preference survey experts on city logistics policy objectives (weight objectives)

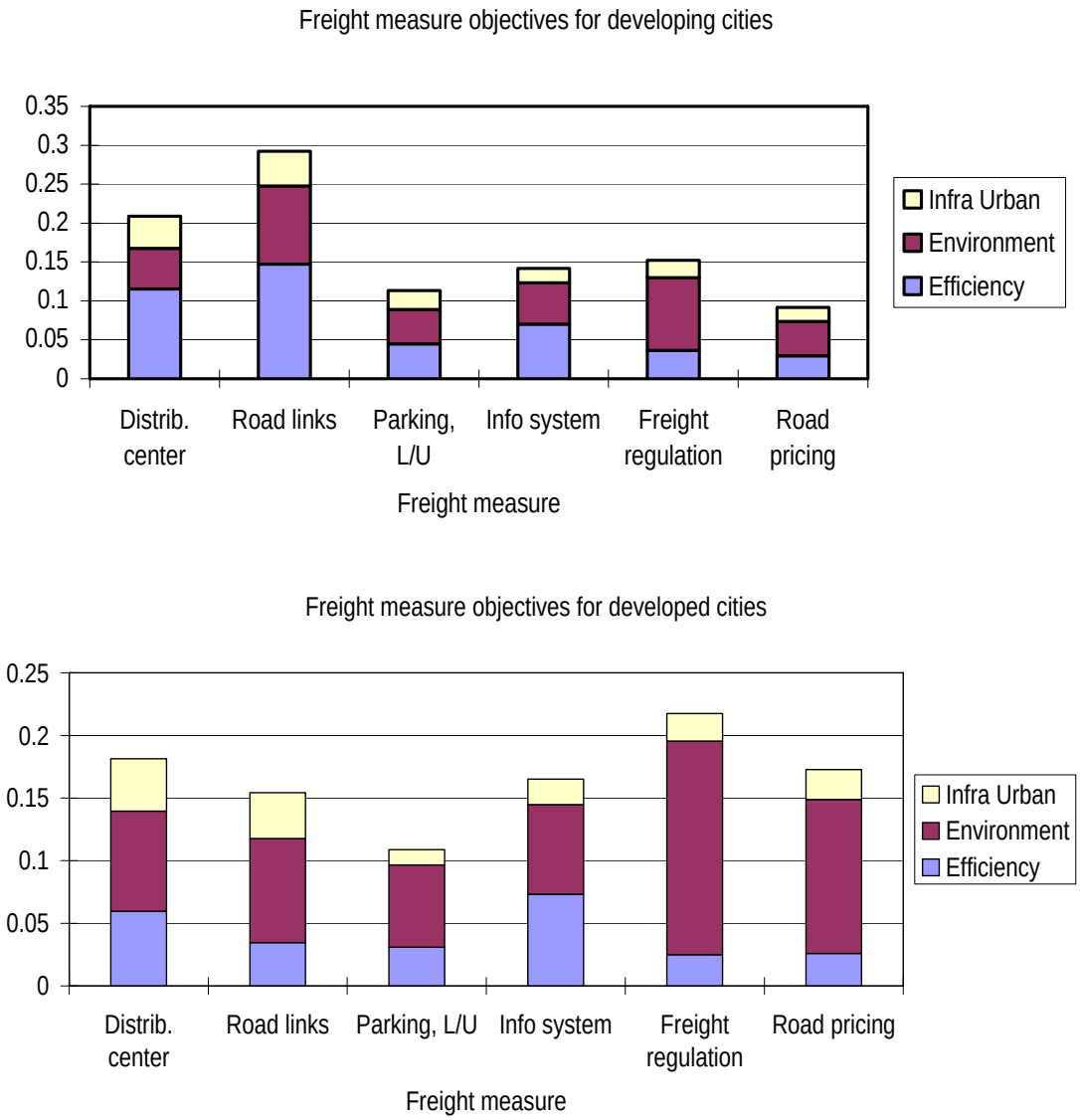
Objectives	Bangkok	Jakarta	Kuala Lumpur	Manila	Shanghai	Seoul	Osaka	Tokyo
Efficiency & Economy	0.327 (2)	0.481 (1)	0.258 (2)	0.550 (1)	0.500 (1)	0.311 (2)	0.097 (3)	0.167 (2)
Safety & Environment	0.413 (1)	0.405 (2)	0.637 (1)	0.240 (2)	0.250 (2)	0.493 (1)	0.570 (1)	0.667 (1)
Infra & Urban Structure	0.260 (3)	0.114 (3)	0.105 (3)	0.210 (3)	0.250 (2)	0.196 (3)	0.333 (2)	0.167 (2)

