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About Organisations

About Logistics Division, Department for Promotion of Industry, and Internal Trade (DPIIT)

The Logistics Division in the Department for Promotion of Industry and Internal Trade (DPIIT), Government of India has the mandate to develop an Action Plan for integrated development of the logistics sector in the country, by way of policy changes, improvement in existing procedures, identification of bottlenecks and gaps and introduction of technology in this sector.

About GIZ

As a service provider in the field of international cooperation for sustainable development and international education work, we are dedicated to shaping a future worth living around the world. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), GmbH in India is jointly working with partners for sustainable economic, ecological, and social development. The thematic areas of GIZ in India are: 1. Energy, 2. Environment, Climate Change and Biodiversity, 3. Sustainable Urban and Industrial Development and 4. Sustainable Economic Development.

The Federal Ministry for Economic Cooperation and Development (BMZ), the Federal Ministry of the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) as well as the Federal Ministry for Economic Affairs and Energy (BMWi) are the main commissioning parties of GIZ in India. Other clients include Indian public sector clients, the European Union and foundations.

About The Urban Lab

The Urban Lab is an Ahmedabad-based 'Think Tank' with an experience of working with multiple local and regional governments committed to creating liveable cities. We influence sustainability mobility and drive local action for equitable, resilient, low-emission, and circular development. We are experts in provides professional services in placemaking, traffic and transport planning, freight and logistics, urban planning, policy, urban management, project management and capacity building.



Foreword

SHRI. RAJESH KUMAR SINGH

Secretary

Department for Promotion of Industry and Internal Trade,

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New Delhi

Logistics is vital to economic growth, yet India's logistics sector faces several challenges. To address these, the Government of India launched the PM GatiShakti National Master Plan and the National Logistics Policy (NLP). The NLP aims to drive economic growth and business competitiveness through an integrated, efficient, reliable, sustainable, and cost-effective logistics network using advanced technology, processes, and skilled manpower. This initiative will reduce logistics costs and improve performance.

The PM GatiShakti plan focuses on infrastructure development and network planning, while the NLP addresses logistics sector development, including process reforms, service improvements, digitisation, and skill enhancement.

Freight movement are crucial to the economy, especially as urban centers contribute over 58% to India's GDP. With urban expansion and booming e-commerce, the demand for urban logistics is projected to rise by 140% by 2030. This increase brings challenges, such as more vehicle trips, emissions, and environmental impacts.

This report introduces the concept and importance of a City Logistics Plan (CLP), highlighting the need for public-private cooperation to promote sustainable urban logistics. The chapters outline core principles and steps for developing an effective CLP, focusing on organisational structure and multi-stakeholder partnerships.

I express my gratitude to the Governments of Bengaluru Delhi and Prayagraj for their support in developing model CLPs, which informed these guidelines. Special thanks to Deutsche Gesellschaft für Internationale Zusammenarbeit and all stakeholders for their involvement.

I urge cities and municipal agencies to integrate these learnings and guidelines into their City Logistics Plans and hope this document serves as valuable assistance for the formulation of CLPs strategies. Together, we can enhance India's logistics capabilities and build a prosperous future.



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Abbreviations

ADB	Asian Development Bank
ANPR	Automatic Number Plate Recognition
B2B	Business to Business
B2C	Business to Consumers
BBMP	Bruhat Bengaluru Mahanagara Palike
BDA	Bangalore Development Authority
BESCOM	Bangalore Electricity Supply Company Limited
BIAA-LPA	Bangalore International Airport Area Local Planning Authority
BIAL	Bengaluru International Airport Limited
BMICAPA	Bangalore - Mysore Infrastructure Corridor Area
BMRCL	Bangalore Metro Rail Corporation imited
BMTC	Bangalore Metropolitan Transport Corporation
BTP	Bengaluru Traffic Police
CACL	Central Advisory Committee for Logistics
CBA	Cost-benefit- Analysis
CFS	Cash Flow Statement
CLC	City Logistics Committee
CLP	City Logistics Plan
CMP	Comprehensive Mobility Plan
CNG	Compressed Natural Gas
DULT	Directorate of Urban Land Transport
F&B	Fruits and Vegetables
FEV	Forced expiratory volume
FPC	Freight Partnership Committee
GAS	Governmental Accounting Standards
GIS	Geographic Information System
GNCTD	Government of National Capital Territory of Delhi
GPS	Global Positioning Systems
GST	Goods and Services Tax
GSTN	Goods and Services Tax Network
HCV	Heavy Commercial Vehicle
HGV	Heavy Goods Vehicle
HSN	Harmonised System of Nomenclature
IAS	Indian Administrative Service



ICD	Inland Container Depot
ICT	Information and Communications Technology
IPS	Indian Police Service
ITS	Information and Technology Systems
KIADB	Karnataka Industrial Area Development Board
KSIIDC	Karnataka State Industrial and Infrastructure Development Corporation
LCV	Light Commercial Vehicle
LEZ	Low Emission Zones
LGV	Light Goods Vehicle
KPI	Key Performance indicator
LPG	Liquified Petroleum Gas
LTZ	Low Traffic Zones
MCA	Multi- Criteria Analysis
MoEFCC	Ministry Of Environment, Forest and Climate Change
MoHUA	Ministry Of Housing and Urban Affairs
MoP	Ministry of Power
MoPNG	Ministry of Petroleum and Natural Gas
MoRTH	Ministry of Road Transport and Highways
MoU	Memorandum of Understanding
NHAI	National Highways Authority of India
NICE	Nandi Infrastructure Corridor Enterprises
NUTP	National Urban Transport Policy
PHEV	Plug-In Hybrid Electric Vehicles
PPP	Public Private Partnership
PRR	Peripheral Ring Road
PUDO	Pickup- Dropoff
RFP	Request for Proposal
RMG	Ready Made Garments
RSI	Roadside Interviews
RTO	Regional Transport Office
SEA	Strategic Environmental-impact Assessment
SMART	Specific, Measurable, Achievable, Relevant, Time-bound
TVC	Traffic Volume Count
UCC	Urban Consolidation Centre
UDD	Urban Development Department
ULB	Urban Local Body
UMTAs	Unified Metropolitan Transport Authorities





Afternoon city commute heavy traffic on highway
Image credits: Welcomia



Executive Summary

Freight flows stand as tangible embodiments of modern life's manufacturing and consumer economies, forming the bedrock of societal foundations. The efficiency of freight movement is critical to the economic vitality of a nation. In India, cities play a pivotal role in economic development, contributing over 58% to the GDP. However, the burgeoning demand for urban logistics, particularly in e-commerce, poses challenges, with a projected 140% increase by 2030. Urban freight inefficiencies, exemplified by haphazard deliveries, contribute to excess vehicle trips and emissions, impacting both the environment and public health.

Conventionally, policymakers treated city logistics as a challenge, resulting in ad-hoc measures that often hindered efficiency. Recognizing this, a strategic shift is imperative. A City Logistics Plan (CLP) emerges as the solution—a comprehensive framework designed to optimise urban goods movement, reduce costs, and minimise environmental impact. This executive summary introduces the purpose, principles, and benefits of a CLP, emphasizing the need for collaborative efforts between public and private sectors for sustainable urban logistics development. The first chapter delves into the key principles and structure of a CLP, providing actionable insights to guide cities in the efficient and sustainable management of urban freight.

The first chapter defines city logistics, sets a context of the need for a city logistics plan, key principles for development of an efficient logistics plan, its purpose and target audience of this report. The second chapter delineates logistics stakeholders, detailing their needs, challenges, and the formation and functions of essential multi-stakeholder partnerships for plan implementation. The third chapter details the organisational structure for CLP, including the establishment of a Nodal Agency and hiring a technical consultant for planning and implementation. The fourth chapter delineates the plan's scope, emphasizing steps such as baseline assessment, sector prioritisation, scenario building, stakeholder consultation, and implementation framework. The fifth chapter outlines the implementation and monitoring process of the CLP, including coordination, communication, and evaluation of logistics measures.



1. INTRODUCTION

Freight flows¹ are physical manifestations of the manufacturing and consumer economies that are foundations of modern life. Transportation policy seeks to ensure that freight is moved as efficiently as possible, as hampering the flow of cargo will have a negative effect on the economy.

Cities are central to India's economic development, contributing to over 58% of India's GDP.² City logistics is a core component of the modern Indian city as it provides residents and businesses with products needed daily. With economic growth and urbanisation, urban logistics is rapidly growing, with total demand estimated to increase by 140% by 2030.³ This growth will be particularly rapid in the e-commerce sector, where the market is expected to be worth nearly INR 9.5 lakh crore by 2025.⁴

Urban freight systems can also be highly inefficient if not planned for and managed well. Uncoordinated and haphazardly planned deliveries generate excessive trips and vehicle kilometres, exacerbating negative externalities. First / last-mile freight movement in cities is responsible for 50% of total logistics cost in India's e-commerce supply chains.⁵ This illustrates the opportunity presented by improved efficiency. Freight vehicles are responsible for a disproportionate amount of vehicular pollution—in India, they contribute 23 kilotonnes of Particulate Matter (PM) and 305 kilotonnes of NOx emissions annually.⁶ They also amount to 10% of India's freight-related CO2 emissions. Additionally, freight vehicles contributed to 10% of road fatalities in Million-Plus cities in 2019.⁷ Improperly parked and illegally driven freight vehicles prove to be a regular obstruction for flow of traffic in cities, causing congestion and delays. Combined, these issues create public health concerns for urban areas while also reducing their economic competitiveness.

Conventionally, policymakers have treated city logistics as a problem area and solutions have been driven by ad-hoc planning. This is because i) there is competition for road space as city transport network and infrastructure are shared by both passenger and freight traffic; ii) Comprehensive Mobility Plan (CMP) only address issues and challenges of passenger movement with limited or no emphasis on freight and logistics; iii) logistics is a for-profit activity, predominantly controlled and operated by private interests, and hence public authorities have a lack of understanding on the commercial dynamics of freight distribution.

Hence, policymakers have used strategies of restricting the movement of goods vehicles within the city limits, relocation of freight activity generators such as markets, transport nagars to outside city limits, which has led to overall loss in efficiency and increase of costs. Meanwhile, logistics service providers, shippers, carriers have continued with their business to provide the goods required by the urban population at the right quantity, place and time. With the proliferation of the gig economy and e-commerce industry in recent years, urban freight mobility and logistics activities have exploded in cities across India.

Meeting the growing demand for urban freight reliably while implementing interventions to improve its efficiency will require proper planning by cities as well as effective collaboration between private and public sector stakeholders. Hence, cities should develop their City Logistics Plan (CLP) which will help them understand current challenges and needs to implement measures to improve logistics efficiency.

[1] National Academies of Sciences, Engineering, and Medicine 2015. Improving Freight System Performance in Metropolitan Areas: A Planning Guide. Washington, DC: The National Academies. Press. <https://doi.org/10.17226/22159>.

[2] business standard. (2023, October 13). Retrieved from https://www.business-standard.com/article/economy-policy/-cities-to-contribute-70-to-gdp-by-2030-111110300048_1.html

[3] NITI Aayog, RMI and RMI India. (2021). Fast Tracking Freight in India. Delhi. Retrieved from https://rmi-india.org/wp-content/uploads/2021/06/Freight-Report-National-Level_FINAL_V4.pdf

[4] KPMG. (2023, October 13). Retrieved from <https://kpmg.com/in/en/blogs/home/posts/2021/07/fast-paced-growth-e-commerce-regulations-thrive.html>

[5] NITI Aayog, RMI and RMI India. (2021). Fast Tracking Freight in India. Delhi. Retrieved from https://rmi-india.org/wp-content/uploads/2021/06/Freight-Report-National-Level_FINAL_V4.pdf

[6] NITI Aayog, RMI and RMI India. (2021). Fast Tracking Freight in India. Delhi. Retrieved from https://rmi-india.org/wp-content/uploads/2021/06/Freight-Report-National-Level_FINAL_V4.pdf

[7] Government of India Ministry of Road Transport and Highways. (2020). "Road Accidents in India 2019". https://morth.nic.in/sites/default/files/RA_Upload.pdf



1.1.Rationale for a City Logistics Plan

CLP is a strategic plan designed to adequately address the urban freight and logistics needs of the city's population and businesses to achieve an economic growth with better quality of life and environment. The CLP helps identify the main needs, plan and evaluate the possible solutions for urban freight and logistics in and around the city. The CLP should be prepared in a structure and format that can be easily integrated with the Comprehensive Mobility Plan (CMP) of the city, link with the Statutory Development/ Master Plan, State Logistics Plan and PM GatiShakti National Master Plan.

CLP involves development of organisational structures, strategies, focused action plans with measures and rules that can be implemented with a cooperative approach of different stakeholders in reaching a common objective in sync with the city's vision, as outlined in the NLP. It is built on principles of logistics performance, institutionalisation, and safety with due consideration of existing planning practices. CLP must be considered as an integral part of CMP devoted to integrating urban logistics schemes, infrastructure, services, regulations in the overall mobility strategies and solutions.

Key Principles (Components) of a City Logistics Plan

The purpose of developing a CLP for Indian cities is to strategically manage the movement of goods within urban areas to achieve efficient, sustainable, and well-coordinated logistics operations. The CLP serves as a comprehensive roadmap that outlines policies, strategies, and measures to address the challenges associated with urban goods movement, particularly in densely populated and rapidly growing cities. This plan is a pivotal tool for enhancing urban logistics efficiency, and fostering sustainable development.

INFRASTRUCTURE



Collaboration

Foster collaboration among government bodies, transport providers, businesses, and citizens. Establish Freight Partnership Committees (FPCs) to facilitate communication, shared insights, and joint decision-making (Details of FPC are outlined in Step 3.5 of the report).

Regulatory

Integration of the CLP with other plans of the city is crucial. CLP must integrate with city-wide plans (statutory and non-statutory), ensuring that transportation infrastructure harmonises with the logistics network. Coordinated planning prevents conflicts and optimises land use and helps in aligning CLP with urban planning strategies ensuring holistic development, enhanced urban life and mitigation of logistics.



SAFETY

Improving sustainability



Prioritise sustainable practices that minimise the environmental impact of goods movement. Encourage the use of electric and hybrid vehicles, promote fuel-efficient technologies, and emphasise clean energy sources. Incorporate emission reduction targets to align with the country's climate goals.

Safety

Manage urban goods movement, emphasizing on well-coordinated logistics. Reduce the presence of heavy vehicles in urban limits during peak hours, redesign streets to reduce road crashes due to vehicle blind spots.



PERFORMANCE



Reduce vehicle/ km (emissions)

Focus on reducing urban emissions by optimizing vehicle kilometres through strategic routing and consolidation of freight. Enhance passenger transport accessibility to logistics infrastructure to reduce individual vehicle use, curbing congestion, and related emissions.

Reduce time taken

Prioritise efficiency by optimizing goods movement. This involves development of freight infrastructure and its integration into commercial streets, and design guidelines, optimisation of freight routes, smart traffic management systems utilizing real-time data, ensuring prompt deliveries, enhancing customer satisfaction, and minimizing operational costs.



Reducing overall cost

Prepare efficient route plans and consolidate trips. Establish urban consolidation centers, micro-distribution hubs, which promotes maximizing transportation efficiency, reduces vehicles, lowers fuel consumption, and ensures cost-effectiveness. Planning and development of by-pass roads to avoid through-freight traffic inside the city.

Improving efficiency

Encourage use of sustainable vehicles, pick-up deliveries, mechanised (un)loading, and upgradation of existing market operations to improve efficiency of the supply chain. Implement technologies for real-time tracking of vehicles, route optimisation, and performance measurement. Utilise data-driven insights to make informed decisions, assess the effectiveness of measures, and adapt strategies.



1.2.Purpose, Target Audience and Benefits

This document aims to guide state and city authorities on the effort required to prepare a City Logistics Plan (CLP) and manage for efficient freight and logistics movement within the city. This will help advance the Government of India's (GoI) agenda on Ease of Doing Business (EoDB) and fulfil India's ambition of achieving NetZero by 2070 which also aligns with the National Logistics Policy (NLP), 2022.

The guideline is also intended for practitioners in cities and/ states in making urban logistics ecosystem efficient and sustainable. The guideline does not provide universal city logistics solutions, but they supply a possible method for analysing freight distribution processes, defining, and choosing among the possible measures and services in collaboration with other relevant actors and stakeholders. It is therefore crucial to tailor the approach and methods herein described to specific local needs and peculiar city characteristics.

These guidelines have been formed based on the learnings from implementation of solutions and developing CLPs for Delhi, Bengaluru and Prayagraj.

This guideline is considered a living document that will continue to evolve through the incorporation of feedback and input from readers.



1.3. Report Structure

This document is structured as follows:

Chapter 2

This chapter delineates logistics stakeholders, detailing their needs, challenges, and the formation and functions of essential multi-stakeholder partnerships for plan implementation.

Chapter 3

This chapter details the organisational structure for CLP, including the establishment of a Nodal Agency and hiring a technical consultant for planning and implementation

Chapter 4

This chapter delineates the plan's scope, emphasizing steps such as baseline assessment, sector prioritisation, scenario building, stakeholder consultation, and implementation framework.

Chapter 5

This chapter outlines the implementation and monitoring process of the CLP, including coordination, communication, and evaluation of logistics measures.





Delivery in warehouses
Image credits: rjankovsky

2. STAKEHOLDERS IN CITY LOGISTICS

A stakeholder is an individual or organisation tasked with the responsibility to ship, transport, fulfil, or even consume freight and who is motivated to use physical infrastructure and personal and professional relationships to realize the objectives of their freight-related activity. Numerous stakeholders convene to decide and determine urban logistics strategies and operations in response to growing, contracting, or constant residential and commercial demand for goods.⁸

Stakeholders in city logistics are key actors who shape urban freight distribution through their decisions and actions. Efficient logistics not only benefit businesses by reducing costs but also positively impact citizens' daily lives by reducing congestion and pollution. Government agencies play a vital role in creating regulations and infrastructure that support these objectives. A well-coordinated effort among these stakeholders is essential for achieving sustainable, efficient, and customer-centric urban logistics systems.

