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EcoLogistics

Low carbon freight for sustainable cities

on the basis of a decision
by the German Bundestag

Recommendation for National EcoLogistics Framework



About the EcoLogistics Project

Supported by the Federal Ministry for Economic Affairs and Climate Action of Germany (BMWK) through the International Climate Initiative (IKI), ICLEI's EcoLogistics project (2017-2021) supports the governmental and non-governmental actors to build strategies and policies to promote low carbon and sustainable urban freight involving nine cities and regions in Argentina, Colombia and India:

- Argentina: Córdoba, Rosario, Santa Fe de la Vera Cruz (Santa Fe)
- Colombia: Capital District of Bogotá, Metropolitan Area of Aburrá Valley (AMVA), Manizales
- India: Kochi, Panaji, Shimla

For more information, please visit: sustainablemobility.iclei.org/ecologistics

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Executive summary

In the context of rapid urbanization coupled with economic development, the demand for goods and services resulting in urban freight movement is expected to grow by 140 per cent over the next 10 years. While final-mile freight movement in Indian cities currently contribute to 50 per cent of total logistics costs, an efficient urban logistics system becomes more relevant. Therefore, urban freight plans, in conjunction with other development plans, is a prerequisite in order to minimize the negative externalities and to create efficient and sustainable freight flows in a city

In above context, Government of India has launched Gati Shakti National Master plan for multi-modal connectivity that aims to develop infrastructure to reduce logistic costs and boost the economy, an efficient urban logistics system becomes more relevant. Furthermore, the National Logistics Policy 2022 aims to improve the efficiency and sustainability of last-mile delivery and resolving transportation-related issues. Therefore, the learning from the EcoLogistics project in Kochi, Panaji and Shimla implemented in partnership of Local government are used to formulate the guidance document of recommendation for the National EcoLogistics framework for replication across other Indian cities.

This recommendation document showcases the methodology and process to be used for urban freight action plan aiming to minimize the impact of negative externalities caused by freight movement: including traffic congestion, GHG emissions, air pollution, noise pollution, traffic accidents and associated safety concerns, and land-use severance. Similarly, the action plan will provide a roadmap to authorities in enhancing the freight movement and operations with a low carbon approach aiming to reduce GHG emissions. It facilitates a safe, socially inclusive, accessible, reliable, affordable, fuel-efficient, environmentally friendly, low-carbon, and resilient freight movement in the city.

The suggested framework is a guide for the cities towards EcoLogistics strategies that has explicit long-term freight goals and a clear set of measures to address urban freight externalities. As such, it is not just focused on one issue, but instead focuses on developing a safe, efficient, and environmentally sustainable urban freight system. The development of a plan also enables an alignment of stakeholder views and actions towards a common goal.

1. Overview

India's freight and supply chains are crucial and help in fulfilling the growing freight demands. With an increase in urban population, a simultaneous increase in freight demand is also observed resulting in increased freight movement and increasing pressure on existing ecosystem, this demand may further exaggerate in future.

Freight sector contributes to 13.5% of GDP (2017) (NITI Aayog & RMI, 2018) in India which is higher as compared to average of 8 to 10% in other developing countries (Errampalli, 2020), yet the network of people and businesses, processes, transport and storing of goods involved in freight, is usually not visible. Also 18% of final goods price is due to the cost transportation of goods. Freight sector also contributes to 7% of total CO₂ emission in India.



Figure 1: Freight sector in India (Image- ICLEI SA, Data source- (NITI Aayog & RMI, 2018))

Despite of the high dependence and expected future rise in demand for freight sector, it is still neglected with majority of initiatives/studies/analysis being focused on passenger mobility. Thus, there is a need to focus on urban freight to improve its efficient operation.

The Government of India has taken some initiatives to combat the externalities related to urban freight which include Dedicated Freight Corridors, Logistics Ranking Index, etc. Although these initiatives are related to urban freight yet the focus on last mile delivery of goods is still lacking. Last mile delivery segment of urban freight has multiple stakeholders which make it more inefficient. Since last mile delivery is usually under the purview of city and initiatives/ decisions taken at city will impact the sector but the roles of cities is also very limited in current ecosystem.

Understanding the lack of focus on cities, ICLEI started implementing EcoLogistics project (2017-2021) in 3 cities each in Argentina, Colombia, and India. This project is being supported by German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) through the International Climate Initiative (IKI). The project intended to showcase the approach to integrate urban freight as a part of overall city development and reduce negative externalities attached with the sector.