Source: OECD, 2003
Note: values in parentheses refer to rank order of importance

The table indicates that there are differences in the priorities of cities with regard to city logistics policy objectives. The cities considered developed (Seoul, Tokyo and Osaka) set higher priority on safety and environmental objectives as compared to developing cities. Developing cities, such as Manila and Jakarta, placed more emphasis on economic and efficiency objectives. The choice is obvious, considering that these cities still aim at improving their economic support infrastructure and services. On the other hand, Bangkok and Kuala Lumpur, which are considered to be on the verge of joining developed cities of Asia, regard safety and environmental objectives as more important due to the gravity of air pollution problem and high accident rates.

Figure 5 further supports the results of the survey as summarized in table 5. Albeit this observation, an interesting note to consider is that both the developed and developing cities are now putting more importance on urban structure. To have a clearer understanding of how the cities rated their policy objectives, table 6 summarizes the freight transport infrastructure policy characteristics of the selected cities. It showed an indication for the rating of the experts of their cities.

Figure 5. Policy objectives by type of initiative by city



Source: OECD, 2003.

Finally, table 6 shows perceived logistics policy objectives as prioritized. The freight characteristics, primary objectives and existing freight measures of the selected cities are summarized, including the IT applications at the time of the survey. The cities that had shown no IT applications have now introduced applications, such as ETC (Electronic Toll Collection, among others). The table further indicated varied responses to a number of discussed topics. The difference may explain the standing in terms of economic development of the selected cities. The cities that have attained economic growth and development have high levels of logistics infrastructure and information systems and, as such, may have placed higher priority on environment and safety as their policy objectives, compared to the cities that are just introducing in place logistics infrastructure and facilities to support economic growth and development.

III. METRO MANILA: A CASE STUDY ON CITY LOGISTICS FRAMEWORK FOR URBAN ENVIRONMENT

A. Urban environment issues and initiatives in addressing them for Metro Manila

Like any other metropolitan area in Asia, Metro Manila faces several challenges. Its logistics policies are consistent with that of the country. At the local level, they are focused on a) reducing traffic congestion, b) alleviating environmental and social impacts, and c) improving economic and technical efficiency of the transport system. At the national level, the policy objectives aim at providing efficient intermodal transport system that serves as the backbone of the country's intermodal logistics network system, supporting economic development and regional economic cooperation in the South-East Asia. Policy objectives at the regional and international levels are focused on improving efficiency of moving people and freight, reducing impacts of transport on the global environment and at the same time facilitating global competitive trading. It can, therefore, be said that policy objectives are indeed consistent with city logistics. Following this premise, Metro Manila's prioritized city logistics policy objectives are as follows:

a) Efficiency and economy;
b) Safety and environment;
c) Infrastructure and urban structure.

In line with the above policy objectives, the following city logistics initiatives were introduced:

a) TDM (Travel Demand Management) Schemes;
    i. UVVRP (Unified Vehicular Volume Reduction Program)
    ii. Truck ban at major thoroughfares
b) Application of ICT (Information and Communications Technology);
    i. ETC (Electronic Toll Collection)
    ii. Customs facilitation at major ports
c) Land use controls;
d) Development of terminals;
e) Development of economic and industrial zones at urban fringes.