Table 1: Outline of stakeholder needs and challenges faced

Type	Stakeholder	Needs	Challenges
Public sector	Government Agencies	Efficient and sustainable urban logistics to reduce congestion, pollution, environmental impact, compliance with regulations, maintain road safety, and support economic growth.	Balancing economic growth with environmental concerns, developing effective policies, and ensuring cooperation among various agencies.
	Transport Providers(truck operators, drivers)	Well-maintained infrastructure, clear regulations, reliable routes, supportive environment for adopting sustainable technologies and practices.	Navigating urban congestion, adhering to regulations, optimizing routes, and adapting to changing consumer demands while minimizing costs.
Private sector	Businesses(shippers, receivers, and financing /leasing bodies)	Efficient logistics to ensure timely deliveries and reduce operational costs, benefit from reduced congestion and reliable transportation.	Balancing supply chain efficiency with cost considerations to ensure seamless coordination among supplier, distributor and retailers.
	Citizens	Timely deliveries of goods and services at reasonable cost to consumers, reduced traffic congestion, improved air quality, accessible and efficient urban services.	Disruptions due to congestion, convenient hours of delivery, and environmental sustainability of goods movement and services, apportionment of infrastructure and costs of logistics.

[8] Stakeholder Relationships in City Logistics, City Logistics: Concepts, Policy and Practice



2.1. Multi-stakeholder partnerships

Multi-stakeholder partnerships can unleash innovative ways of working, mobilizing expertise and difficult-to-reach resources and creating shared accountability in an increasingly complex management of city logistics. Each stakeholder has a valuable role to play, a real opportunity exists in developing partnerships to achieve things together that are incomprehensible to be achieved alone. These partnerships should be long lasting, scalable, and transformative.

The United Nations defines partnerships as “voluntary and collaborative relationships between various parties, both State and non-State, in which all participants agree to work together to achieve a common purpose or undertake a specific task and to share risks and responsibilities, resources and benefits”. Partnerships from the public policy point of view are defined as “a voluntary cooperative arrangement, involving public, private and/or civil society organisations that is formalised with common, non-hierarchical decision-making procedures and that addresses a public policy issue”.¹⁰

City Logistics Committee (CLC): The committee can be tasked with guiding the preparation of a City Logistics Plan (CLP) following a review of the city's performance on freight. The CLP can map the current freight performance of the city, define its present and future needs and priorities, and identify quick reform areas. The committee can provide guidance, create an enabling environment for the implementation of the CLP, and support the monitoring of progress of the CLP.

2.2. Committee formation and composition

City Logistics committee

For forming a city level committee, compositions from these two alternatives can be considered depending on the geographical constraints and administrative set-up of the city similar to Unified Metropolitan Transport Authority (UMTAs) (a government nodal agency that performs regulatory, policy and strategy functions related to urban passenger transport in cities and integrate and approve proposals by different transport agencies at city level).

Alternative 1: Committee for a single municipal area for non-metro cities

This structure applies to urban areas including cities such as Jaipur, Lucknow, Kanpur, Mysore etc, where the urban area is contained within a single local government jurisdiction. This kind of structure will be most prevalent across the cities in India.

Alternative 2: Committee for a group of adjacent municipal areas/ urban agglomeration

For urban areas where two or more cities are adjoining and have a presence of significant inter-city freight movement and require a facilitated coordination of vehicle movement, having a logistics committee to monitor each city's logistics reporting to a single committee monitoring the co-relation of the adjacent areas will be more relevant. This kind of structure would apply to cities such as Ahmedabad – Gandhinagar or Pune – Pimpri-Chinchwad, or urban agglomerates such as Greater Kochi, Mumbai etc which have two or more municipal areas in proximity.

Members of City Logistics Committee

The committee is proposed to be chaired by the Municipal Commissioner in case of Alternative 1 of city level committee, by one or more Divisional Commissioners in case of Alternative 2 and by Principal Secretary, Urban Development in case of State level committee. Depending on the governance and geographic features, the composition can vary. The tables below outline the suggested composition of the committee.

[9] General Assembly resolution 60/214, United Nations.

[10] Julia Streets, Accountability in Public Policy Partnerships (Hampshire, United Kingdom, Palgrave Macmillan, 2010).



Government Agencies

Stakeholder type	Areas for collaboration
Urban Local Body	Nodal agency
Transport Department (RTO)	Transportation regulations and policymaking e.g., designing incentives for electric vehicle adoption, regulations for freight vehicles
Police Department	Traffic management
Environment Department	Introducing sustainable practices in logistics and monitoring emissions, levying environmental/pollution cess, etc.
State Urban Development and Town Planning Departments/ authorities	- Plan industry related policies like industrial land use planning, pollution control - Land use planning for the city - Parking management
Finance department	Project prioritisation and finance
Industry departments / District Industry Centres	Insights on the existing coverage and shortcomings of the industries operating in the city

Private Sector

Stakeholder type	Areas for collaboration
Logistics service providers	- Freight demand and movement patterns - Mapping locations for warehouses, fulfilment / deposit centres. - Waste management life-cycles
Truck associations, third party logistics providers	Understand barriers with freight vehicle operations
Shippers/ providers	- This will include Warehouse Providers, Packaging Companies, Handling Agents. - Their inputs will be critical to understand freight demand and movement patterns, mapping locations for warehouse, ensure integration across transport modes/vehicle types.
Goods receivers	This will include market associations like shops, restaurants, etc. Their inputs will be crucial to understand operational barriers with the goods movement.

The city logistics committee should have representation from both public and private sector. The urban local body, traffic department, transport department and development authority representation are the most relevant for urban logistics planning and enforcement. However, in their absence / their lack of capacity to undertake logistics planning, para-statal agencies such as infrastructure development boards, or other urban local bodies such as Notified Area Committee, Town Area Committee, Special Purpose Agency, Township, Port Trust, or Cantonment Board may chair the management of logistics depending on the city's character and basic functions.



State level committee

Apart from committees at the city level, state level apex committee may be constituted. This state-level committee can guide, monitor progress and provide expertise to smaller cities, which are often resource and cash constrained. Moreover, for majority of the cities, significant freight movement will extend beyond municipal boundaries, making state's intervention crucial for the comprehensive implementation of identified actions. The structure of the state-level can be drawn upon the learnings of existing UMTAs at the state level or existing Three tier institutional mechanisms at state (EGoS, NPG, TSU) under PM GatiShakti.

- The committee can be part of the existing UMTAs in cities/ city regions where UMTAs exist. The UMTAs are responsible for the transport planning and management for their respective jurisdiction, so it will be easier and is recommended to integrate the functions of the logistics committee with UMTAs, where they are already functional.
- Wherever the UMTAs are not functional or don't exist, the states and cities can formulate a new logistics committee reporting to a nodal agency such as the Municipal Corporation at the city level or state urban development/transport department at the state level.
- For the second case, as mentioned above, in which the UMTAs do not exist currently, the states and cities can endeavour to establish these structures. Once the UMTAs are formulated, the logistics committee can be subsumed under them for better functioning.

National level committee

A national-level committee i.e., a Central Advisory Committee for Logistics (CACL) is envisaged in the draft National Logistics Policy or existing PM GatiShakti implementation framework. Three-tier institutional mechanisms i.e., EGoS, led by the Cabinet Secretary, while NPG assists with network planning, and TSU provides expertise for holistic infrastructure development and logistics optimisation. The primary role of the central committee will be to enable co-ordination with states and cities and support in implementation of their logistics plans by acting as a bridge between the central level agencies, state governments and the city

City and state committees will be advised by/can consult central government agencies, as needed:

- **Logistics** – Ministry of Commerce and Industries (MoCI) and Department for Promotion of Industry and Internal Trade (DPIIT)
- **Roads** – Ministry of Road Transport and Highways (MoRTH), National Highways Authority of India (NHAI)
- **Railways** – Ministry of Railways
- **Ports** – Ministry of Ports, Shipping and Waterways
- **Inland Waterways** – Inland Waterways Authority of India
- **Airports** – Ministry of Civil Aviation, Airports Authority of India
- Central Board of Indirect Taxes and Customs (ICD, CFS)
- Urban Development – Ministry of Housing and urban Affairs (MoHUA)
- Electric vehicles, clean fuels – NITI Aayog, DHI, MoP, MoPNG, MoEFCC

The committee will collaborate with central and state government agencies as needed to ensure integration across policy schemes and for effective implementation of identified actions. The involvement of private sector actors such as freight operators and e-commerce agencies are necessary to understand on-the-ground operational issues and logistics demand. This coordination amongst stakeholders is essential to facilitate logistics planning, secure data, and develop integrated infrastructure plans. Other stakeholders include end-user industries, importers/exporters, domestic traders, logistics service associations, chambers of commerce, custom brokers, freight forwarders, and charging infrastructure providers.



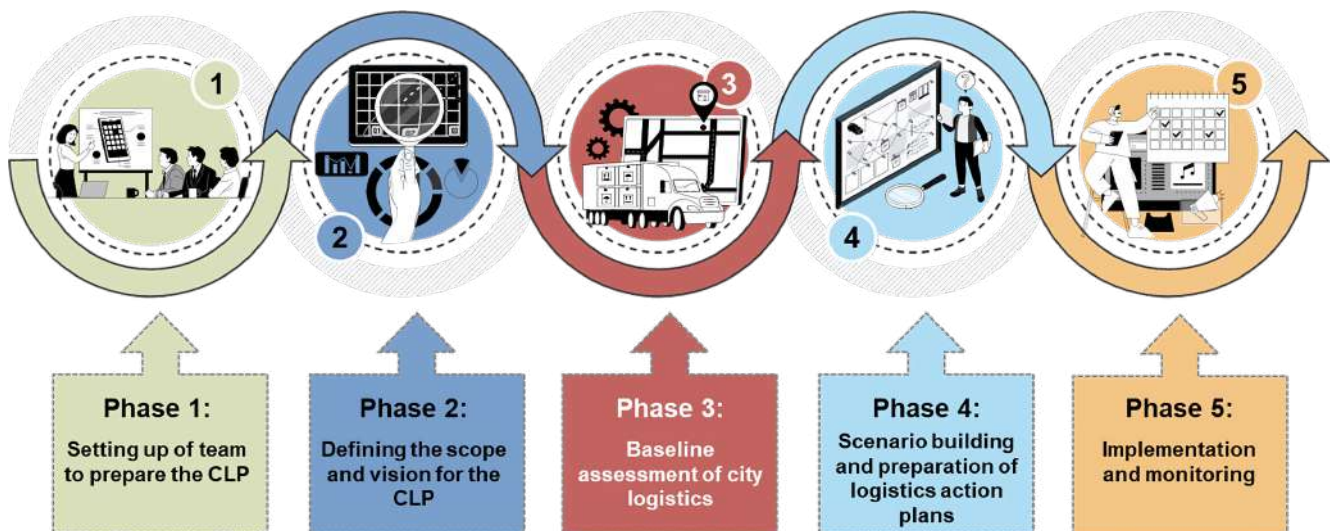


Cross Harbour tunnel congestion on roads
Image credits: Leung Cho Pan

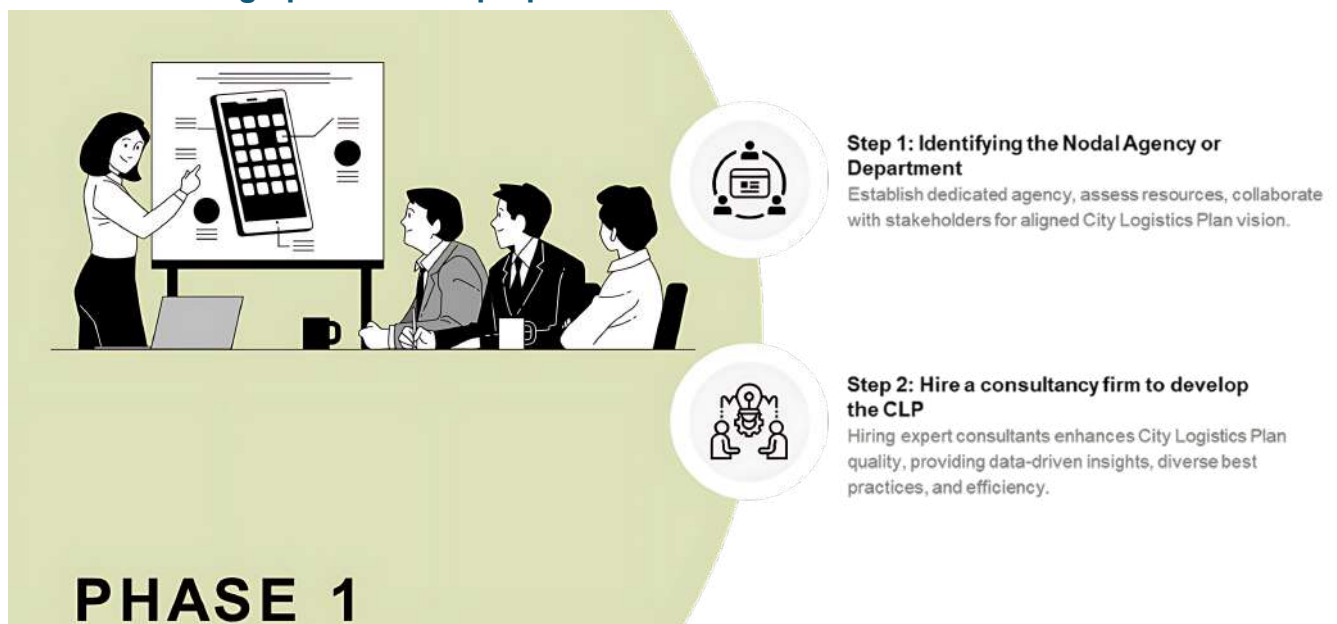
3. ORGANISATION FRAMEWORK FOR PREPARING THE CLP

In this chapter, the organizational set-up required for preparing and implementing a city logistic plan has been outlined. This includes the formulation of a Nodal Agency mandated to spearhead the CLC and the process of hiring a technical consultant to help in the planning / implementation process of the CLP.

Figure 1: Methodology adopted in the planning process



Phase 1- Setting up of team to prepare the CLP



Step 1.1: Identifying the Nodal Agency or Department

The initial phase of creating a CLP involves establishing a dedicated agency within the CLC to oversee the project. A core team from the nodal agency comprising a project manager, transport planner, and an engineer assesses available resources and funding options for the CLP's feasibility. To enhance expertise, engaging specialised urban logistics consultants is recommended. The nodal agency defines the scope, drafts proposals, evaluates submissions, and closely supervises the consultants' work to ensure alignment with the city's objectives. Details about the same have been outlined in the section 2.2 (Committee formation – city level committees)

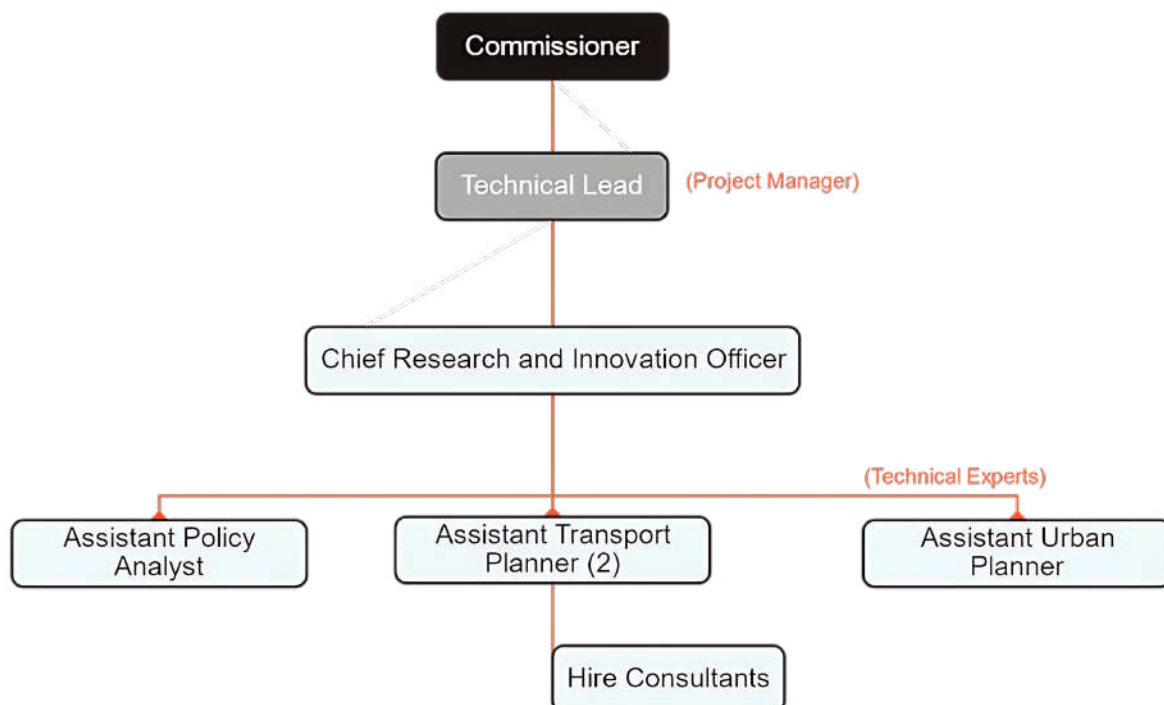
While not mandatory, it is highly advantageous if the nodal agency falls under the Urban Development Department/ Transport Department/ Infrastructure Development Board/ Infrastructure Development Authority. This department should possess the required expertise in urban development strategies, infrastructure, and transportation planning to effectively plan for city logistics and subsequently incorporate the same into the statutory plans of the city, collaboration with essential stakeholders such as the ULB, Traffic Police, and other relevant departments. This ensures alignment of the CLP's vision with broader urban planning initiatives.

Box 1: Formation of Directorate of Urban Land Transport (DULT)

Established in 2007 by the Government of Karnataka under the Urban Development Department (UDD), the Directorate of Urban Land Transport (DULT) has a primary mission of overseeing the coordination and execution of urban and transportation projects, along with managing the State Urban Transport Fund. DULT's vision aligns closely with the National Urban Transport Policy (NUTP).