2. Policies and actions, focused on urban freight and logistics

Currently the policies and actions related to freight and logistics are very limited and majorly focused on the operations while the integration between the land use and transport strategy is still lacking. At the national level, there is an increased focus on India's Intended Nationally Determined Contribution (INDC) aims to achieve its Sustainable development goals (SDGs) and these are major goals to which urban freight is closely linked. Central Government has also developed policies related to logistics movement including Draft National Logistics Policy, Make in India, URDPFI guidelines, National Urban Transport Policy, 12th five year plan (2012) and budget along with initiatives including formation of Logistics division, ease of doing business, logistics portal, logistics data bank development and district level reforms.

Other freight related acts include, the Indian Vessels Act (1917), The Indian Bills of Lading Act (1856), The Indian Carriage of Goods by Sea Act (1925), The Merchant Shipping Act (1958), The Warehousing Corporation Act (1962), The Multimodal Transportation of Goods Act (1993), The Carriage by Road Act (2007) and The Railways Act (1989), National Waterways bill (2015), Pradhan Mantri Jal Marg Yojana (PMJMY) etc.

Apart from these, there are other related policies which affect freight in India. States including Gujarat, Andhra Pradesh, WB, J&K, UP, Chhattisgarh, Maharashtra, Karnataka, HP, Kerala and Goa have developed State logistics policy or taken initiative to encourage logistics in their state. Policies include development of logistic park, setting up/ improving basic infrastructure and amenities at warehouses/loading and unloading areas, fund allocation and regulation of freight.

Despite of initiatives at national, state and city level (city specific notifications), there is a lack of focus on last mile freight delivery. The Department of Logistics (established under The Ministry of Commerce), recently developed the National Logistics Policy which focuses on regional freight movement along with development of state/city level logistics plan among other measures.

2.1. City actions and urban goods movement

Cities play a very inactive role in freight sector, the National Logistics Policy of India also lacks the focus on last mile goods delivery which relates directly to the cities but the city level logistics plan development will address this issue.

There is a need for a coordinated actions across city, state, and the national governments along with the private sectors for an efficient freight operation. Cities may play an important role in taking up leadership roles and engage with stakeholders to develop shared solutions for increased freight efficiency. Coordinated efforts may improve understanding and data availability, leading to continual improvement of freight sector.

3. Background of urban freight

Over the past decades, economic development has transformed India. Rapid economic development, technological evolution and accelerated investment have poised the growth of freight sector as simultaneous growth in population improves purchasing power of the citizens (3rd globally in 2017) further leading to increased demand for freight movement.

Urban freight acts as the backbone of commercial activity through delivery of supplies and services. Freight sector is an essential component of efficient economic and social development in India and contributes to 13.5% of GDP. This sector also accounts for 18% of embodied logistics costs of the final price of goods on an average (2017)¹ which is much higher than other countries (e.g. in USA it is 7.6%) due to various challenges interlinked with operation. This provides a significant opportunity for improvement in the transit efficiency between two cities to reduce this logistics cost.

Freight vehicle ownership is growing faster than GDP and freight activity with an annual growth of approximately 8.5% since 2010² and the freight activity may increase by more than 500% (in ton-km) resulting in about 400% increase in freight CO₂ emissions.³ A major percentage of existing fleet includes trucks which are more than 10 years old and the operators focus on maximising profits instead of exploring ways for efficient driving resulting in increased negative externalities.

Various negative externalities which include congestion due to the presence of heavy-duty trucks, parking of freight vehicles for loading/unloading causing conflict with passenger movement also, pollution from freight vehicles (majority of vehicles are old leading to more pollution). In 2018, logistics sector contributed to 7% of country's CO₂ emissions⁴, which may further rise with the rise in freight movement to satisfy demands. Even though urban freight is closely linked to the overall livability aspect of urban areas, consideration of freight sector is still overlooked with major focus on passenger movement.⁵

Majority of goods consumed in urban areas originate externally and are transported within cities through "last mile" transport elements in the supply chain. E-commerce sector is comparatively organised due to its highly competitive market, while other sectors require understanding and organisation.