Table 6. Freight transport characteristics of selected cities in Asia

	Shanghai	**Jakarta**	**Manila**	**Bangkok**	**Kuala Lumpur**	**Seoul**	**Osaka**	**Tokyo**
Primary objective	Efficiency and economy	Efficiency and economy	Efficiency and economy	Efficiency and economy	Safety and environment	Safety and environment	Safety and environment	Safety and environment
Underlying problem	Congestion	Congestion	Congestion	Congestion accidents	Accidents	Accidents	Air pollution	Air pollution accidents
Prioritized measures	Road links Terminals Info system	Road links Regulation Terminals	Road links Terminals Info system	Road links Terminals Regulation	Regulation Info system Regulation	Info system Terminals Road links	Regulation Terminals Pricing	Regulation Pricing Parking facility
Main expected effects	Capacity Jobs Accidents	Costs Reliability Accidents	Costs Reliability Capacity	Costs Decentralize Air pollution	Accidents Noise Reliability	Accidents Air pollution Reliability	Air pollution Noise Decentralization	Accidents Air pollution Decentralization
Existing measures								
Node				Public freight terminals		Public freight terminals	Public freight terminals, Truck parking facilities	Public freight terminals, Truck parking facilities
Link	Road network	Road network	Road network	Road network	Road network	Road network	Road network	Road network
Mode							Idling-stop	Idling-stop

	Shanghai	Jakarta	Manila	Bangkok	Kuala Lumpur	Seoul	Osaka	Tokyo
							trucks	trucks
Operation	Off-peak deliveries	Off-peak deliveries	Off-peak deliveries	Off-peak deliveries	Off-peak deliveries	Cooperative delivery, Off-peak deliveries	Cooperative delivery, Vehicle fleet sharing	Cooperative delivery, Vehicle fleet sharing
Regulations	Truck restriction	Truck restriction	Truck restriction	Truck restriction	Truck restriction	Truck restriction		Local truck restriction
Economic measures		Truck parking fees				Truck parking fees		Parking charges, Road pricing
IT application					ETC	EDI, ITS	EDI, ITS	EDI, ITS, Internet load auction

Source: OECD, 2003.

As mentioned, the primary objective of Metro Manila in the context of city logistics is attaining efficiency and economy. As in other Asian cities the underlying problem related to urban freight transport is congestion. To address the problem and at the same time meet efficiency and economy objectives, the priority measures should include: a) provision of road links; b) development of terminals; and c) development of information systems. The provision of road links is aimed at building the country's economic infrastructure backbone. To achieve the purpose, intermodal logistics corridors, such as the Subic/Clark-Metro Manila-Batangas corridor, are being improved through the upgrading of a high standard highway system. To this end, completion of the limited access highway network in the corridor will provide the vital link from southern Luzon to central Luzon, where major international ports and airports are located. The corridor will also enhance the access of production areas to the markets and improve mobility of people in the two regions.

The underlying expected effects are reduction of costs and improvement of reliability and capacity. The logistics corridor is not complete, particularly in Metro Manila, where trucks travel on urban roads and are subject to local traffic management schemes. The main measures include off-peak deliveries and truck movement restrictions. These measures will contribute to relieving congestion and reducing environmental impacts; however, they also incur additional costs and impediments.

With the passage of the country's law on climate change, the Philippine Government, through its concerned line agencies have drawn guidelines coming up with measures in addressing climate change. Priority for cleaner fuel or energy use has been set and all vehicles are now subject to gas emissions inspection. The establishment of the Road Safety Board shows country's concern for the improvement of road safety. Speed limits on toll roads were set and enforced.