DULT formulated a core team to work alongside the consultants appointed to prepare the city logistics plan for Bengaluru. Outlined below is the structure of its core team:

Figure 2: Core team formulated by DULT in the preparation of CLP for Bengaluru



DULT enabled the consultant to effectively collaborate with agencies like BBMP, BDA, BMRCL, BMTC, and BTP in data collection and planning of its city logistics. Furthermore, to implement the proposed plan, DULT offered support to spearhead stakeholder engagements, project planning, and coordination of Freight Partnership Committees formulated for Bengaluru.



Tasks

To ensure a comprehensive and efficient development process for the CLP, formulate a dedicated core team (within the nodal agency) with well-defined roles and responsibilities:

a. Project Manager: The Project Manager will provide leadership, oversee project milestones, oversee coordination with the relevant stakeholders and anchor the overall development process of the CLP. The manager should have the technical expertise of being an IAS, IPS, GAS or any equivalent position.

b. Technical Experts: Along with the project manager, two support staff should be appointed as part of the core team. The experts should be an urban/ transport/ infrastructure planner/ engineer and data analyst who will provide pertinent expertise and knowledge across the planning and implementation phase of preparing the CLP.

However, in case this expertise is not available, at the very minimum, the nodal agency should have dedicated officer and support staff, preferably someone working in the traffic/ transport/ commercial tax/ planning areas to oversee and manage the project.

Actions to be undertaken

1. Evaluate available human resources within the identified nodal agency.
2. Examine the budgets of the urban development department, urban development authority, municipal corporation, and industrial development agencies to identify potential funds that can be allocated to CLP development. Determine if any funds are specifically designated for urban planning, transport, or infrastructure.
3. Explore potential funding sources beyond existing budgets. Look into grants, subsidies, and programs offered by national, state, and international organisations such as the World Bank, ABD, GIZ etc.

Step 1.2: Hire a consultancy firm to develop the CLP

To support the CLC with gaps in available expertise for preparing the city logistics plan, it is suggested that a consultancy firm be hired for their specialized knowledge which can significantly enhance the quality and effectiveness of the plan. Qualified consultants with expertise in urban logistics, transportation planning, and data analysis, along with experience of multi-stakeholder consultations may grasp intricate logistical challenges comprehensively. Their familiarity with best practices from diverse urban logistics projects assures alignment with industry standards. Time and resource efficiency are optimised as consultants work full-time, hastening development and relieving internal teams for other strategic and pivotal tasks.

Tasks

1. Appointment of qualified consultants using a quality cum cost-based tender for the preparation of a city logistics plan.
2. Provide consultants access to relevant data sources, encouraging collaboration for in-depth analysis.

Actions to be undertaken

- Identify gap areas in the expertise available with the city level committee.
- Define the scope of work and specific areas where external expertise is required. This could range from data collection and analysis to scenario building and preparation of action plans for the city logistics plan.
- Draft a Terms of Reference (ToR) document to be added in the Request for Proposal (RFP) detailing the project's objectives, scope, deliverables, tasks to be performed and evaluation criteria. Share it with reputed consulting firms specialised in urban logistics (Refer Annexure 7.2).
- Evaluate consultant proposals based on their technical resource availability, track record, and understanding of the project's goals. Once selected, work closely with the consultant to establish clear communication channels, project milestones, and reporting mechanisms.
- Foster a collaborative approach where internal teams and consultants work together to ensure local knowledge is integrated into the plan. Set regular check-ins and progress reviews to ensure that the CLP's development aligns with the city's goals and vision.

Upon hiring of a consultant, the city level committee can now move to the planning phase of baseline assessment, gap identification and develop action plans for implementation. In the next chapter, steps to achieve the same have been outlined.



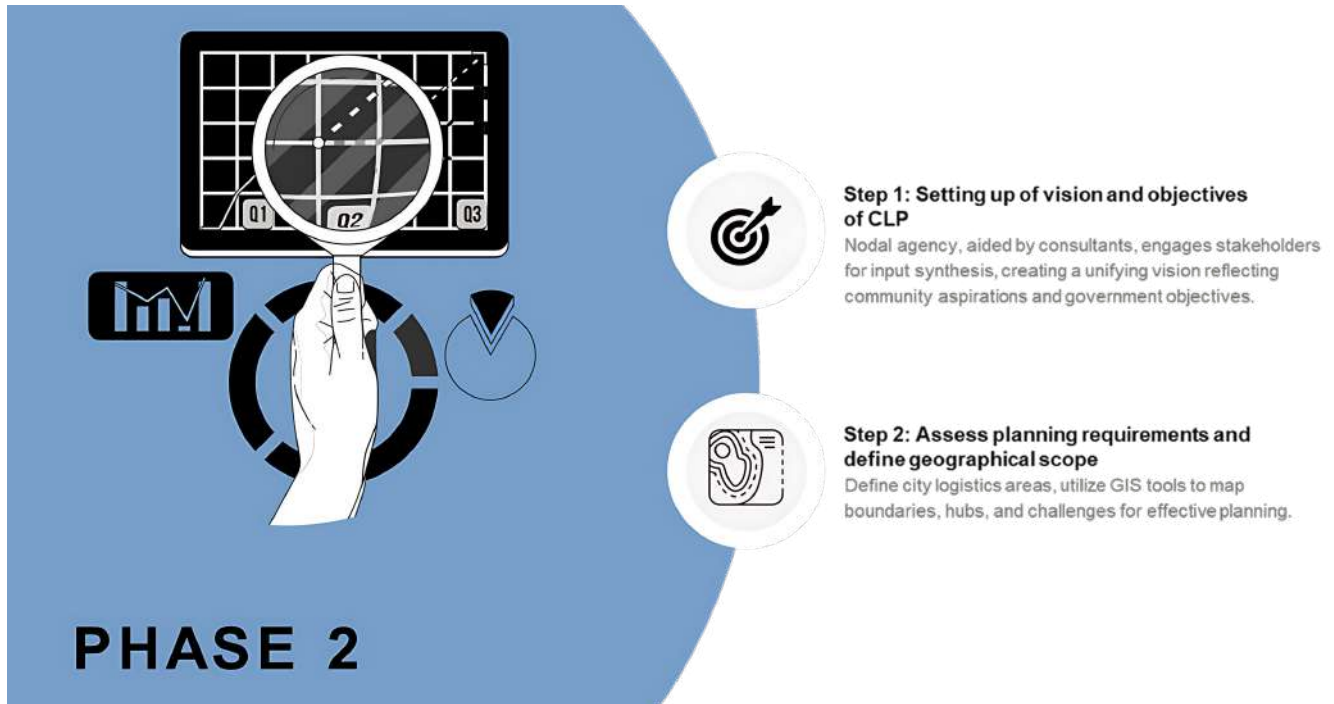


Congestion on roads
Image credits:Pexels

4. PLANNING PROCESS OF CLP

This chapter focuses on defining the scope of the plan and its objectives. It outlines steps in developing a baseline assessment of freight and its characteristics in the city, identifying priority sectors for a detailed assessment, scenario building, stakeholder consultation and development of measures and framework for implementing the CLP.

Phase 2- Defining the Scope, Vision and Objectives



This step aims to provide a clear understanding of the scope of the CLP, its geographical coverage, and its interlinkages with other relevant planning processes. By doing so, the CLP can effectively address urban logistics challenges, integrate seamlessly with broader master planning strategies, and accommodate stakeholder needs.

Step 2.1: Setting up of vision and objectives of CLP

To collaboratively establish a clear and inclusive vision of urban logistics aligned with broader urban goals, the nodal agency with the help of the consultant (if necessary) should initiate a process of engaging with all relevant stakeholders that will be responsible for implementation of identified actions in the future. By synthesizing inputs from stakeholders regarding their needs, individual plans, common themes, future aspirations, and shared values, a unified vision statement that encapsulates their collective goals and aspirations can be developed. This ensures that the vision resonates with the objectives outlined at all levels.

The reference scenario for defining the objectives to be reached, at city level, is provided by policies and official documents issued by the central and state government agencies in the past 10-15 years. The approach adopted is typically focused on the minimisation of both economic costs and negative impacts of freight movement to improve sustainability in logistics. This in an ideal scenario done by considering the interests and needs (often conflicting) of different stakeholders involved in the urban logistics chain through their different representation bodies.



Table 2: General objectives

From the socio-economic point of view:	From the commercial point of view:
• Reducing traffic impacts in the historic urban centre • Increasing the liveability of the urban environment • Enhancing local economic development	• Generate tangible benefits on competitiveness and business expansion • Optimise logistics operations • Reduce costs and improve knowledge about the costs of deliveries/logistics
From the operational point of view:	From the technical point of view:
• Improved city access regulations • Measures to support the adoption and operation of sustainable vehicles (e.g., fully electric) • Measures to support the transport operators' market • Measures to address labour market disruptions	• Tools, systems, and solutions to optimise fleet and delivery operations • Solutions to optimise logistics operations • Improved integration of logistics operations within the overall urban mobility system

Tasks

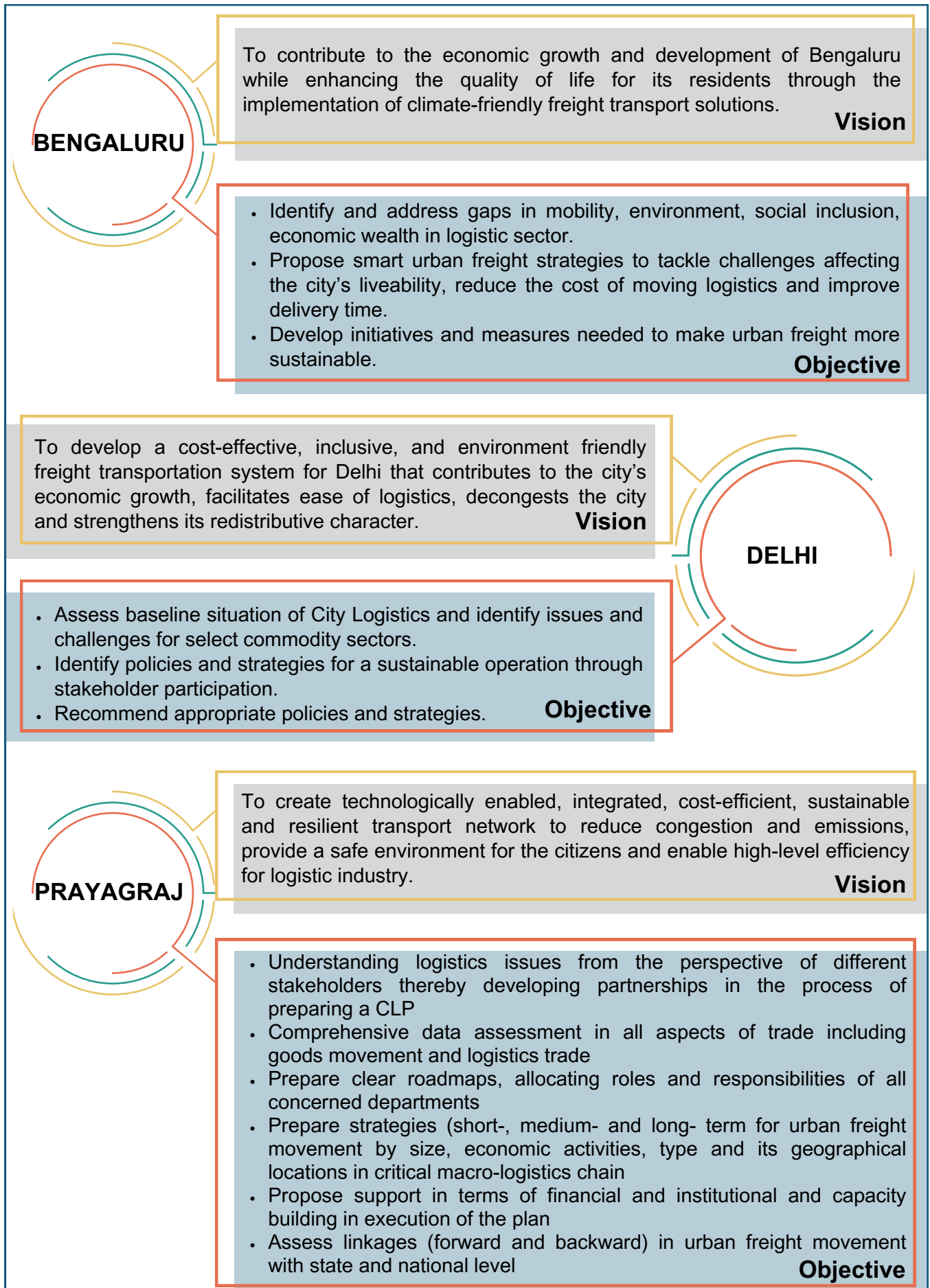
1. Review existing policies at national and state level to align vision and objectives to what is stated to create a holistic and integrated urban logistics system.
2. Brainstorm for an over-arching vision and set collective objectives derived from the individuals.
3. Define the vision of the CLP in parallel to the CMP of the city.
4. Address local stakeholders with the vision and objectives and get a consensus.

Actions to be undertaken

1. Use government websites, official documents and data sets available with government to get information regarding existing experiences and relevant legislation.
2. Identify and define concrete and feasible objectives with a set of achievable targets.
3. Formulate mode-specific objectives, such as reducing last-mile delivery times, optimizing rail freight movements, increasing utilisation of waterways, and enhancing air cargo efficiency.
4. Agreement of vision and objectives by the nodal agency and key government agencies.
5. Define the needed targets to achieve the said objectives.



Box 2: Precedents of vision and objectives set by various cities



Step 2.2: Assess planning requirements and define geographical scope

Rationale

The city is jointly a place of production, distribution, and consumption of material goods and will thus generate material flows. The role and extent of these functions vary according to the historical and socioeconomic context of each city, commonly involving a specialisation (e.g., financial cities, manufacturing cities). Globalisation has changed the functions of production, consumption, and particularly distribution by expanding its role with terminals and logistics zones. Some cities in India, have become prime financial, cultural, transportation, and political centres, with production taking a more marginal role.

One of the key preparatory actions is the clear definition of the study area (that usually corresponds to the city centre) and the identification of the main features of the reference area by, for instance, collecting mobility information and data about economic activities, social aspects, attraction centres (including the position of shopping centres and small shops) and traffic nodes. It is fundamental to identify:

- Zones which are mainly interested by freight flows, especially those areas with a high percentage of economic, commercial activities and growth centres.
- Characteristics and main types of city logistics flows (clothing, Food and Beverage (F&B), supermarkets, consumer electronics, house appliances, construction material etc.); main regulatory aspects in force (traffic restrictions, pedestrian areas, regulated access areas, special regulations for residents, etc.) with particular attention to regulations for commercial and freight vehicles circulation.

Tasks

1. The logistics plan for the city is developed by defining an area, considering urban corridors, suburban areas, high traffic zones, congestion points, and growth centres based on logistics demand.
2. GIS tools are used to map the city's boundaries, transportation networks, and potential logistics hubs, providing a spatial context for logistical challenges.

Actions to be undertaken

1. The implementation of this task is mainly based on desk activity and on the existing documents produced by the departments of the ULB and by other involved public and private entities (chambers of commerce, associations, etc.).
2. It is advisable to use GIS tools and a user-friendly database to summarise and process all the collected information, to clearly identify the most significant zones or points of interest, and to highlight the areas where city logistics solutions are currently lacking and could be implemented.