¹ (NITI Ayog September 2018)

² <https://www.teriin.org/sites/default/files/2021-02/sustainable-freight-initiatives-report.pdf>

³ <https://www.teriin.org/sites/default/files/2021-02/sustainable-freight-initiatives-report.pdf>

⁴ (NITI Ayog September 2018)

⁵ GIZ SUTP

4. Urban goods movement in India

Movement of goods and materials is termed as urban freight and it serves as the wheel on which urban economy moves. Urban areas and freight movement are interconnected and exist in correlation with each other, it is the population which creates demands for goods to be transported and the freight movement helps in development in urban areas.

In recent times, the freight sector in India is evolving and transforming rapidly. Economic growth in India is the result of investment and development of infrastructure and technological advancement specially related to transport system. Goods movement in India usually takes place via roads (HCVs, MCVs, LCVs, 3 wheelers and smaller vehicles for last mile delivery), railways, aviation, sea and pipelines (like safe drinking water, cooking gas, etc.), etc.

The type of vehicle depends on the quantity, time available, distance and type of goods. The usual types of vehicles used are as follows:

- Trucks usually used for long distance freight transportation of bulk goods i.e. for regional flow of materials depending on the connectivity of the city.
- Freight autos and vans are used for inter/intra city flow of goods in small quantities.
- E-rickshaws are also usually used in cities for intercity flow of goods. It is more prevalent to use these in cities with plain terrain. These can be used on narrow roads where it is difficult for the autos or trucks to enter.
- Very small quantities can be delivered by bikes/scooters. E-commerce products are usually delivered by motorbikes which is more efficient in case of congestion.
- NMT- Conventionally NMT contributes as a major mode of last mile delivery in cities. Manual rickshaw, cycles, porters, carts etc. are used to deliver goods to consumers.

Porters deliver the loads to the destinations which are inaccessible to road transport especially hills/ mountainous areas or shops on slopes (Eg. Shimla)

Indian cart pullers: It is the mode of freight transport in areas which have narrow lanes and it is not possible for the trucks or other roadways to travel in these areas. Eg. Bazaar road, fort Kochi

In addition to various modes of transport, goods movement also involve various land use elements like ports, warehouses, inter modal terminals, urban logistics facilities, storage areas, etc. The figure above illustrates the various modes used for goods movement along with various land related elements.

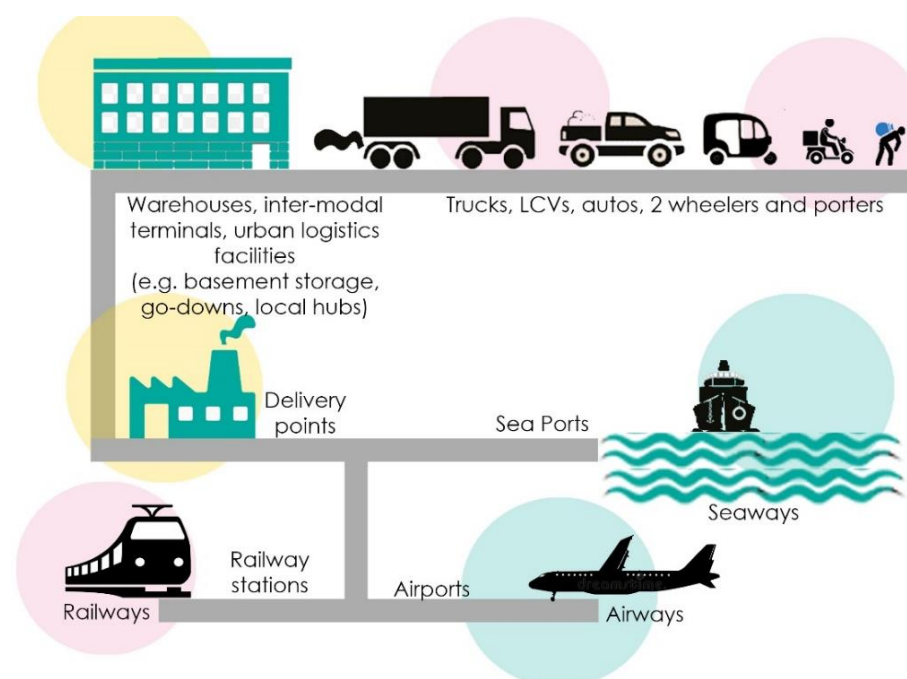


Figure 2: Modes and elements related to goods movement (Source: ICLEI SA)

4.1. Disruption due to Covid-19 pandemic.

A change in behaviour of freight demand generators (consumers) has been witnessed due to various factors related to Covid-19 pandemic. Various travel restrictions and lockdowns imposed by the government led to increase in dependence on e-commerce/home delivery leading to an increased pressure on existing freight ecosystem, specially the last mile delivery of goods.