Within the city centres, notably in metropolitan areas, such as Metro Manila, Metro Davao and Metro Cebu, various TDM schemes were implemented. The most noteworthy is the imposition of truck restrictions, known as truck ban, which will be discussed further in this paper. Another important TDM measure is vehicular volume restriction on peak hours, technically known as the UVVRP (Unified Vehicular Volume Reduction Program) and popularly called colour-coding based on the original programme name designated for color coding for private vehicles. The UVVRP has been in place in Metro Manila for more than ten years and is currently being reviewed.

The measures imposed under the infrastructure and urban structure objective that affect urban logistics are as follows: a) land use zoning and controls; b) restricting construction of logistics centres and terminals near residential areas and areas designated as historical and heritage preservations. Similarly, designation of locations for logistics

centres, terminals and related facilities in urban areas are now being incorporated in land use city plans. Likewise, decongesting urban areas through the development of new towns, creating economic and industrial zones at urban outskirts, is being urged by both the government and the private sector.

The development and application of ICT for logistics aim at meeting the general objectives of city logistics policies. They not only reduce the impediment in the intermodal logistics network system but also enhance efficiency of logistics system and contribute to improving urban environment. The reduction of transaction time at customs facilities in ports is another merit of ICT.

B. Implications of city logistics policy in Metro Manila

The truck ban scheme is meant to illustrate the implications of city logistics policies in Metro Manila. The truck ban has been in force for several years. The common issues, both positive and negative, related to traffic ban in Metro Manila, which are positive and negative, are summarized below:

a) It is the most commonly utilized vehicle restriction in developing countries;

b) Banning trucks is perceived as a practical form of reducing traffic during peak hours;

c) Government usually enforces truck restraints so that public transit modes would not compete for limited road space;

d) Viable measure during construction periods, when road capacity is greatly reduced, ensuring better traffic movements; and

e) Truck restrictions can present problems if not fully understood.

Truck ban is considered a powerful traffic management scheme, however, as already mentioned earlier, it affects urban freight transport operations. It is, therefore, important that viable alternatives are presented to minimize the impacts. Figure 6 shows the corridors in Metro Manila where truck ban is imposed; while table 7 summarizes the various truck ban schemes implemented. As mentioned, truck ban has impacts on urban transport system. The most important are economic impacts, which are summarized below:

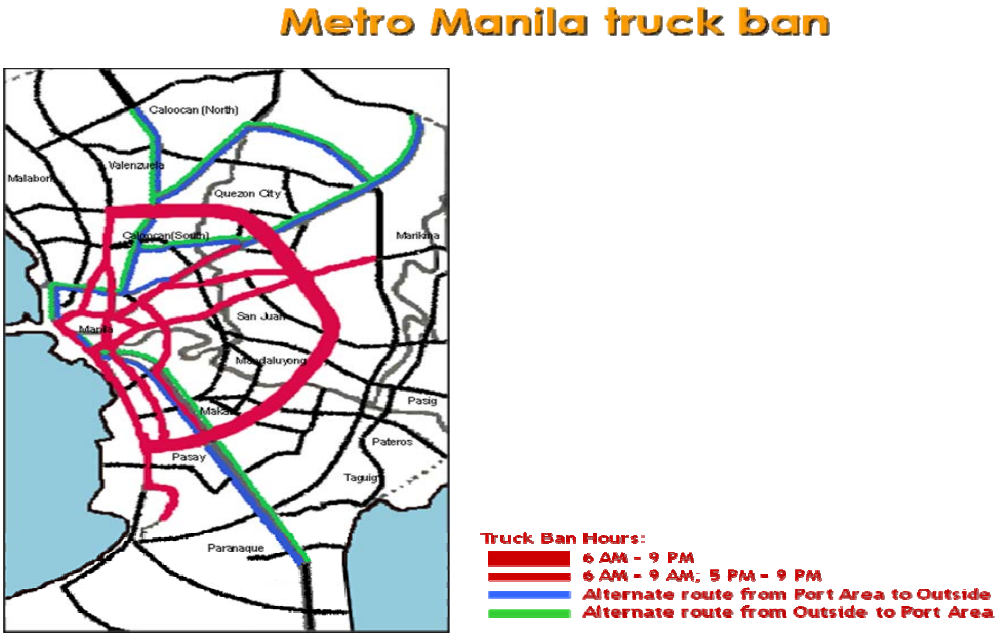
a) Changes in truck operating characteristics
    i. Shortened delivery schedules and reduced delivery hours
    ii. Reduced quantity of products delivered during banned hours
    iii. Increased travel time