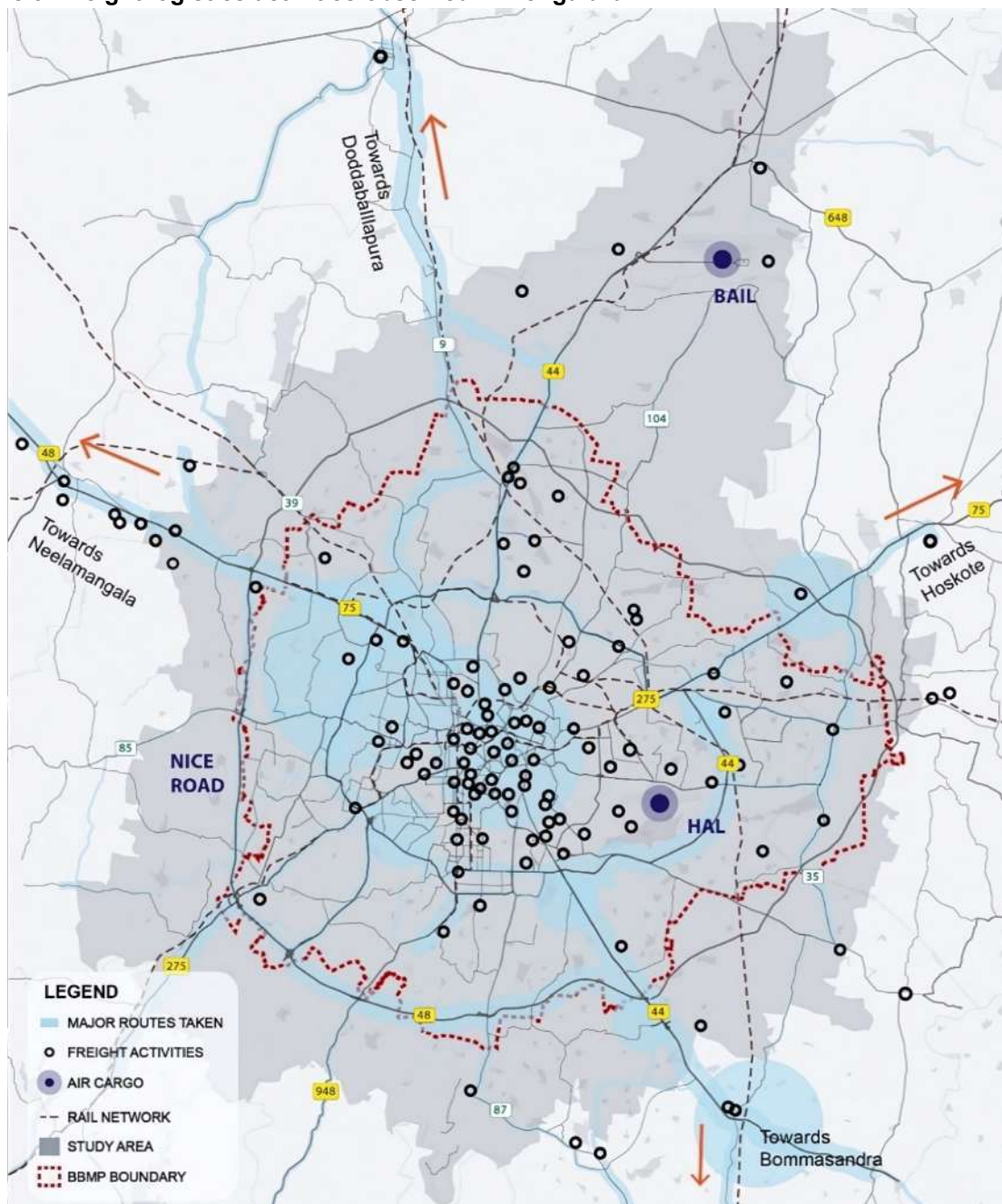


Box 3 : The case of Bengaluru

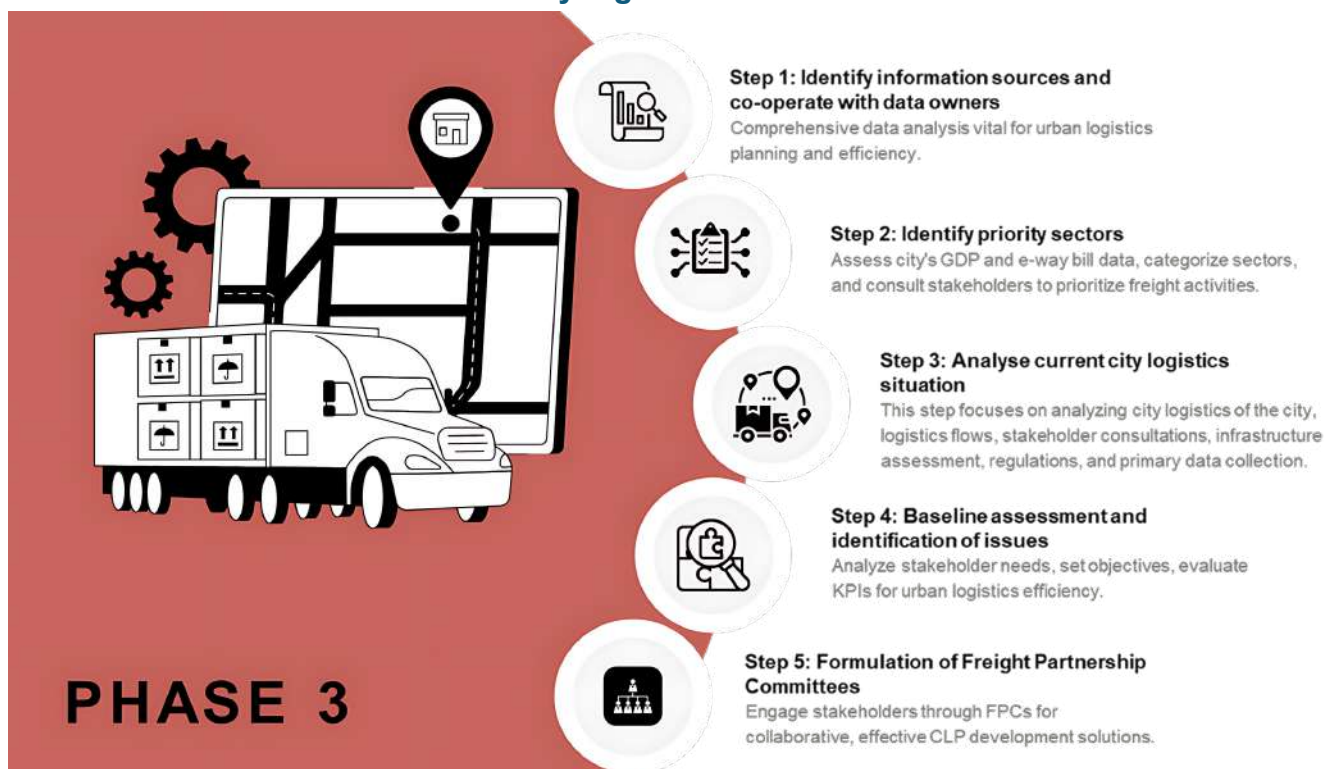
Since Comprehensive Mobility Plan (CMP) was already prepared for Bengaluru, with the aim of integrating the CMP and CLP, DULT in Bengaluru decided to retain the same influence area as in CMP for the assessment of logistics in the city. However, some freight activities outside the study area were also studied in detail as they were impacted by the movement of logistics in the city. Relevant stakeholders from these areas of focused freight activities were therefore included into the study.

The strategic approach included customizing planning models and philosophies to seamlessly integrate City Logistics Plans (CLP) with Comprehensive Mobility Plans (CMP). The process began with zoning strategies, to harmonise logistics considerations with broader urban development objectives. A pivotal aspect of the methodology was data collection, laying a robust foundation for informed decision-making. Specialised planning models were developed, to navigate the complexities of urban logistics, with a focus on optimizing efficiency and sustainability. Future guidelines were considered to ensure adaptability to evolving urban landscapes. Figure below displays the a glimpse of various data sets integrated while understanding the logistics situation in Bengaluru.

Figure 3: Freight logistics activities observed in Bengaluru



Phase 3- Baseline assessment of city logistics



Step 3.1: Identify information sources and co-operate with data owners

Rationale

One of the crucial parts of the methodology is the analysis of the overall situation of the city. It is therefore essential to understand the city context, paying special attention to the inner centre, from the mobility, transport, and logistics points of view, to identify the specific issues and concerns that need to be tackled. By using a holistic data collection framework for logistics planning, local authorities can receive answers on how the process for gaining knowledge on a city's current logistics situation should be structured, what information to collect, and how.

Tasks

Begin by compiling a comprehensive inventory of potential data sources relevant to urban logistics. This includes transportation and traffic data, economic data, environmental data, and sector-specific data for at least 1-5 years. Again, it is important to collaborate with relevant government departments responsible for transportation, trade, commerce, and urban planning. They often possess valuable data related to traffic flows, road conditions, trade volumes, and economic activities. After collecting information from various government sources, engage with logistics companies, transport operators, and e-commerce platforms as they have data on goods movement, delivery patterns, and demand fluctuations and technology.

These include:

- Key city documents to be used for analysing the local situation (statistics, political decisions, past traffic surveys/ data, city strategic planning, spatial development plans) considering different aspects, from mobility to social conditions.
- Main existing/ planned investment programs and decisions, dealing with mobility and logistics at city level.



- Available data on different transport modalities and making a critical reading of the main figures.
- Land use plans, details of establishments and the sectoral supply chains to get a broader picture of the main freight traffic attractors and generators.
- Technological systems and devices available in the urban area (i.e., access control system, urban traffic management system).
- Existing infrastructures and facilities for city logistics and freight distribution (e.g., Distribution Terminals, load/ unload areas for freight) that can be available and already in operation (forerunner sites) or are planned, studied or of potential interest for the site (followers' sites)
- Existing regulation framework and identifying the main relevant rules.

Actions to be performed

- Establish formal data sharing agreements with government departments, private companies, and technology providers.
- Ensure that data sharing adheres to privacy and legal regulations.
- Promote transparency in data sharing by outlining the purpose of data usage, ensuring data security, and assuring stakeholders that their sensitive information will be handled responsibly. Highlight how the insights derived from data analysis will contribute to improved urban logistics, reduced congestion, and enhanced business operations.

Box 4: Step-by-step guide on documentation of baseline data

Step 1

Identify the specific freight-related activities and supply chain movements that are integral to the city's logistics.

Step 2

Initiate comprehensive stakeholder engagement with businesses, manufacturers, distributors, and logistics service providers. Conduct interviews, surveys, and workshops to gather insights into the diversity of freight activities.

Step 3

Undertake a zoning analysis to identify key areas where freight activities are concentrated. Classify zones based on industrial, commercial, and residential functions, understanding how they contribute to logistics flows.

Step 4

Gather quantitative and qualitative data on freight movements. Utilize existing data sources, such as traffic records, shipping manifests, and industry reports. Conduct on-site observations to capture real-time information.

Step 5

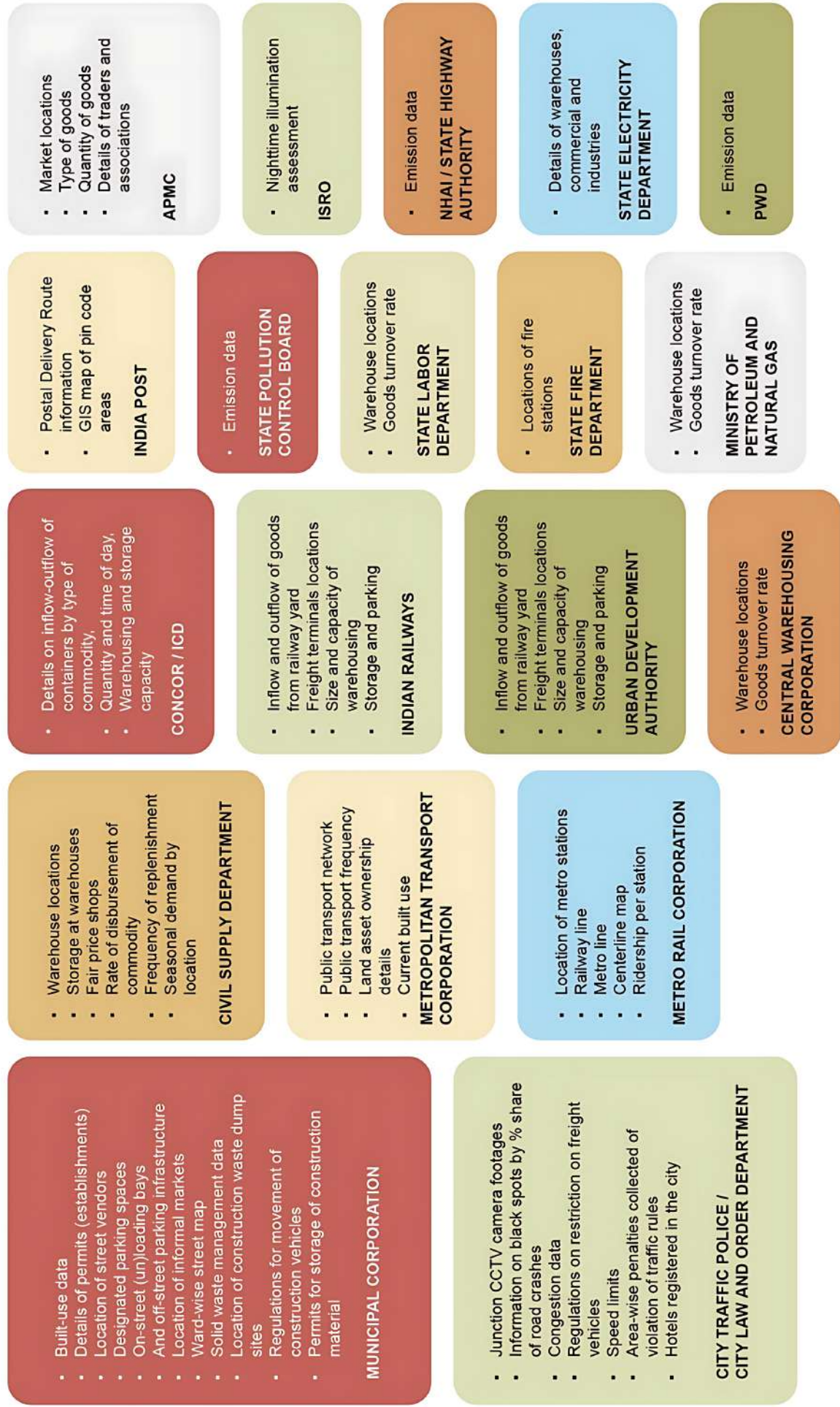
Develop detailed maps illustrating the primary freight routes within the city. Identify critical corridors and intersections where logistics activities are concentrated. Analyse traffic patterns and congestion points.

Step 6

Collaborate with supply chain stakeholders to map out the key nodes and links in the city's supply chain. Identify major distribution centers, warehouses, & manufacturing hubs.



Figure 4 : Data sources from various government agencies



Step 3.2: Identify priority sectors

Rationale

Identify the most relevant supply chains through assessment of the city's GDP and e-way bill data available with the state government, to understand the contribution of logistics to the local economy, job creation, and revenue generation. Understand related commercial vehicle flows, figures of the demand (shop owners, hotel), existing transport operations and packaging typologies for the studied supply chains. Identify main points of logistics transfer and analyse the organisational and operational conditions of each activity.

To identify the top priority sectors, an assessment based on key performance parameters to evaluate the performance of freight activity in the city should be formulated.

Tasks

- Categorise sectors by the available categorisation of Harmonised System of Nomenclature (HSN) code for classifying the goods under GST.
- Undertake stakeholder consultations with key industry associations to understand the supply chain existing in the city.
- Prepare a matrix to evaluate the sectors contributing to freight activities in the city and identify priority sectors with over 75% score.
- Evaluate the sectors on the given matrix to determine the priority of sectors for which the freight activities need to be addressed first.

Box 5: Sectors identified by HSN codes in CLP Bengaluru

	Agriculture – Pulses, Cereals & Spices		Plastic and Rubber
	Animal Husbandry		Mineral products
	Horticulture		Mechanical products
	Floriculture		Vehicles and transport related equipment
	Structural Materials – Cement, steel, stone, marble & granite		Pharmaceutical products
	Furnishing Materials - plaster, ceramic, glass, mica and asbestos		Precision instruments and apparatus
	Wood, charcoal and cork		Wood pulp, paper & paper board
	Yarn		Leather, fur, hide and skin
	Ready-made Garments		Fabric
	FMCG		Arms and ammunitions
	FMCD		Gems stones and precious metal
	Chemicals		Other accessories
	Base metals		Miscellaneous manufactured items

Harmonised System of Nomenclature code (HSN Code) is used for classifying goods under GST. The same classification is used for the study as e-way bills and e-invoices data contain information of the movement of goods by commodity.

Based on the findings of the e-way bill data and assessment of the statistics of economic development of Bengaluru studied for the year 2019-20, 26 sectors are identified as listed below.

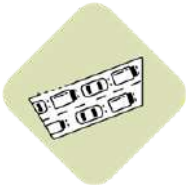
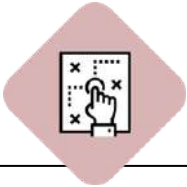
Source: City Logistics Plan, Bengaluru

Actions to be performed

- Through available data and preliminary stakeholder consultation, assess the following parameters within the supply chains.
- Determining what sectors / supply chains would have an immediate and visible impact on improvement of efficiency by evaluating the findings of each of the sectors across the priority matrix. The evaluation parameters and scores have been outlined below:
- Assess top sectors contributing to at least 75% of the share of total trips in the city and study their supply chain in detail.



Table 3: Parameters for assessment of priority matrix

	Parameters	Assessment	Score
	Congestion on road	Understanding the supply chain to determine the presence of heavy and light goods vehicles in the city from the available e-way bill data and through discussions with freight operators.	• Low impact - only during night • Medium impact - dedicated slots in the day • High impact - throughout the day
	Market presence	Evaluating the location of city markets in the freight supply chains its proximity to the nearby transportation network, available freight and street infrastructure and surrounding land-use.	• Retail market in core city • Sub-market / wholesale in core city • Main market / manufacturing in core city
	Infrastructure capacity		• Efficient infrastructure at delivery terminal • Poor infrastructure at delivery terminals • No infrastructure at delivery terminals
	Vehicle size	This parameter evaluates the share of freight vehicles involved in movement of the commodity across the supply chain within the city by evaluating the cargo capacity, manoeuvrability, environmental impact of the vehicle, last-mile suitability, and load optimisation.	• Major movement in small vehicles • Major movement in large vehicles • Movement in both small and large vehicles
	Shelf life	The shelf life of commodities impacts its management within the freight supply chain by looking at the storage conditions for commodities with respect to their shelf-life, the frequency of its trade is to be evaluated.	• Long shelf life • Medium shelf life • Short shelf life
	Travel kilometres	When evaluating freight trips within the city, focus on analysing total distances travelled, trip duration, and existing traffic patterns. Stakeholder consultations may further shed light on delays caused due to externalities of the trade.	• Point to Point trade • Last mile delivery • Both B2B and B2C trade
	Time taken		• Decentralised system of distribution • Partially centralised distribution • Centralised distribution

Box 6: Note on E-way bill and E-invoice data

E-Way Bill is an Electronic Waybill for movement of goods to be generated on the E-Way Bill Portal of GoI. A GST registered person cannot transport goods in a vehicle whose value exceeds Rs. 50,000 (Single Invoice/bill/delivery challan) without an e-way bill that is generated on www.ewaybillgst.gov.in.

This data set consists of details of the consigner- and consignee, the name of the transport operator, commodity, mode of transport and quantity of trade, its origin and destination, Plate number of the vehicle in which it is being carried and approximate distance to be travelled. This information is typically filled in by the consigner, however, in case of a part load, the e-way bills are generated by the operator transporting the goods. In part-load transfers, the commodity is loaded onto a larger truck off-site the given origin and destination locations of the bill (usually at the transporter's consolidation centre). However, this regulation is modified slightly in implementation across the states. It was understood during the assessment of e-way bill data provided by the Commercial Tax Department, Government of Karnataka has exempted the need for filing e-way bills for movement inside the city for up to 50km. The data available, while useful for understanding the long-distance movement of goods, currently does not capture intra-city freight movement.