Although the economy and situation is recovering back and returning to its previous situation but the behavioural change and demands needs to be considered for planning an efficient freight ecosystem. Also, an increased focus is required on supply chain resilience to cater to similar situations in future. This can be utilised as an opportunity for adoption and integration of new technology and intermodal freight, etc.

4.2. Stakeholders

Urban freight sector involves multiple stakeholders leading to disparity in roles and actions. It also includes various sectors like retail (e-commerce included), courier and post, hotel/restaurant/café, buildings and construction and municipal waste.

Various stakeholders play different roles which include regulatory roles, administrative roles, development of policies, enforcement roles, develop supporting infrastructure, ensure safety and vehicle standards. The list of these stakeholders and their roles are as follows:

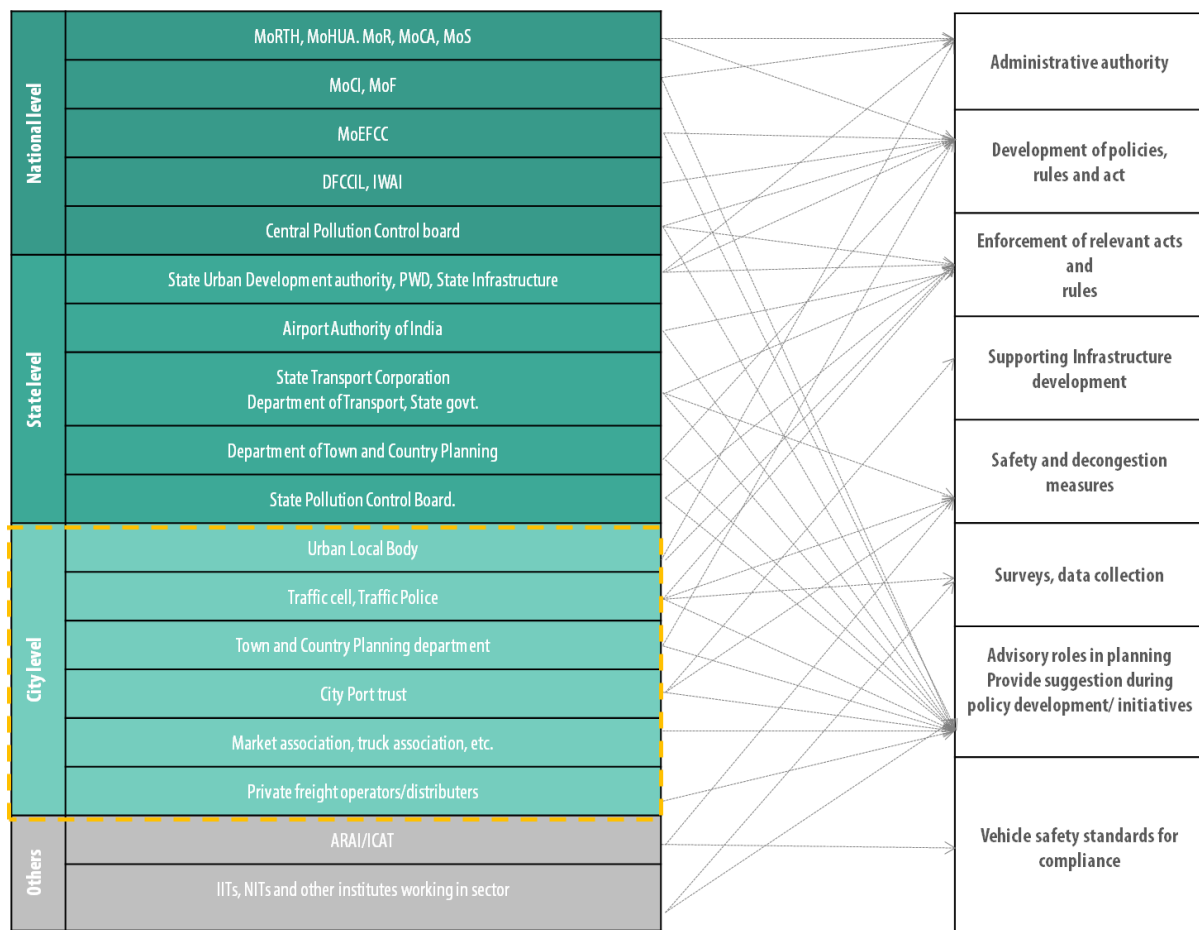


Figure 3: Stakeholders related to freight ecosystem in India (Source: ICLEI SA)