b) Reduced truck delivery frequency
    i. Decreased truck trip frequency per day

c) Reduced production/supply chain efficiency
    i. Decreased rate of production due to delays in delivery schedules

d) Increased transport costs
    i. Increased costs due to poor productivity are passed on to consumers

Figure 6. Corridors covered by truck ban



Source: Castro and Kuse, 2005.

The safety impacts of truck ban, as shown in the logic analysis (Castro and Kuse, 2005) indicated the likelihood of increase in accidents when the truck driver:

a) Operates a trailer-truck;
b) Has insufficient sleep;
c) Performs night time deliveries;
d) Has insufficient knowledge of the truck ban ordinance; and
e) Violates truck ban rules

Table 7. Truck ban implemented in Metro Manila

Truck ban 1 (EDSA only)	6 a.m. to 9 p.m. everyday except Saturdays, Sundays and Holidays. No cargo truck shall be allowed to travel or pass along EDSA.
Truck ban 2 (10 major routes)	6 a.m. to 9 a.m. and 5 p.m. to 9 p.m. every day except Saturdays, Sundays and Holidays. No cargo truck shall be allowed to travel or pass along these routes.
Definition of cargo truck	"Cargo truck" as used in the ordinance refers to motor vehicles, whether loaded or empty, having a gross vehicle weight of 4,500 kg or more, principally intended for carrying cargo.
Violation and penalty	Any person who violates the provisions of this ordinance shall be punished by a fine of not less than 500 pesos but not more than 2,000 pesos or by imprisonment of not less than 7 days but not more than 30 days or both, at the discretion of the court.

Source: Castro and Kuse, 2005.

There is a need for Metro Manila to enhance its environmental improvement policy framework to incorporate city logistics among the alternative approaches addressing the issues in environmental improvement. The case of the truck ban, which is considered an effective policy initiative in the context of addressing not only congestion but presumably environmental deterioration, showed that it has not only social adverse effects but also

negative effects on efficiency and costs. It is, therefore, imperative that policymakers in Metro Manila, and any other metropolitan areas in Asia, should complement truck ban (or similar traffic management schemes) with other city logistics initiatives to have a balance in addressing congestion and environmental improvement.

CONCLUSION

There are a number of studies that showed the negative impacts of transport, notably freight transport on urban environment. Remedial measures involving transport planning and logistics, within the concept of city logistics were found promising in addressing the negative impacts of urban freight transport on traffic and urban environment. The policy objectives of city logistics, ranging from efficiency/economic to urban structure to environmental aim at improving the level-of-service of the urban freight transport systems. They can ensure economic growth and at the same time address the negative impacts of urban freight transport on the environment.

The concept of city logistics promotes green logistics and reverse logistics, which can also contribute to urban environment improvement.

REFERENCES

Castro, J. T. and H. Kuse (2005). The impacts of large truck restrictions in freight carrier operators in Metro Manila. *Journal of the Eastern Asia Society for Transportation Studies,* vol. 6, pp. 2947-2962. Available from www.easts.info/on-line/journal_06/2947.pdf.

Ogden, K. W. (1992). Urban Goods Movement: A Guide to Policy and Planning, Brookfield: Ashgate Publishing.