E-Invoice is a system in which B2B invoices are authenticated electronically by GSTN. This information is updated in real-time to eliminate the need for manual data entry while generating part-A of the e-way bills, this data set, has details of the commodity, its origin and destination, vehicle number, quantity, and commodity. However, this is only recorded for all commodities traded by any organisation with a turnover of more than 50 Cr. is recommended to mandate the provision of E-Way for all movement inter- / intra- city goods movement (may also explore incentivizing the same through tax rebates considering the positive economic impact because of available data for logistics planning). While intra- is used for checking and verification of bills, the inter- city movement documented will assist in the monitoring of freight movement inside the city which typically bears 40% of the cost of the overall delivery supply chain and improve the efficiency of the system subsequently improving the state's economy.

Step 3.3: Analyse current city logistics situation

Rationale

Based on the results of the tasks performed in the step 3.1 of the study on the identification of priority sectors for freight planning, this step involves developing a more detailed understanding of the sector's freight distribution processes and mobility scenario. This step is dedicated to the analysis and understanding of the overall situation of logistics in the city from the freight transport point of view, to identify specific issues and concerns.



Tasks

The analysis involves these main aspects:

- Characterise the study area from a commercial point of view. Identify various commercial establishments (bars, restaurants, shops, small markets, large retail groups, large-scale distributors, malls, and departmental stores) based on their supply chain, size, and type of product.
- Understand the types of logistics flows in the study area (e.g., clothing, foods and drinks, supermarkets, consumer electronics, household appliances, etc.) by leveraging E-Way Bill and E-invoice data from GST records, which contains details of goods movement in inter-state transportation.
- Further, indulge in stakeholder consultations, speaking with labourers, drivers, and truck operators to understand the finer details about the logistics flows in city markets and between the transporter consolidation hub and establishments.
- Analyse logistics process of the identified infrastructures and facilities for city logistics and freight distribution, if any (e.g., city distribution terminals, (un)load areas for freight, etc.) and evaluate the current flows to the capacity of the available infrastructure of parking, (un)loading, right of way of the access roads, connectivity by public transport and street infrastructure;
- Analyse the specific regulations for commercial and freight vehicles circulation in the study area and available Information and Technology Systems (ITS) and city mobility technologies (Access Control System, Road Pricing systems, Parking Management System, etc.) for monitoring.
- Undertake specific primary data collection and information surveys on the main areas of freight generation and attraction within the study area. Data can be collected by means of available consolidated methodologies, such as traffic volume counts (TVC), roadside interviews (RSI), establishment surveys and truck driver surveys suitable to the level of detail needed to be achieved.

Actions to be undertaken

- Assessment of available data with various government agencies and private organisations willing to share information for the purpose of preparation of the city logistics plan.
- Identify data gaps and develop a method to carry out interviews/ surveys, besides desk activities dedicated to the collection of information on existing logistics processes and infrastructure. As regards the survey, key activities are:

a. Interviews with local stakeholders: a more detailed analysis of freight and city distribution processes must be carried out through interviews with key stakeholders, aimed at identifying the needs of each relevant category. Particularly, two main categories will be addressed and interviewed on-site: shop owners, details of which would be available with the urban local body under permits issued for establishments/ with the labour department and transport operators' whose information can be collated from the E-Way bill data. Further, details of associations belonging to each relevant actor across the supply chain of the priority sectors must be interviewed (i.e., if any associations are present, or relevant for logistics processes, etc.). The support of trade associations can be an important success factor in this activity, allowing a larger data collection and development of contacts database.

b. On-field data collection: Information on routes of transport & time of travel, by type of commodity and vehicle shall be collected from transport operators and complemented by surveys carried-out on road during specific time windows of peak hours of freight as identified through consultation of stakeholders and city traffic movement peak which would be identified in the CMP or can be assessed using google traffic maps.

- Depending on the economic and staff resources, traffic counting should also be implemented. These can either be:

a. Automatic: enabling to monitor time of transit, type of vehicles and relevant speed in a continuous way during a fixed period of time through the use of ANPR Cameras installed by Traffic Police.



- b. Manual:** by employing a survey agency along the freight routes to count vehicles on an identified junctions/ arterial roads and freight hubs to count vehicles by type present across the day for 16- to 24- hours. Compared to automatic counting, this system, besides being less accurate, is also rather discontinuous as it is not possible to guarantee the constant presence of surveyors on the road.
- Both types of surveys (automatic vehicle counting and on-road interviews) can provide additional information allowing to:
 - Extend the information collected through stakeholder interviews (see above).
 - Validate such information through direct observation of logistics flows in the area.
 - Conduct in-depth analysis of specific sector supply chains that heavily impact urban logistics, such as manufacturing, wholesale, retail, e-commerce, and reverse logistics. Identify peak demand periods, delivery routes, and transportation preferences. Useful information can be collected by merging traffic counting with specific surveys to drivers of commercial vehicles:
 - Traffic typology (within the urban area, crossing the urban area, etc.)
 - Type of transport (self-supply, 3rd party, courier, etc.)
 - Origin/destination of freight
 - Type and volume of freight carried
 - Number of deliveries per day
 - Average stopping times of vehicles during delivery processes
 - Time slots and days characterised by higher traffic flows of commercial vehicles
 - Quantify the costs, define staff resources, investigate areas, prepare questionnaires for surveys, etc., for an optimal implementation of surveys and counting. (Refer Annexure 7.4) Repeating the survey two or more times can prove to be very useful, to cover different days of the week and time periods (e.g., peak vs non-peak hours). It will also avoid any irregular situation that may happen in case of a single survey (i.e., market days, etc.). In case any significant data/ information is not available, it is recommended to approach different stakeholder groups (transport associations, chambers of commerce and industries, etc.). This may be achieved by organising specific focus groups. Data and information can be collected in a quick and efficient way, helping to set-up a useful reference scenario.
 - Employ GIS and satellite imagery to map out transportation routes, congestion points, existing nodes and potential areas for logistics hubs.
 - Analyse the road infrastructure to identify bottlenecks and areas with poor road conditions that hinder smooth goods movement.
 - Evaluate and analyse the data and surveys grouped under the following assessments

Table 4: Assessment criteria and various analysis

Assessment criteria	Data analysis	
Efficiency	- Vehicle size / type - Journey length and speed - Routes taken for deliveries - Number of deliveries - Quantity of goods - Empty running	- Market capacity/ utilisation - Transportation time and cost (Un)loading time and cost - Storage facilities - Parking management
Environment	- Empty running - Operational cost - Emissions - Environmental-friendly distribution	- Noise pollution - Turnaround time - Traffic regulations
Safety	- Vehicle age - Weight restrictions of commodities being carried - Road crashes - Traffic flow optimization	

Note: Kindly refer annexures for details on the possible sources for data collection.

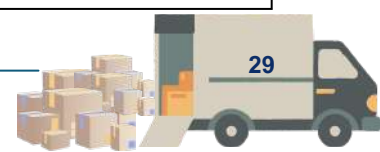
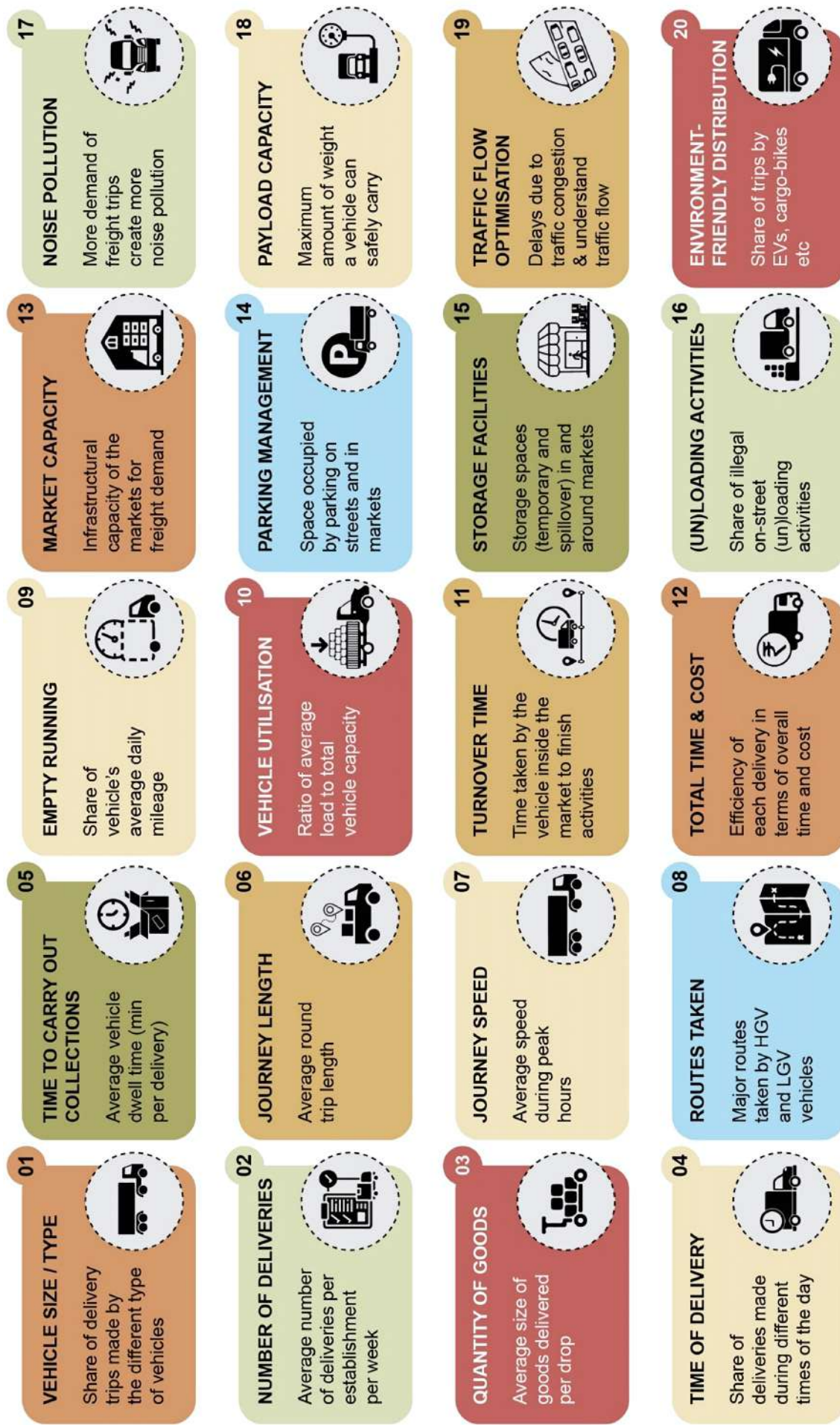


Figure 5 : Snippets of analysis undertaken from the data available



Step 3.4: Baseline assessment and identification of issues

Rationale

Based on the above steps and starting from the results of the surveys carried out, key stakeholders need should be identified. Vision and objectives of the plan should be taken into consideration along with the needs and constraints of all the relevant stakeholders. Broad needs of stakeholders have been outlined in chapter 2. The analysis should be predominately a desktop study, using specific tools for synthesising the various collected information. To evaluate the performance of existing freight scenario for key sectors, specific KPIs must be identified at link and node level along the urban distribution chain. Link represents the transport route and node represents the marketplace.

Tasks

- Identify requirements based on the results of the surveys and data gathered from the activities described in step 3.2. Specific requirements should be identified for the five categories detailed below based on the needs of the city (additional categories can also be identified depending on specific local situations):
 1. Technical users' needs focusing on the technical and functional aspects of the involved city logistics schemes and its application.
 2. Operational needs addressing day-to-day city logistics operations including elements such as the type of operations carried-out, the workload, work environment, motivation, monitoring and control of logistics processes.
 3. Commercial impacts on economic and sales processes. This category deals with services and support offered to commercial operators, customer service and satisfaction, quality of information supply, competitive advantage, or company image.
 4. Socio-economic impacts consisting in the wider impacts of city logistics schemes and services on socio-economic related user needs.
 5. Environmental impacts comprising of vehicular emissions and solid waste generated during value addition, transit and distribution of commodities.
- Identify the main problem and objective. Some examples are listed below:
 1. Alleviating traffic congestion and reducing presence of heavy trucks in urban centres.
 2. Sustaining economic development.
 3. Maintaining accessibility to the (historic) town centres, increasing the attractiveness of the city for residents, tourists, and commercial organisations.
 4. Optimising loading and unloading lots and parking spaces.
- In parallel to these key activities, based on the data collected with local surveys, a baseline should include energy consumption and environmental point of view.

Actions to be undertaken

- Analyse the baseline for the study area to measure and evaluate the information collected. For example, the number of commercial vehicles, their type and size, average distance covered by each trip and the daily number of trips. This will allow calculating the number of kms per year and impacts. Based on these data and considering average consumptions of fuel (diesel or gasoline) and engine standard emissions (BS), it is possible to calculate the baseline regarding energy consumptions and commercial traffic.
- Undertake a detailed evaluation of Key Performance Indicators (KPIs) and specific findings and challenges being faced at the identified market areas for each of the priority sector. As part of the analysis, stakeholder consultations should be carried out.



Box 7: Methodology adopted by Delhi and Bengaluru for specific assessment

Delhi, while preparing the city logistics plan studied supply chains and categorised the freight activity under two area: nodes and links. Where the node represents the market areas undertaking activities across various hierarchies, the link represents the transport route taken for trading the commodity, its street infrastructure and level of service. This approach allowed the cities to understand their logistics intricacies, streamline operations, and foster sustainable economic development with a focus on efficiency and connectivity.

Key Performance indicators (KPI) were formulated covering operational, environmental, and social aspects keeping in view the commodity distribution pattern to assess the baseline scenario for each sector. KPIs were defined at both node level (wholesale markets to determine the efficiency of Infrastructure and operations and identify challenges) and link level (to determine operational performance of vehicles). The table below shows the key performance indicators outlined in the CLP of Delhi.

Table 5: Key Performance Indicators defined in the City Logistics Plan of Delhi and Bengaluru

Activity Locations	Principles	KPI	Data Requirement
Node	Decongestion	Turn-around time	Entry and exit time
		Mandi Capacity/ utilisation	Annual/ monthly arrival tonnage, handling capacity
	Operational Efficiency	Loading-unloading time per tonne, and loading-unloading cost/tonne	No. of labours deployed (Manual Operation)
			Weight Loaded or unloaded
			Start and end time of loading-unloading
Link	Operational Efficiency	Operational Cost/ tonne-km	Fuel cost, driver cost, maintenance cost, average weight carried per loaded vehicles, average trip length, cost per trip
		Operational Capacity Utilisation	Average trip distance per day, weight carried
	Environmental	Empty Running(Dead KM)	Age, fuel type, vehicle type, standard, number of empty trips, emissions, average trip length, weight carried
		Fuel Efficiency (Fuel Used/ ton-km)	
		Emissions/ tonne-km	
	Safety	No. of Fatalities Ratio of women to men labour force	Crash Data registered
			Total freight vehicles in city
			Total labour by gender

Source: City Logistics Plan, Bengaluru and Delhi



Step 3.5: Formulation of Freight Partnership Committees

Rationale

Involving a variety of relevant stakeholders throughout the process helps in the legitimacy, quality, and cost effectiveness of the CLP's development. Moreover, city logistics and transportation business and operations are predominantly owned, managed and operated by private sector and therefore institutionalising their representation at important stages of CLP development is important. Establishing FPCs have been successful in building public private partnerships in the United Kingdom to identify and address area or sector specific city logistics issues.

Freight Partnership Committee: This committee is a more flexible partnership concept than that of a Public Private Partnership (PPP) in a traditional meaning. In a PPP, several public and private partners are brought together with the focus on financial agreements – for example to carry out large construction projects. The term FPC refers to long-term partnership between the concerned logistics stakeholders (both government and private), that on a formal or informal basis meet regularly to discuss and find solutions to problems and issues that occur in the urban area.

Tasks

- Develop collaborative mechanisms, for the FPC to be involved in the CLP development. Facilitate regular meetings, workshops, and consultations to ensure their active participation. Outline their roles, responsibilities, and participation methods. Collaborative involvement ensures a holistic understanding of logistics challenges and the development of effective solutions. Details of how to undertake these meetings has been outlined in detail in Annexure 7.5.
- In the long term, consider development of a web-based stakeholders governance platform which supports stakeholders' consensus building to facilitate the participation process.

Actions to be performed

- Identify a list of private stakeholders required to work alongside the city level committee to confirm the identified issues and develop a better understanding of the root causes of the problems, past solutions that have been tested and failed, and the reasons for failure of implemented suggestions.
- Formulate Freight Partnership Committees by sector for ease of focused discussions.
- Conduct in-person workshops to discuss the gaps identified.
- Identify potential low hanging measures for implementation in short term to further gain the confidence of private stakeholders.

Box 8: Freight Quality Partnership, Derbyshire County and City Council

In European countries, Freight Quality Partnerships have been in place since the 1990s to involve private stakeholders in the decision-making process of managing cargo flows in a city. One such council was Derbyshire County and Derby City council.

Derbyshire County and Derby City councils set up a joint FQP in response to the Government's White Paper on transport. The FQP has two aims:

- To produce a freight strategy for the sustainable movement of goods within Derby City and the County.
- To oversee the implementation of the strategy

Derbyshire County and Derby City councils decided to develop a joint FQP, as they already had a joint LTP. In the past they would have written a strategy internally before any consultation took place. The result would be a strategy focused primarily on their agenda only. In preparing their new freight strategy, Derbyshire wanted the emphasis to be on partnership from the very start. Consequently, they formed a small group made up of authority and industry partners and brainstormed what the key issues were. They then wrote to many businesses to explain what they were trying to do and inviting them to join the partnership. Through discussions at the partnership meetings and responses from the mail out to the business community a strategy was developed.

Source: Freight Quality Partnerships - Case Studies, Department of Transport



Box 9: Freight Partnership Committee - Bengaluru

A city level Freight Partnership Committee was formulated for the city logistics plan for Bengaluru, comprising of city organisations, private sector, and representatives from the central and state government.