4.3. Urban freight movement in India – Approaches for improvements

In India, the maximum speed of freight vehicles (trucks operated by larger operators) is around 30-40 kmph covering about 600-800 km per day while the small and medium sized transporters (dominant segment) are able covers 300-325 km per day⁶. These statistics

⁶ (Pritam Banerjee, Soumya Chattopadhyay, Deepankar Sinha and Prashant Sharma August 2021)

are much lower than the global average of 60-80 kmph with distance of about 1200-1400 km per day.⁷ This comparison along with other externalities exemplify the need to understand and incorporate approaches for improvement of freight operation in India.

The illustration below includes the approaches of avoid, shift, improve, shifting to alternative fuel options and behaviour change of users and operators which are some of the approaches for improving freight operation in India.



- Avoid (empty) trips
- Reduce freight volume and haul distance
- Increase load factor
- Customise vehicle sizes



- Shift road transport to NMT
- Maintain and strengthen non-motorised freight sector
- Shift road transport to rail
- Shift road transport to water transport.



- Use technologies for fuel efficient trucks
- Better operate and manage logistic traffic
- Reduce air pollutants & noise



- Use alternative fuels and drive systems
- Improve fuel quality

Behaviour change for people, often in workplace travel planning

- Reduce trips by reducing unnecessary deliveries)
- Re-time trips i.e. deliveries during off peak hours in day/night
- Re-route trips for delivering goods to avoid congested areas
- Re-mode trips by using alternatives like cargo bikes and walking

The **Avoid-Shift-Improve** approach is common in the transport sector. In addition to the ASI approach, integration is vital to enable the sustainable urban logistics system's useful and practical transformation. Therefore, ICLEI adopts the ASII strategies in categorizing strategies and intervention measures, namely the Avoid-Shift-Improve-Integration, as there are cross-cutting strategies in nature and pivotal in framing the institutional and innovation conditions.

⁷ (Pritam Banerjee, Soumya Chattopadhyay, Deepankar Sinha and Prashant Sharma August 2021)