Organisation for Economic Co-operation and Development (2003). *Logistics Developments Supported by ICT and ITS in the Asia-Pacific Region*. Prepared by the Asian Task Force, Institute of Highway Economics. OECD RTR Outreach Activity of the Asian Logistics Project. Tokyo. Available from <http://browse.oecdbookshop.org/oecd/pdfs/free/9204011e5.pdf>

Organisation for Economic Co-operation and Development (2007). *Efficient and Sustainable Intermodal Logistics Network in the Asia-Pacific Region*. Prepared by the Asian Task Force, Institute of Highway Economics. OECD/ECMT Outreach Activity of the Asian Logistics Project, Tokyo. Abstract and conclusion available from http://www.transportstrategygroup.com/shop/item/efficient-and-sustainable-intermodal-logistics-network-asia-pacific-region-institute-of-highway-economics-tokyo-2007.

Taniguchi, E. and R. G. Thompson (1999). *City Logistics I.* Kyoto: Institute of Systems Science Research.

Taniguchi, E., R. G. Thompson, and T. Yamada (1999). Modeling city logistics. In *City Logistics I,* E. Taniguchi and R. G. Thompson, eds. Kyoto: Institute of Systems Science Research, pp. 3-38.

Visser, J., A. van Binsbergen and T. Nemoto (1999). Urban freight transport policy and planning. In *City Logistics I,* E. Taniguchi and R. G. Thompson, eds. Kyoto: Institute of Systems Science Research, pp. 39-70.

Transport and Communications Bulletin for Asia and the Pacific

General guidelines for contributors

1. Manuscripts

One copy of the manuscript in English should be submitted together with a covering letter to the Editor indicating that the material has not been previously published or submitted for publication elsewhere. The author(s) should also submit a copy of the manuscript on computer diskette, labelled with the title of the article and the word-processing programme used, or by e-mail as an attachment file. MS Word and WordPerfect are the preferred word-processing programmes.

The length of the manuscript, including tables, figures and bibliographical references, may not exceed 7,500 words. Manuscripts should be typed on one side of A4 paper in double spacing and pages should be numbered. A list of references should be included. Manuscripts are subject to editorial revision.

The title page should contain (a) title; (b) name(s) of the author(s); (c) institutional affiliation(s); (d) complete mailing address, email address and facsimile number of the author, or of the principal author in the case of joint authors; and (e) an abstract of approximately 150 words clearly stating the main conclusions of the article. Acknowledgements, if any, should appear at the end of the text.

Articles should include a final section containing the main conclusions, which should be broadly intelligible to a non-specialist reader.

2. Tables

All tables should be clearly headed and numbered consecutively in Arabic numerals. They should be self-explanatory. All tables should be referred to in the text. Full source notes should be given below each table, followed by general notes, if any. Authors are fully responsible for the accuracy of the data.

3. Figures

All figures should be provided as camera-ready copy and numbered consecutively in Arabic numerals. All figures should be referred to in the text. Full source notes should be given below each figure.

4. Footnotes

Footnotes, if any, should be brief and numbered consecutively in superscript Arabic numerals. Footnotes should not be used for citing references.

5. References

There should be a complete reference for every citation in the text. References in the text should follow the author-date format, for example (Sadorsky 1994), or (Skeldon 1997: 243). Only those references actually cited in the text should be listed and these should appear in alphabetical order at the end of the manuscript. References should be in the following style:

[Book]
Skeldon, R. (1997). *Migration and Development: A Global Perspective.* London: Longman.

[Chapter in book]
Krueger, Alan, B. and Lawrence H. Summers (1987). Reflections on the inter-industry wage structure, in K. Lang and J.S. Leonard, eds., *Unemployment and the Structure of Labour Markets.* London: Blackwell. pp.40-49.

[Article in journal]
Wachs, M., 1990. Regulating traffic by controlling land use: the southern California experience, *Transportation*, vol. 16, No. 3, pp. 241-256.