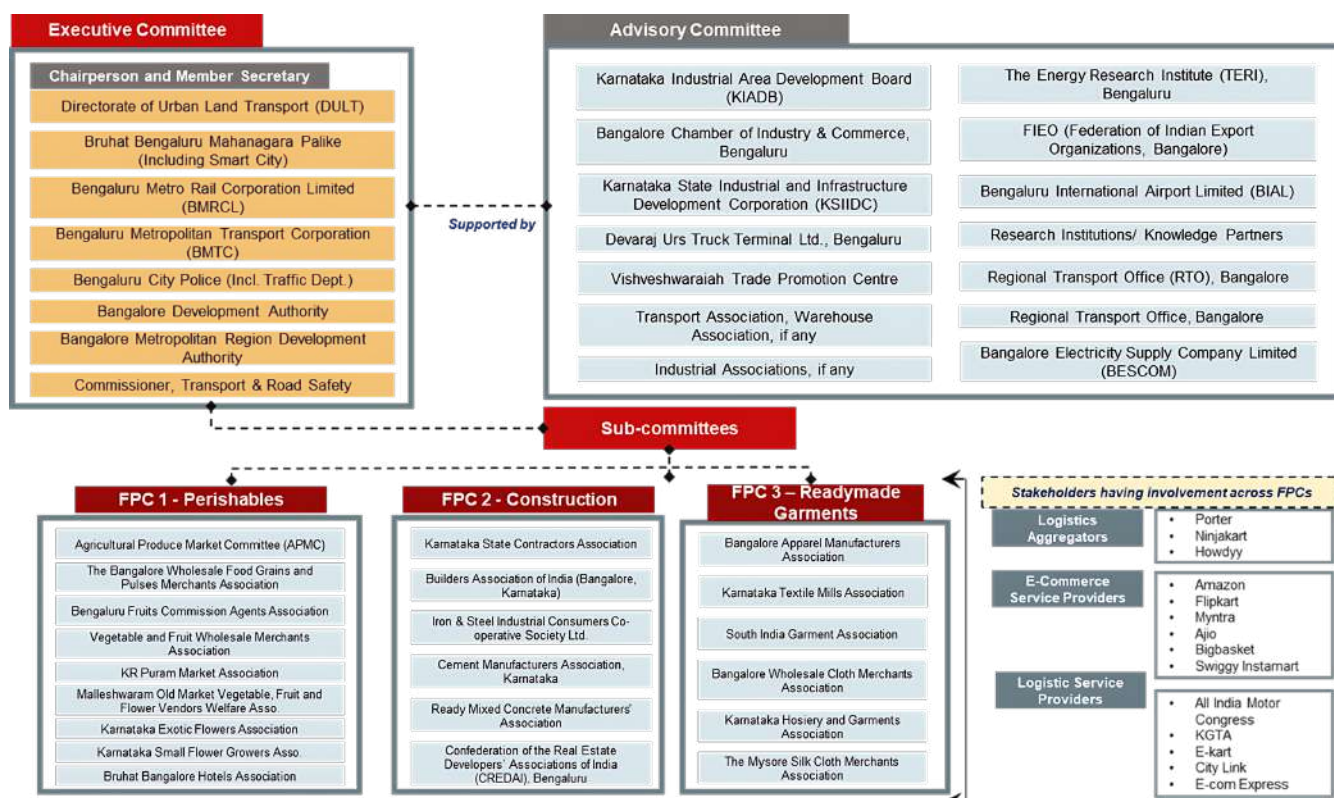
The broad functions of such a committee included:

1. Advisory & Planning (Setting of vision and targets, identification of key actions and projects (such as pilots), review and recommendations of proposals for improved logistics planning for the city, alignment of city's freight efficiency objectives with existing or proposed transport, vehicle, zoning, and land use planning for the city, inputs to state and national policies from the freight efficiency perspective).
2. Stakeholder Coordination (Engaging with stakeholders, working with academic institutions, civil society organisations, non-government organisations and think tanks, as well as local civil society organisations and NGOs, host stakeholder convenings, evaluate city-specific enablers, and formulate implementation action plans).
3. Providing regular support across the city government to prepare and implement the CLP.
4. Progress Assessment (Monitoring and regularly evaluating the implementation of measures outlined in the CLP).

Formation of the FPC and the various stakeholders involved are mentioned in the Figure 6 below.

Source: City Logistics Plan, Bengaluru

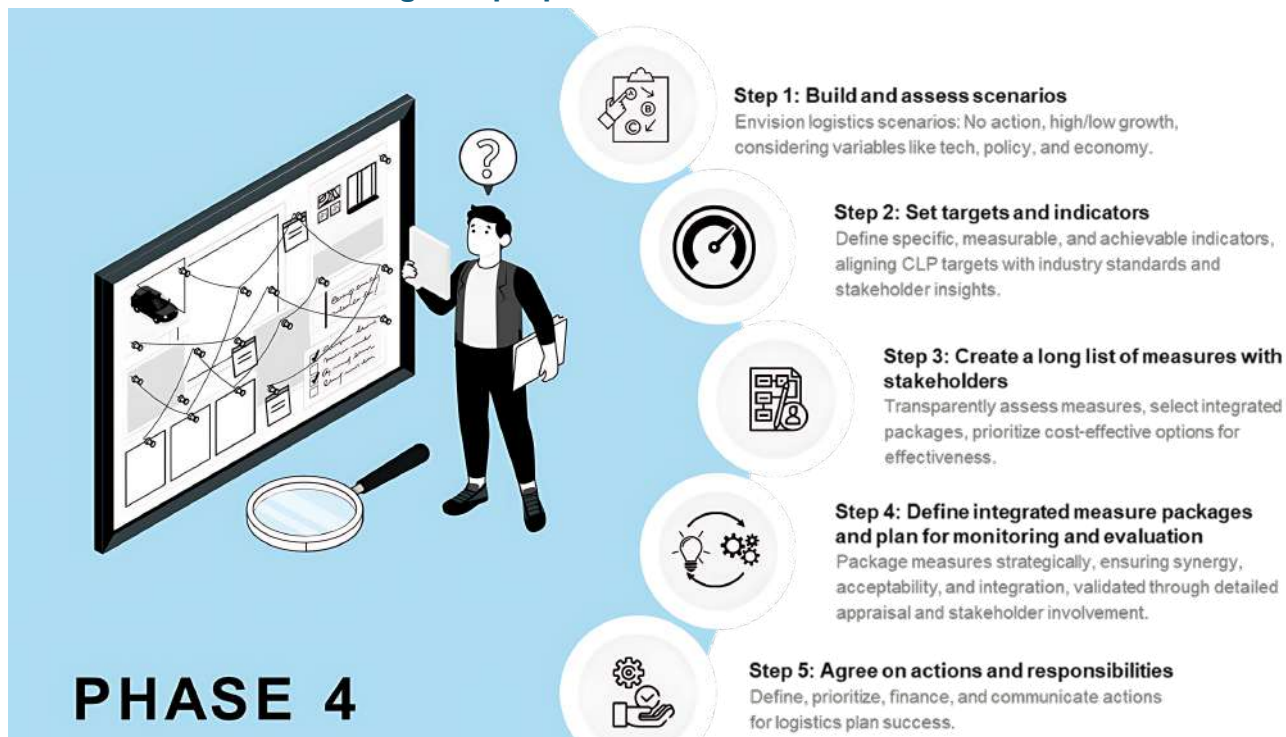
Figure 6: Freight Partnership Committee proposed for Bengaluru



Source: City Logistics Plan, Bengaluru



Phase 4- Scenario building and preparation of CLP



Step 4.1: Build and assess scenarios

Rationale

Based on the requirements identified in phase 3 of the study, the possible measures/ solutions to be adopted by the city shall be identified and analysed. This step involves envisioning different plausible outcomes to understand potential urban logistics dynamics. Engaging stakeholders in scenario discussions ensures a holistic understanding of the challenges and opportunities that might arise. The private stakeholders, companies and enterprises involved in the FPC define their individual plans based on quantified targets. It is therefore suggested that the future vision of a CLP be articulated on quantified targets for specific logistics parameters in three-time horizons (Business as usual, high growth and low growth).

Tasks

- Describe the future logistics characteristics in the case of no action being taken (business as usual scenario) and for the high growth and low growth scenarios related to infrastructure development and trends (based on demand, supply, growth of vehicles and economic activities and implementation of disruptive technology).

Actions to be performed

- Determine critical variables that significantly impact city logistics, such as population and vehicle growth, technological advancements, economic shifts, and policy changes.
- Assign different values or ranges (high and low) to these variables to create alternative scenarios. For instance, consider scenarios with varying levels of e-commerce growth, transport network expansion, or environmental regulations.
- Develop a range of scenarios, including optimistic, pessimistic, and moderate possibilities. Each scenario should capture a distinct future trajectory.
- Implement training actions and coordinated activities at a city's authority level before implementing the consensus building process on the scenario development.



Box 8: SUTP guidelines

Scenarios help to better understand the likely effects of external factors that affect urban mobility (such as changes in climate, information technology, finance, and security) in combination with alternative approaches to react to them. By illustrating different possible future situations, they allow planners to assess consequences of current trends, potential societal and local changes, as well as alternative strategic policy priorities independently of each other. At least three scenarios should be developed:

A business-as-usual scenario that describes the development forecasted if the current policy direction is continued and only measures that have already been planned are implemented. Alternative scenarios that describe forecasted developments resulting from different strategic policy priorities (e.g., public transport focus vs. active mobility focus vs. electromobility focus). Such scenarios show the contributions of different policy directions, helping to define what to put most emphasis on. It is recommended to include only sustainable policy directions, as the business-as-usual scenario already allows the comparison with a less sustainable scenario.

Source: SUTP iNUA implementation guide

Box 9: Process of trend analysis and future scenario identification

In the process of trend analysis and future scenario identification, one begins by defining the scope and collecting relevant data, followed by the identification of key variables influencing the subject. Conducting trend analysis and engaging stakeholders provide insights into historical patterns and stakeholder perspectives. External factors are then considered, leading to the development of multiple future scenarios. Quantifying these scenarios involves using data driven methods, and specific evaluation metrics are defined to objectively compare and prioritise scenarios based on efficiency, environmental impact, and safety considerations. Sensitivity analysis is performed to account for variations in key factors, and scenarios are refined accordingly. The entire process is documented transparently, and findings are communicated to stakeholders, ensuring a comprehensive understanding of potential outcomes.

The study scenario building exercise for Bengaluru has been explained as a case example for better understanding.

The impact of freight flows in the city are generally reflected in vehicle registration trends and goods vehicle permit issued for movement of cargo within the city. The commercial vehicle population is apparently impacted by the above stimulating factors however regulatory restrictions also influence movement of goods.

The below factors are at play:

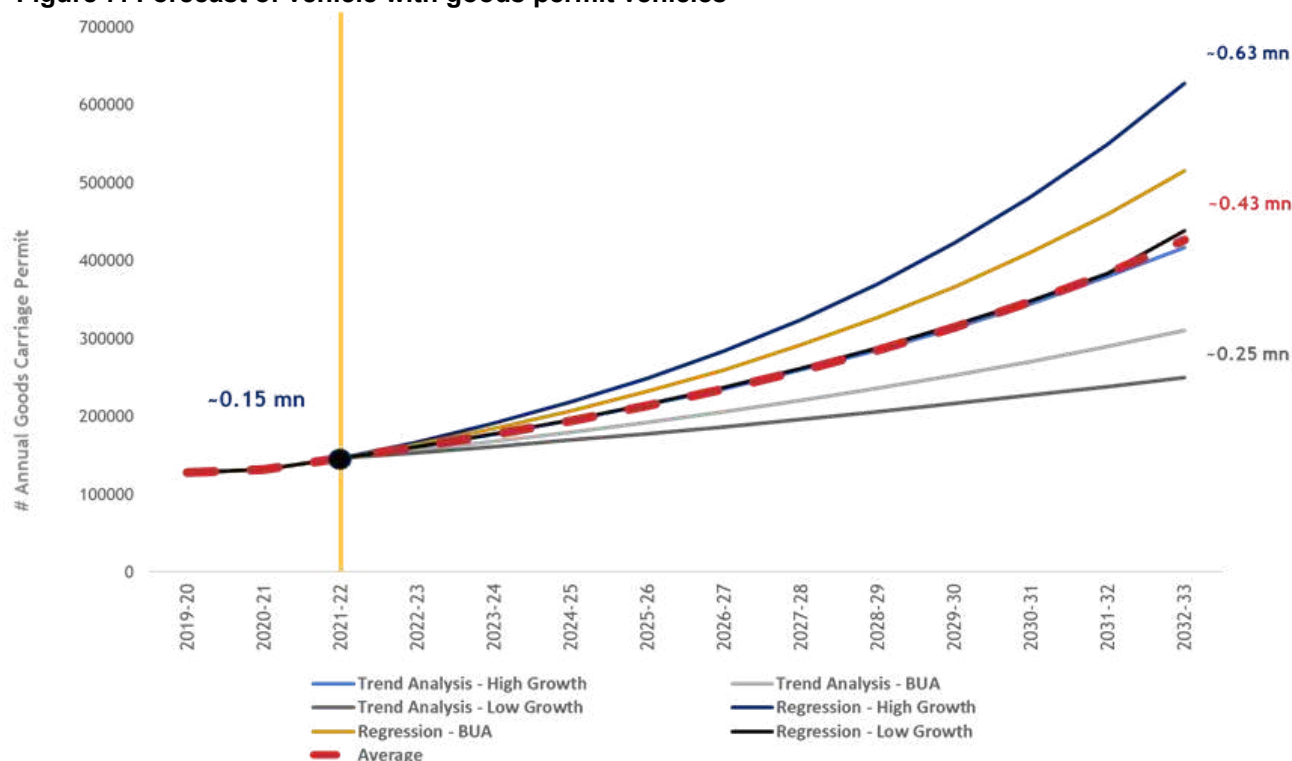
Factors	Nature	
	Stimulating	Restricting
Macro-Economic	• Population • Disposable income • Consumerisation • Urban Sprawl	• Economic slowdown • Market disruptions through technology breakthroughs – 1) fleet aggregators 2) Drone-based delivery etc.
Regulatory	• Land use planning • Tonnage restriction • Availability of vehicle finance • Availability of logistics infrastructure (cargo terminals, logistics parks, wide roads etc.)	• Vehicle entry time Restrictions • Fuel Price • Permissions and approvals



Certain considerations have been made when determining the existing scenario of logistics in the city. Goods vehicles older than the age of 12 have been excluded since due to age restrictions their movement prohibited in the city, potentially leading to the resale of such vehicles in secondary regional markets, global/state economic trends to understand growth of city and possible emergence of aggregators leading to consolidation of freight.

The limitations to gain a comprehensive understanding of pan city logistics load when preparing city level plans include the understanding of the existing situation of freight vehicles using only the goods carriage permits data of the metropolitan area potentially neglecting external to internal and vice-versa. While e-way bill data is available for the same, it excludes data of trips below INR 50,000, agricultural trips and internal trips within city limits. Furthermore, unregistered trips in specific goods categories are difficult to capture as they are neither registered nor monitored.

Figure 7: Forecast of vehicle with goods permit vehicles



Source: Analysis by The Urban Lab and Coordinates

Box 10: Available projection models/ tools when planning for adaptation

Several freight projection models and tools help in forecasting future freight demand, understanding logistical challenges, and devising strategies for efficient urban freight management. Here are some relevant models and tools:

- 1. TRANSEARCH:** Developed by the U.S. Federal Highway Administration (FHWA), TRANSEARCH is a comprehensive transportation planning tool. It assists in freight data analysis, identifying trends, and projecting future freight demand. The tool allows users to estimate commodity flows, mode choices, and infrastructure needs.
- 2. CUBE Voyager Freight Modeling Software:** CUBE is a widely used transportation planning software that includes a module specifically designed for freight modeling. It enables practitioners to simulate freight movements, evaluate network performance, and assess the impact of various scenarios on the transportation system.
- 3. TransCAD:** This is a transportation planning software that offers a range of tools for modeling and analyzing freight transportation. It allows users to develop detailed freight demand models, simulate logistical scenarios, and evaluate the impact of different policies on freight movements.



4. PIECES (Prospective Insights on the Economic Geography of Supply Chains): PIECES is an open-source supply chain simulation model developed by the World Bank. It helps in analyzing the efficiency and resilience of supply chains, making it useful for practitioners interested in understanding how disruptions may affect freight movements.

5. Ptv Vision Traffic Suite: Ptv Vision Traffic Suite includes software like PTV Vissim and PTV Visum, which are widely used for traffic and transportation planning. These tools have modules dedicated to freight modeling, enabling practitioners to simulate and analyse freight movements in urban areas.

6. GIS-based Models: Geographic Information System (GIS) tools like ArcGIS or QGIS can be used to develop spatially explicit freight models. These tools allow practitioners to map freight movements, identify critical nodes, and visualise the spatial distribution of logistics activities.

8. Urban Freight Simulation Models: Simulation models like Aimsun or SimEvents can be employed to simulate and analyse urban freight movements dynamically. These tools provide insights into how various factors, such as delivery schedules or infrastructure changes, impact the flow of goods in real-time.

When selecting a model or tool, it's essential to consider the specific needs and characteristics of the urban area under study. Additionally, collaboration with local authorities, businesses, and logistics providers can enhance the accuracy and relevance of the projections.

Source: Various Sources

Step 4.2: Set targets and indicators

Upon finalisation of the concrete and feasible objectives, a set of achievable targets should be defined, accompanied by a clear set of assessment indicators. Defining relevant indicators and establishing measurable targets is crucial to monitor the progress and effectiveness of CLP objectives. Ensuring that the proposed targets are achievable and aligned with the city's broader goals enhances the feasibility and impact of the plan. This would incorporate an exhaustive list of primary and secondary objectives and associated indicators for measuring the expected impact of the overall CLP, as well as of an individual implementation of logistics measures.

a) Identify indicators for all objectives & agree on measurable target

Ensure targets are Specific, Measurable, Achievable, Relevant, and Time-bound (SMART). This makes targets precise and actionable. For each objective, identify indicators that directly reflect its intended outcome. Indicators should be quantifiable and reflect the key aspects of the objective. Ensure that reliable and up-to-date data can be collected for the chosen indicators to maintain accurate assessments and for monitoring. For instance, for reducing congestion, indicators might include average travel time, vehicle density, or road occupancy rates.