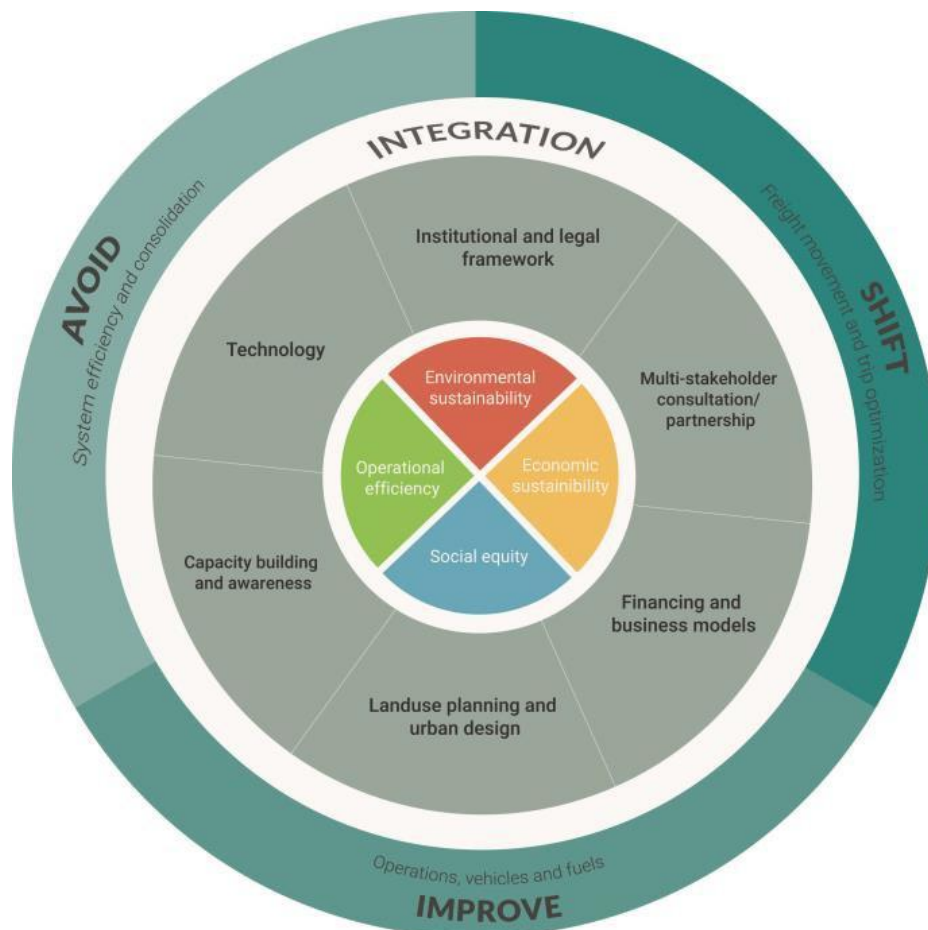


Figure 4: The Avoid-Shift-Improve-Integration approach

5. Recommendations

Urban freight transport is a complex and fluid system. The outcomes greatly depends on the relationship between the stakeholders, urban infrastructure available, and long-term planning and the future developments in the sector. A city may implement variety of solutions or their combinations depending on the local conditions and requirements. There are various categories of recommendations which may be adopted by the cities, government, businesses, operators, etc. to improve the freight operation and its outcomes.

Urban freight sector involves various actors including consumers, operators, regulators along with commodity, vehicle, etc. which affect the sector directly or indirectly. Thus the sector needs to be flexible as it is market-led. The actions required for adoption and integration of steps towards efficient freight are following recommendations:

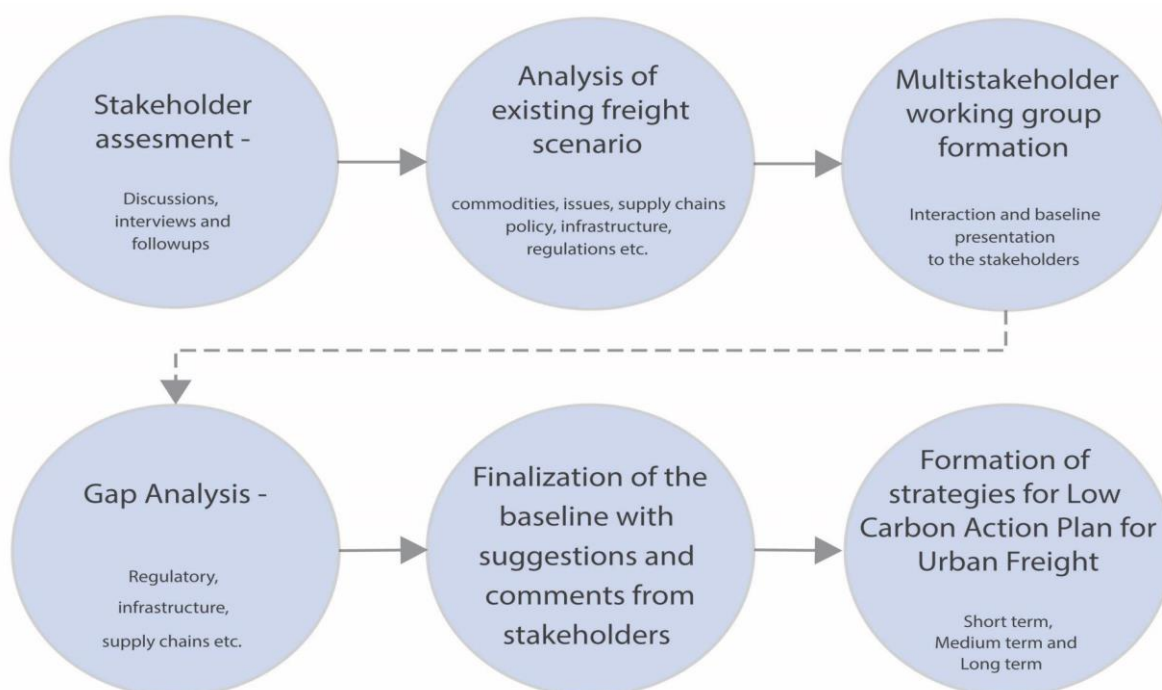


Figure 5: Process of streamlining the urban freight- Recommendations

5.1. Engage with the Stakeholder

The involvement of stakeholders is essential as they are varied and have competing interests. These include: National and local governments, businesses, freight operators, end customers, trade associations, unions, residents' groups, academics, etc. The engagement with stakeholders may be through consultations, workshops, face-to-face interaction, meetings etc. These interaction at specific steps of actions will help the stakeholders in being aware of the actions and outcomes and contribute in successful implementation.