Consider available national / global benchmarks or standards to set targets that align with industry norms. Benchmarking provides a basis for realistic expectations, use historical data, modelling, and simulations to set targets based on achievable improvements observed over time.

Ensure that targets for different objectives within the CLP are not contradictory but rather complementary, creating a balanced and cohesive plan. Verify that the proposed targets are consistent with existing policies, regulations, and legal frameworks. This prevents conflicting goals. Engage stakeholders in the target-setting process. Their insights provide a practical understanding of what is attainable and aligns with their respective roles.



Example

To make the above indications clearer, a description of the set of indicators identified for monitoring the “load/unload bays” is provided:

- **General indicators**

1. Number of goods vehicles /day present in the urban area
2. Travelled km/day by goods vehicles in urban area, no. deliveries for each trip, no. deliveries for each bay.

These indicators can be monitored by data collection drives, through on-site interviews with transport operators and through AI-based monitoring of ANPR traffic cameras.

- **Daily use of the single bay-** This indicator is based on on-site ticket collection count or through a parking management system (if present)
- **Service efficiency and approval-** The efficiency can be monitored by the single bay availability verification as indicated above.

The knowledge and approval parameters can be monitored with FPC meetings with transport operators and shopkeepers.

Table 7: Key targets stated and the relevant indicators

Key Targets	KPIs
Reduce vehicle/km	• Vehicle empty running • Fuel efficiency • Emissions/tonne-km
Reduce time taken	• Turn-around time • Time taken for (un)loading activities • Manoeuvring time to find empty parking / (un)loading area
Reduce overall cost	• Cost of (un)loading goods • Operational cost of storage
Collaboration	• Regular interactions and feedback from FPCs
Improving efficiency	• Load factor • Traffic flow and speed of vehicles • Transparent traffic management • Technology enabled freight nodes • Optimum storage utilisation
Regulatory mechanisms	• Reservation of land for freight activities in master plans/ development plans • Availability and frequency of Public Transport around freight nodes identified • Availability of spaces for Pickup- Dropoff (PUDO) services
Improving sustainability	• CO2 emissions caused by freight vehicles • Cases of overloading of LGVs • Adoption of cleaner vehicles and technologies • Use of sustainable modes for last-mile delivery • Average age of freight vehicles on road • Average volume of solid waste collected from city markets (from commodity spoilage / packaging)
Improving safety	• Cases of freight vehicle involved road crash • Share of usable pedestrian infrastructure in freight nodes of the city • Share of women in the labour force





Turn-around time



Mandi Capacity / Utilization



(Un)loading time per ton



Operational Cost / ton-km



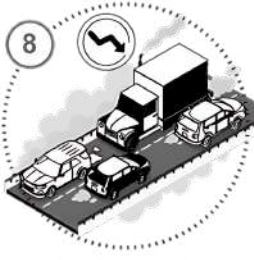
Operational capacity utilization



Empty running



Fuel efficiency



Emissions / ton-km



Number of fatalities



Integration of freight activities



Loading unloading activity
Image credits: Pexels

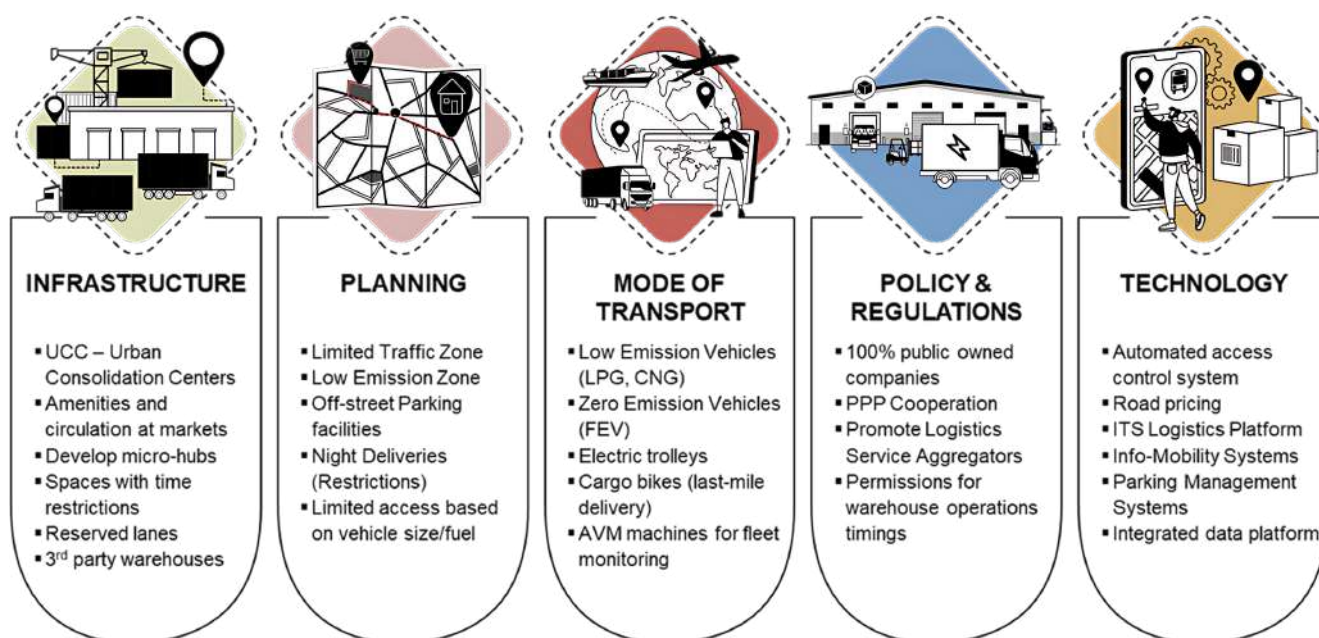
Step 4.3: Create a long list of measures with stakeholders

The development of effective package of measures will ensure that the defined objectives and targets are met. The selection should build on discussion with key stakeholders, transparently assess measures for feasibility and contribution to the objectives and consider experience from other places with similar policies. In order to maximise synergies and help overcome barriers, integrated packages should be defined. Planning evaluation and monitoring of each measure or its package early makes sure it is considered when responsibilities and budgets are discussed later on.

The assessment and selection of measures aims to identify the most suitable and cost-effective measures to achieve the vision and objectives. In order not to forget relevant options, a comprehensive longlist should be created based on expert knowledge and the ideas of the formulated FPC, the experience of practitioners in other cities, and databases of available measures.

To achieve a set of effective measures that realistically fits with the available resources and local circumstances, a transparent assessment of all options on the long list needs to be conducted. The assessment will be guided not only by effectiveness in terms of contribution to objectives, but also by acceptability and value for money. Especially in times of tight budgets for urban transport and mobility, it is crucial to get the most impact possible for the resources spent.

Figure 8: Possible solutions suitable for different local needs



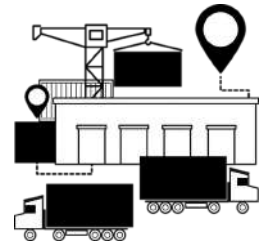
Source: Prepared from literature review of proposals done by The Urban Lab for Bengaluru CLP

Considerations

This is a key feature characterising every different measure; thus, it shall be thoroughly analysed and generalisations should be avoided. Implementation aspect often affects service provision modalities and/ or the choice of infrastructure and vehicles to be adopted. This is the case, for instance, one of the issues related with the type of road network and the fleet vehicles' characteristics (e.g., narrow streets in the city centres often require hand carts). Moreover, the environmental context is another important factor influencing project specifications. For example, in residential areas it is essential to plan services and adopt vehicles that can minimise emissions and pollution impact. Moreover, regulations regarding Low Emission Zones (LEZ)/ Low Traffic Zones (LTZ) shall be duly considered (particularly as regard to vehicle characteristics).

Infrastructure

The specifications dealing with this aspect are of typical “design and engineering” nature, as they can concern hard measures such as Urban Consolidation Centres (i.e., warehouse location, typology of building, new or adaptation of existing ones, accessibility, internal and external areas, devices, energy supply, etc.). The size and typology of infrastructure are also influenced by additional factors. These include the use of electric vehicles (requiring suitable recharging systems and equipment, in some cases solar panels covering logistics bases), service schemes (i.e., third-party warehouse, pick up points services), type of goods delivered (fresh, refrigerated, frozen product, etc.). A minor but important measure to be considered for infrastructure specifications includes road signages highlighting loading/ unloading areas and/ or reserved lots for electric or shared vans (also by using variable message panels, if needed).



Vehicle Fleet



This element is related to the specific logistics measures to be implemented, the regulatory framework and the road network. Additional aspects to be considered in the definition of fleet specifications deal with particular logistics measures such as: “van sharing” by equipping vehicles with specific monitoring devices, “reverse logistics” services (i.e., collection of packaging/ construction waste), use of eco-friendly vehicles (i.e., conventional/ electric bikes, electric cargo motorbike/ scooters, electric handled trolleys, etc.). Eventually, the size of the served area is an additional factor affecting vehicle specifications considering that extra- urban services with longer routes cannot be provided by Forced expiratory volume (FEVs) but require different technologies/ fuel (CNG, Hybrid, Bi-Modal, etc.).

Regulation

This element shall be detailed to support the implementation of the overall measures. Regulations shall deal with both access modalities to different urban areas and operations within a specific area (i.e., specific time windows for commercial vehicles – that may depend on the nature of transported goods – specific/ dedicated routes, restricted areas, vehicle weight/ dimension, type of engine, load factor, etc.) and may differ based on the operator (third-party operator, provider, self-supply, etc.).



ICT support tools/ devices



Despite specifications of this aspect usually have an engineering/ technological character, the definition shall be strictly related to operational and service schemes of the logistics measures to be implemented, to the type of vehicles to be adopted and to the identified regulatory aspects. ICT tools have several applications in logistics. For example, technology platforms can be used for the management of logistics in UCC, monitoring the different phases of deliveries (collection of orders, delivery/ route planning track & tracing, goods return, administrative procedures), vehicles and delivery status. By integrating specific modules, the platform can also be used for managing added value.



Other kinds of added-value services such as van sharing, pick-up-points and park & buy require particular attention to the planning of technological aspects dealing with operations management, vehicles (i.e., GPS devices) and infrastructures (i.e., parcels delivery sites at parking / public transport stations, etc.).

Tasks

- Identify a wide variety of measure options that would contribute to the vision, objectives, and targets that the public administration wants to reach and has agreed on in advance with the members of the CLC and city/state authorities. Learn from experienced cities and practitioners to consider all relevant options.
- Select the most promising measures for the local context that are more responsive to their specific needs and their own mobility framework. Global experiences have shown that there are no unique and standards “rules package” applicable everywhere. It is to be ensured that the selected package of measures enhance socio-economic and environmental efficiencies of urban freight and logistics in the city without imposing monopolies that benefit few private companies.
- Ensure efficient use of available resources and avoid selection of financially unrealistic measures. The measures have to be of a political – administrative and operational logistics character.
- Conduct a transparent process that provides convincing evidence for the effectiveness and feasibility of selected measures.

Actions to be performed

1. Produce a systematic overview of measures that are already planned or implemented, based on the available information in development plans / zonal or local area plans, comprehensive mobility plans as well as plans from other relevant policy areas (e.g., energy, environment, economic development, social inclusion, health and safety).
2. Create a long list of potential measures that connect to the objectives and vision. Consider new and innovative ideas. Also include measures that would be implemented by the private sector.
3. Involve FPCs in drawing up the long list of measures.
4. Be sure to include a mixture of investment, operational and organisational measures for all relevant freight transport modes in the long list. Also aim for a mix of measures with effects at the short-, middle- and long-term.
5. The optimal package of measures for achieving the stated goals of city logistics will be represented by the implementation, under the constraints that characterise the local context, of the whole package of measures to be applied in an integrated, coordinated and shared way with key stakeholders.
6. Learn from others’ experience. Identify measures that have already been successfully implemented elsewhere and get in touch with their planners. This avoids ‘re-inventing the wheel’ and making costly mistakes that others may already have learnt from.
7. Conduct a detailed analysis of each measure identified, to allow a practical assessment of the overall sustainability of the solution (in terms of efficiency with respect to energy, environment, and economic aspects) to be carried out in the following steps. Therefore, the main tasks, at this level, relate to the analysis, identification, and specification of the main characteristics and/or elements involved by each measure.
 - Logistics measures/ services can produce expected benefits only if supported by a robust regulation. For example, a goods sharing service operated by low/ zero emission vehicles can succeed only if a specific regulation forbids (or limits) the use of (non-eco-friendly) private vehicles for shops’ self-replenishment.
 - The planning of “soft” measures requires a specific detailed analysis of their implications not only from the point of view of the city corporation and traffic police (or any other Public Authority in charge of the rules) but also from the perspective of involved transport/ commercial operators.
 - Therefore, an essential recommendation for the specifications and design of urban logistics measures concerns the importance of providing all the elements for a robust evaluation (in terms of organisational, operational and economic aspects) of the possible different impacts of each measure by the relevant stakeholders.



8. Conduct an appraisal of all measures on long list to identify the most suitable and effective measure.
- Consider the likely impact of measures on the performance of the freight system (by changing the demand of goods, by changing the availability of freight facilities, or by changing the cost of provision and operation of the logistics system).
 - Assess for each measure the likely performance against each of the city's objectives (effectiveness), the likelihood of being approved (acceptability), and implications for the city's budget (value for money). Consider different assessment methods and decide which one to use. The choice depends on the experience.
 - i. A relatively quick approach used by many cities is expert ratings of multiple criteria (simplified multi-criteria analysis), for example in a series of workshops. To follow this approach, a group of qualified experts should be gathered (e.g., city level committee / FPC). After presenting a measure, each expert rates individually, scores are discussed as a group, experts can amend their ratings but do not have to agree on a common score, and finally the averages are calculated to compare and prioritise measures
 - Based on the results of the assessment, reduce the long list of measures to a short list with the most promising measures. Ensure that both freight and passenger (all modes) transport flows are considered for the study.
 - Provide a more detailed specification for the measures on the short list. Consider where and when the measure should be implemented, and who will use it or be affected by it.
 - i. The time schedule for this phase depends on the quantity and on the complexity of the measures to be implemented (or enhanced), as well as on the level of requested integration and priority.
 - ii. It is important to stress that the possibility to plan different logistics services separately is a good opportunity: starting with the "simplest" services, going to the more complex ones, and integrating the two categories in the subsequent phase.
 - iii. This approach allows to follow from the beginning, and step-by-step, the possible problems that may arise (and that are inevitable due to the complex nature of some measures), and to adopt any corrective action before an advanced planning stage. This will guarantee important savings during the whole planning process. This time schedule eventually also produces an overall enhancement of the skills of the involved staff along the various steps of the planning phase, as these are characterised by a growing level of technical and operational complexity.
 - Involve other departments (including the financial department) early on and provide benefits for participating.
 - Identify which measures require additional or external technical support for feasibility, technical or market studies.



Box 11: Logistics Partnerships in Bengaluru

To address the concerns of developing efficient and sustainable logistics systems, many cities have recognised the vital role of logistics partnerships in the formulation and execution of city logistics plans. These partnerships serve as collaborative frameworks that bring together diverse stakeholders, from governmental bodies and private enterprises to transport operators and community representatives, to collectively tackle the complexities of urban freight management. In this context, Bengaluru's establishment of Freight Partnership Committees (FPC), has demonstrated the transformative potential of such alliances in shaping the future of urban logistics.

The cities opened a three-step participatory process with the stakeholders for the Validation, Consolidation and Implementation of the CLP. Any CLP includes both public measures and measures that should be promoted by/ in cooperation with the private sector, leading to a mutual consensus on implementation of the plan.

Within the FPC consultation events, consultation sessions were held with stakeholders (both individually and in groups) for an open debate for consensus building on the issues faced by various stakeholders and their root causes. Further plans of the city are to hold meetings for awareness raising as a useful tool for information sharing, as well as specific training sessions for the successful implementation of the plans.

After a review phase with comments and suggestions gathered during the FPC meetings, the CLP will be promoted, discussed, and approved by the FPC. These committees are local (promoted and chaired by the DULT) where large companies, public and private organisations and technical institutions are integrated, with the common goal of acting in all areas that impact positively on the economic and social progress of Bengaluru.

Step 4.4: Define integrated measure packages

Rationale

Experience shows that isolated measures can only have a limited impact, while packages of measures can positively reinforce each other and help to overcome implementation barriers. A measure package combines different measures to contribute more effectively to the objectives and to increase their acceptability. To identify the most useful measure packages, different ways of grouping them should be explored and tested.

A detailed impact appraisal of the main measures and measure packages is needed at this stage to avoid unrealistic projects, confirm innovative ideas, and ensure cost-effectiveness, often using standardised methods such as multi-criteria analysis (MCA) or cost-benefit analysis (CBA).

The final packages selected with the help of the FPC should not only maximise the contribution to the objectives, but also strive for integration of the logistics plan with land-use planning and other sectoral planning activities.

Box 12: The case of Delhi

The overall objective of the CLP prepared is to improve city logistics operations to ensure that goods are delivered timely, efficiently, and in a cost-effective manner, while meeting the needs of customers and stakeholders with a balance of economic, environmental and social dimensions, and working partnerships between public and private sector organisations to identify and successfully implement sustainable strategies. The strategic objective of Delhi was to design and establish a sustainable model capable of solving logistics needs of the city of Delhi both in the present and for the future.

Based on the context of Delhi, the main strategic steps have been outlined as:

1. Optimising and implementing common infrastructures, services, and resources.
2. Promote intramodality, coordination and integration of logistics.
3. To recommend appropriate policies and strategies
4. Greening urban logistics system
5. Rearranging the space devoted to parking. Refurbish urban public spaces.

The Department of Industries, GNCTD set-up a specific "focus group" involving the different actors actively involved in the supply chain system. The focus group has been active all along the production of the CLP report.