5.2. Develop the baseline

In-depth understanding of the existing situation of freight in the city may include the demographics, registered vehicles, freight vehicles share, modes, emission contribution, externalities attached to freight operation, identification of hotspots, freight congestion, routes, commodities, supply chains, existing- regulatory, infrastructural, technological, operational ecosystem, etc.

5.3. Encourage development of institutional capacity

Incorporation of multi-stakeholder consultation advisory group for cities for interaction and guidance in implementation of solutions. It is advised to set up a governance structure involving key stakeholders, planning departments, market association, trucker association,

small transport groups, major retailers and courier companies in the area. A dedicated and integrated body for urban freight management could be set up to work closely with the working group, collaborate with other departments and stakeholders, implement and manage freight transport related development projects in the city. In case such a stakeholder working group exists in cities, it is advised to strengthen the group through more consultations.

A nodal agency can be developed or a designated person for freight may be appointed in the city government. etc. Further, a pool of expert agencies can be consolidated to assist and guide cities and improving capacity to understand and implement solutions. The existing operators, stakeholders and officials should be trained for freight sector. Chambers of commerce, transport department, private training institutions, Universities should propose regular training programs for logistics jobs, supply chain management, drivers should be trained for Eco-driving, safe driving etc. Freight managers appointed by the city should also undergo training programs and best practice study visits depending on the budget and opportunity through various national and international projects.

5.4. Gap analysis

The steps discussed above may be useful in understanding the existing gaps in freight ecosystem which may include regulatory gaps, institutional gaps, lack in supporting infrastructure, issues in supply chain, etc. Identification and analysis of these city specific gaps may be useful in finalising the best suitable solutions for the city.

5.5. Develop a long-term vision for the city

A city may choose from the priority areas like reducing carbon emissions, reducing conflict between passenger mobility and freight, operation cost reduction, resilient supply chain, enhancing urban economy, improving road safety and consideration of e-commerce and reverse logistics for future planning.



5.6. Develop Action plan and integrate in other plans

A city should develop short/medium/long term action plan which may act as a guidance document to support implementation of solutions.

City level Logistics plan to improve understanding of goods movement through/in/out of the city further leading to identification of issues through gap analysis.

Logistics sector should be considered and integrated during master plan preparation also with understanding of freight intensity, areas, routes, storage areas, etc. Other transport plans/Comprehensive mobility Plan (CMP) should also include freight and its elements and be included in development of Land use plans.

Plan should provide a detailed analysis on the availability and need for the loading/unloading zones, freight transfer point, Logistics Park, multi-modal freight hubs etc. depending on the city size and economic activities.

6. Interventions

The interventions which a city may take for improving existing freight ecosystem may include variety of categories as follows:

6.1. Regulatory

Regulatory measures have to be taken up by the city/government level and may include defining low emission zones (Clean Air Zones, Low Emission Zones, Zero Emissions Zones, green zones delivery bays) in a city, notifications for freight vehicle entry/exits, parking regulations, time restrictions, vehicle standardisation, encouraging alternative fuel options/technologies (EVs, CNG), (e.g. Clean Air Zones, Low Emission Zones, Zero Emissions Zones, green zones delivery bays), etc.

Depending on the understanding of existing regulations, enforcement and conflicts in a city, further enforcement of these existing regulations along with some additional required regulations may help in combating many existing freight related negative externalities.

6.2. Infrastructure improvement

Improving existing freight infrastructure (warehouses etc.), developing adequate parking, loading/unloading areas, developing urban consolidation centres, encouraging shared use of public transport infrastructure during off peak hours of passenger movement.

6.3. Integrated Land use planning and transport planning with inclusion of urban freight

Integrating logistics related areas with land use planning, demarcating truck only parking zones, conscious placement of storage facilities, etc. Transport planning with a consideration of freight vehicles also while developing signages and signals, resting areas, etc. Land use defined for freight related activity may further attract financial investments and interests for developing warehouses/consolidated logistics hubs etc.

6.4. Adoption of technology

Integration of technology for real time information of freight vehicles and better navigation, traffic control and management, integration for parking reservation, data generation and utilisation, etc.

There is lack of verified data related to freight traffic, routes, fuel consumption, fuel efficiency or carbon emissions from cities, vehicle data (ownership and registrations), etc. due to which it is difficult to identify specific solutions for these issues. This data may be generated through technology integration and utilised for planning future steps to improve freight operation. It is advisable for ULBs to set up a freight transport inventory based on the recommendation provided by the learnings from ICLEI's EcoLogistics project to keep records of major freight activities taking place in the city. Data collection needs to be done at regular intervals, and inventory should be updated every year. Analysis of collected data will lead to frame a better policy and propose projects to reduce the negative externalities from the transport sector.

6.5. Considering change in consumer demands and behaviour

The measures and actions in a city may be planned considering the demands of consumers and behavioural changes. This would be useful in coping up with the needs and reduce the upcoming additional pressure on ecosystem.

6.6. Financing sustainable urban freight

Financing sustainable urban freight is a pivotal policy instrument to translate policies and plans into reality. There are different forms of public financing: subsidies; public loans or shared costs. Subsidies for electric vehicles are the most common financial support from the governments to deploy energy-efficient vehicles.

6.7. Knowledge sharing

Knowledge sharing platform may be developed which may be used for sharing good practices, peer learning and sharing experiences from cities.

6.8. Voluntary actions

Other voluntary actions may include promotion and encouragement of best practice, providing/ supporting/ endorsing education and training for capacity building of operators, facilitating pilots and case studies, etc.

Implementing pilot/demonstration project may help in leading by example to procure goods and services transported by low, and zero emission fleets.

6.9. Monitoring and evaluation

Monitoring of policies and actions is also an essential step and a framework may be developed for this purpose.

7. Envisaged outcomes of addressing freight related negative externalities

7.1. Environmental

- Decarbonisation – Government and private stakeholders initiating actions for meeting the Paris agreement, New Urban Agenda (NUA) and Agenda 2030 as well as countries' Nationally determined contributions (NDCs) and Nationally Appropriate Mitigation Actions (NAMAs), etc. may lead to reduction in CO2 emissions i.e. decarbonisation.
- Air quality – Addressing the freight related externalities will lead to reduction in SOx, NOx, PMs in atmosphere and hence improved local air quality.
- Road safety – Priority of freight vehicles is profit and moving goods which results in compromised road safety.

7.2. Economical

- Decongestion – Actions exploring into relocation of goods movement generation (warehouses/whole sale markets) to outer periphery of cities/ other locations may result in decongesting the city core areas.
- Costs to economy – Efficient goods movement when the negative externalities are being addressed will result in cost reduction. Lesser emissions, reduced accidents, reduced fuel consumption will all contribute to reduction in costs to economy.
- Encouraging sustainable economic development- Economic sustainability maintains the economic competitiveness of the city and addresses energy efficiency and overall freight sector efficiency and affordability

7.3. Social

Social inclusion - Ensuring solutions don't increase the risk of social inclusion or result in health complications (e.g. social housing located next to major truck routes will impact the residents). Ensuring public participation in city policies framing processes for inclusive policy solutions.

Health and safety- Ensuring health and safety of temporary/migratory workers (gig workers); and improving overall quality of life of the local communities and minimize disturbances to the communities resulting from logistics operations.

Operational efficiency- It is a coefficient of delivery productivity (e.g., average payload), utilization of existing fleet and services and reliability (timely delivery of goods).

8. Way ahead

There is a need of coordinated action to tackle the issues and improve the gaps related to urban freight movement. If the last mile delivery is managed and the entire system of passenger and goods movement is considered in an interlinked way, sustainable freight movement may be obtained. At city level, steps like spreading awareness, incentivizing safe, clean, efficient urban freight, regulatory steps, encouraging R&D and improving procurement of clean freight vehicles may be helpful

This document is a guidance document for government stakeholders on the way forward to integrate urban freight as a part of overall transport ecosystem. The recommendations in this document have been developed on the basis of interaction with stakeholders during EcoLogistics project activities along with the learnings from the project cities. The learnings from real time findings of this project being implemented in three cities of India with different demographics, economic conditions, cultural and social conditions have been documented in this report and these can be replicated in cities with similar freight ecosystem. The recommendations have been validated in project cities and have been found useful.

The solutions may be decided according to the city and city specific strategies may be implemented to improve overall freight ecosystem.

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