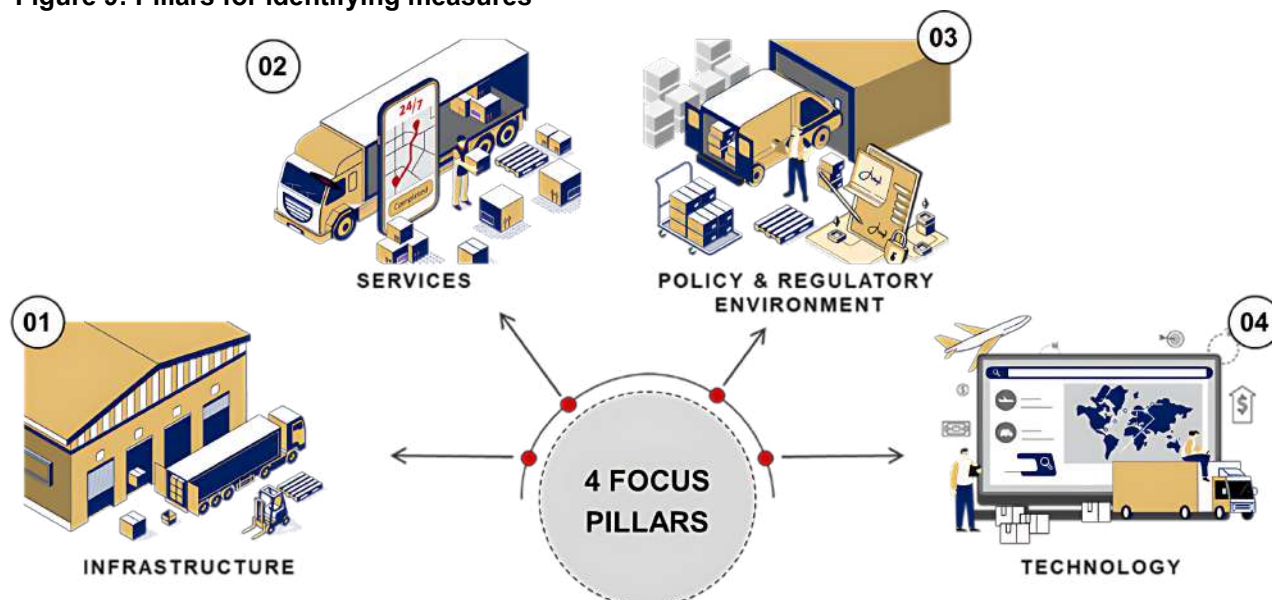


Box 13: The case of Bengaluru

For Bengaluru, the proposals have been developed under the pillars identified in the Karnataka State Logistics Action Plan, 2022. The key tasks are structured under the 4-logistics pillar model

- Infrastructure Development
- Service Enhancement
- Policy-Regulatory Environment
- Addition of “Technology” as the fourth pillar

Figure 9: Pillars for identifying measures



The measures identified in the CLP Bengaluru are based on an understanding of the current issues, stakeholder recommendations and an analysis of the pros and cons from best practices implemented in other countries facing similar issues.

Table 8: Proposals given in the city logistics plan Bengaluru

Issue	Measures
Traffic congestion and delays	Prioritise development of Peripheral ring road (PRR)
Delays and queuing at toll booths	Enhance the design and infrastructure at toll booths
Centralised markets and distribution + insufficient infrastructure	Planning of hierarchies in distribution of goods
Lack of parking spaces	Sharing of off-street parking facilities
Vehicle emissions and pollution	Enforcement of scrappage policy
Freight activity within city area with dense clusters	Integrate with master plan of the city



Tasks

1. Use packaging of selected measures to help overcome barriers to implementing specific measures and to exploit synergies.
2. Strive for integration with land-use planning, mobility plans and other sectoral plans.
3. Ensure ownership and high acceptance of the measure packages among decision makers, citizens, and other stakeholders.

Actions to be performed

1. Identify options for packaging measures. There are different methods to group measures, for example by –
 - type of measure (striving for a mix of land use, infrastructure, regulation, management, and service, behavioural, information provision and pricing measures in a package),
 - acceptability (grouping popular and less popular but effective measures into packages, e.g., incentives and restrictions),
 - objective or challenge (adding measures that contribute to the same objective or solve the same problem to a package),
 - geography (combining measures in the same area into one package),
 - costs (combining an effective but expensive key measure with measures that create revenues to achieve lower net costs),
 - bundling for external financing (grouping measures in need of external financing that:
 - i. support one clearly defined objective.
 - ii. are implemented in the same impact area;
 - iii. share the same project owner; and
 - iv. have similar implementation periods);
 - The key to decide which measures come together in a package is to identify which ones will work well together or may be needed to make other measures viable. Measures in a package should interact while achieving more together than either would on its own (synergy) or facilitating other measures in the package by overcoming the barriers to their implementation.
 - Ensure that passenger connectivity is considered. This may include links with the sub-urban rail networks and city public transport networks.
 - Check proposed logistics measures regarding integration with land-use planning.
 - Integrate the measures where possible with further sectoral planning activities (e.g., environmental, health or economic measures).
 - Ensure addressing all objectives, including externalities, such as greenhouse gas emissions, noise, and local air pollution.
 - Ensure a balance of short-term and long-term measures.
 - Make sure to have a mixture of investment, operational and organisational measures.
 - Check that all relevant transport modes are addressed, including freight.
2. Test and appraise the alternative packages and their key measures in detail. Modify them based on the results to avoid unrealistic projects and ensure cost- effectiveness. For example, if it turns out in the detailed option appraisal that certain key measures risk being unfeasible, go back to Step 4.2 and adjust the short list of measures to ensure it still achieves the objectives. Consider different assessment methods and decide which one to use based on experience, available resources, and the types of measures to assess.
3. Conduct a risk assessment of the selected measure packages. In its most simple form, this can be a thought exercise which assumes the effectiveness of the measures depending on, what would happen if these change, and how to mitigate those risks. If possible, also use quantitative methods, for example by running sensitivity tests. This means that the appraisal (or model) is re-run with a range of assumptions. If the preferred package performs well under a number of assumptions, it has been validated. If its performance is variable, then it is less robust, and less obviously worth pursuing. This may suggest trying to redesign it to improve its performance.
4. Discuss the selected measure packages with the city level committee and involve them in the selection process. Communicate the measure packages in a transparent way.



5. Actively involve and get feedback from FPCs on measures and measure packages. They should be involved in the validation and final selection of packages. Make a final selection of measures and measure packages.

Step 4.5: Plan for monitoring and evaluation

Rationale

Monitoring and evaluation both the planning process and measure implementation are crucial to the effectiveness of a CLP. Robust monitoring and evaluation processes helps to systematically learn from the experiences, to adjust and to improve planning activities. Regular monitoring helps ensure that necessary progress is made. Evaluation after implementation is crucial for providing evidence of the effectiveness of the CLP and its measures, which is essential for long-term success, as it enables decision makers to justify expenditure and to avoid future mistakes. Transparent reporting should ensure that evaluation results feed back into the public debate.

While strategic indicators and targets have already been defined earlier (see section 1.2 and Step 4.2), here the indicators at measure level are developed and the monitoring and evaluation activities are agreed in more detail. The aim of defining monitoring arrangements early is that they become an integrated part of measure implementation.

Tasks

1. Define a set of indicators that allow monitoring and evaluation of all main measures with reasonable effort.
2. Agree on suitable monitoring arrangements (including responsibilities and budget) to assess the status of measure implementation and target achievement, enabling timely and effective responses.
3. Make monitoring and evaluation arrangements an integral part of the further process.

Actions to be performed

1. Identify which information is needed to monitor and evaluate the measures.
 - **Outcome:** What impacts are expected from a measure? Define a suitable outcome or freight activity indicator for each main measure or measure package to be able to evaluate its success. Strategic outcome indicators on general progress towards sustainable and efficient logistics have already been selected in Step 4.2. Here, more specific indicators on the objectives of individual measure packages are defined, e.g., emissions from trucks, number of accidents, or number of trips in a certain area of the city.
 - **Output:** What policy, infrastructure or service is directly implemented in a measure? Define a suitable output indicator for each measure to be able to monitor the extent to which it has been carried out, e.g., km/ tonne freight movement.
 - **Input:** What resources are spent? Monitor the investment and maintenance costs (including labour costs) of each measure to react in time if costs get out of hand, and to be able to evaluate value for money.
2. Evaluate existing data sources, considering the results of previous data audits (see Step 3.3 and 4.2). Identify gaps and, if necessary, develop or identify new sources of data (e.g., survey data, quantitative data from automatic measurements).
3. Before developing measure indicators, discuss the topic with private freight operators and other organisations, as they might already have adopted some. Progress is much easier to monitor if already implemented and accepted indicators are used.
4. Define a set of quantitative and qualitative measure indicators that provides sufficient information with reasonable effort. Consider available data and limited resources for collection of new data when selecting indicators. Whenever possible, use standard indicators that are already well defined and where people know how to measure and analyse them.



5. Develop monitoring and evaluation arrangements for all selected indicators, both strategic and measure indicators. For each of them:
 - Develop a clear definition, reporting format, how data is measured, how the indicator value is calculated from the data, and how often it will be measured.
 - Establish a baseline value, i.e., a starting value and expected development without CLP measures, as well as a target value of desired change.
6. Agree on clear responsibilities and a budget for monitoring and evaluation. Highly-skilled staff members, or an external partner, should be responsible – ideally an independent body. The budget for monitoring and evaluation typically should be at least 5% of the total CLP development budget.

Step 4.6: Agree on actions and responsibilities

a) Describe all actions

Rationale

Following the agreement on package of measures, operational planning must break the packages down into actionable tasks (or ‘actions’) for the departments and institutions that oversee their implementation. Based on detailed action, descriptions and block cost estimations, clear responsibilities, implementation priorities and timelines need to be agreed. At this stage, it is also essential to communicate the concrete (‘actionable’) content to the most affected stakeholders (which is often the public) and to political decision makers. The main aim of this step is to agree on a widely supported set of clearly defined actions that helps to achieve the vision and objectives.

Cost estimating is the process of collecting and analysing historical data and applying quantitative models, techniques, tools, and databases in order to predict an estimate of the future costs of an item, product, program or task based on information available at the time.



Actions to be performed

1. Break the measures down into several actions, e.g., prior to the construction of an Urban Consolidation Centre (UCC), a study should identify the capacity requirements on the given route and where these UCCs are needed.
2. Describe the actions in as much detail as possible. These four questions can guide the specifications
 - Where should the action operate?
 - When should the action operate?
 - Who will use it?
 - How intensively should it be used?
3. Identify links between actions and best order for implementation. With the identification of relationships between actions, find out how they relate to and can benefit from each other in the actual implementation.
4. Prepare actions in an overview table including detailed action descriptions, legal requirements, expected contribution to objectives, as well as suggested priorities, responsibilities, and timeline.



b) Identify funding sources and assess financial capacities

Rationale

A thorough financing plan is needed to ensure that the previously identified measures and actions are economically sound and financially viable. This starts with identifying all the available funding and financing streams as well as assessing the ability of the organisations involved in the CLP to access or capture them. It is important to complement the scan of financing and funding sources with an organisational assessment because the financial commitments and capacities of the different organisations vary, and they have different legal rights and responsibilities related to finance.

In identifying potential sources of financing and funding for logistics measures, a wide range of options should be assessed. Next to available sources - such as local budgets and taxes, state and national funds and subsidies, and existing revenue streams from parking fees, and other areas - also potentially new sources of funding should be assessed, such as bonds, land-value capture, development charges, and the private sector. It is important at this stage to also think about sources of funding for further detailed feasibility and market studies for larger investments.

Tasks

1. Identify potential financing instruments and funding sources for all actions.
2. Assess the financial viability of individual actions within measures to rule out non-viable actions and achieve cost-effective measure designs, while still considering how funding streams could reasonably evolve in the future.
3. Assess the ability of different organisations involved in the CLP to access the funding streams.



The level of detail of the project specifications is strictly connected to the nature of the service to be implemented. For example, the specifications and the design of an UCC for last-mile delivery services, at this level, shall involve several aspects such as the identification of the suitable location, the possible infrastructure (adaptation of an existing warehouse or realisation of a new one), the definition of supporting ICT, the identification of the equipment and devices necessary for the specification of the fleet vehicles.

Actions to be performed

1. Assess the actions specified in the previous step against their financing needs and revenues in the short, medium, and long term, including operation, enforcement and maintenance, and identify any funding shortfalls (total cost of ownership).
2. Estimate direct financial revenues from the actions, e.g., from lease of advertising space, fees for parking or other municipal services, and define the expected degree of cost recovery.
3. Assess additional monetary value generated through the actions (e.g., increased value of land and real estate in the vicinity of new freight stations) and potential mechanisms for value capturing.
4. Identify financing instruments and funding sources for the selected actions. Assess all of the following options to identify the most suitable ones. Explore in particular options beyond the local budget.
5. For measures that require external financing, identify the legally appropriate borrowing entity, and assess the creditworthiness.
6. Identify sources of funding for further detailed feasibility and market studies for larger investments.



c) Agree on priorities, responsibilities, and timeline

Rationale

When a final set of actions have been selected and described, the next step is to assign responsibilities, priorities, and a schedule for implementation. A clear picture of prioritised actions and schedules and who is in charge for them is a cornerstone of every CLP. This requires close coordination and discussion among all actors that will have a role in developing and implementing the actions.

Tasks

Identify suitable priorities and responsibilities for implementation of the selected actions. Assure that all actions are clearly prioritised and realistically deliverable. Secure efficient and effective allocation of resources (human, knowledge, time). Formalise the responsibility of all actors and the resource contributions with the respective partners. Provide a clear time horizon for action implementation. Achieve formal agreement on responsibilities and timeline among decision makers and key stakeholders.

In this matter, it is important to remember that the definition of “soft”, meaning “easy” measures with low/ zero costs is applicable in practice mainly to infrastructural aspects, for instance, the implementation of loading/unloading lots with specific road signs. However, from the perspective of operators, the definition of “easy implementation and low implementation costs” is not correct, because although these regulatory measures do not imply any direct costs, its application can produce significant impacts on operational aspects and thus on the relevant costs for the operators. This may require high level of acceptance which can be established through freight partnership meeting discussions.

This is the case, for instance, of all those regulatory measures that can directly or indirectly affect urban logistics processes (and often related costs), such as restriction of time-windows in LEZs and limitation of its access through low emission commercial vehicles, regulation on stops inducing loading/ unloading areas, extension of pedestrian areas, etc.

Actions to be performed

1. Discuss the proposed actions and their priorities with the city level committees and FPCs who could play a role in financing, designing, and implementing them. Make sure to involve other relevant government departments in the discussions. The logistics stakeholders involved in the FPC can establish clear management and implementation plans through a written Memorandum of Understanding (MoU). Responsibilities for various tasks can be assigned to specific subgroups within the FPC. This structured approach ensures organised collaboration and effective task management.
2. Identify options for who can take the lead in implementing the actions. Consider abilities, strength, and competences of the stakeholders. Sometimes having one party taking responsibility for a task might be the obvious way forward. In other cases, collaborative and interdisciplinary work with different stakeholders might be a smarter solution.
3. Agree on clear responsibilities for each action of the measure packages. An action without a responsible party is likely not to be carried out.
4. Agree on a general timeline for the actions, where an approximate start and end of action implementation are defined. Focus on the next 2-3 years of detailed planning, but also do outline planning for the next 10 years and be aware of actions requiring even longer-term implementation. (The detailed planning of actions for the next years should be revised and updated regularly, at least every 5 years.)



5. Consider related actions that could influence each other. For example, restrictions on parking of freight vehicles on-street should be enforced after the development of the necessary infrastructure (e.g., off-street parking/ development of distribution hubs); and controversial actions (e.g., congestion charging) should be implemented in a package with or preceded by popular ones (e.g., incentives to the first 100 operators to relocate their consolidation activities to the developed Urban Consolidation Centre) to increase acceptability.

6. Consider large projects that are likely to impact the freight system in the city, e.g., a construction work like the development of a ring road, or the implementation of congestion charging. Such projects often have an implementation time longer than the CLP, they tie up planning capacities by requiring a complex implementation process including strategic environmental impact assessment (SEA) and therefore strongly influence all other activities.

7. Update the action table and factsheets (prepared in this step) with newly agreed information.

8. Make timeline, responsibilities, and allocation of resources public to ensure transparency and information for citizens.

d) Ensure wide citizen support

Rationale

The actions planned in the CLP directly impacts residents, businesses and their operations, often becoming the most controversial aspects of the process. For instance, while it may be agreed easily that wholesale activities should be relocated from the urban core of a city, (i.e., on the strategic level), and a restriction of heavy goods vehicles is supported by a majority (i.e., on the measure level), the specific actions planned by the department in charge of these restrictions may create controversy. To facilitate effective implementation of actions later, it is therefore important to ensure wide public support throughout measure and action planning - and well before CLP adoption. After involving citizens in the development of measures and measure packages (see Step 4.3 and 4.4), the planned actions should be at a very minimum communicated publicly, giving citizens and stakeholders the opportunity to provide feedback before final decisions are taken.

Ideally, they get actively involved in the agreement of actions and feel it is 'their' CLP with 'their' measures and actions and understand its role in improving logistic sustainability and quality of life for everyone.

Tasks

- Ensure ownership and high acceptance of the planned actions among decision makers, citizens, and other stakeholders.
- Provide transparency around planned actions.
- Facilitate adoption of the CLP and effective implementation of actions later.

Actions to be performed

1. Communicate in a transparent and professional way the main elements of the CLP, in particular the planned actions.
2. Actively inform and get feedback from decision makers. Consider organizing a dedicated information session in the local council well ahead of the official process to adopt the CLP. Direct conversations with key decision makers, such as mayors and the heads of citizen action groups, can also give important information on how to widen the support and facilitate adoption.
3. Actively involve and get feedback from important stakeholders, for example in a meeting of the city level committee.
4. Actively involve and get feedback from citizens on actions, for example in the form of a public debate.
5. Make the main elements of the CLP, including its most important actions, a topic in the local media. When communicating the actions, emphasise the positive change they contribute to and their role in the CLP. If possible, use quantifiable evidence of expected benefits and attractive visual elements, such as before-after pictures from other cities. A common risk is that only those negatively affected get active. Specific communication efforts are therefore recommended to also activate those that benefit among the public.
6. Be always clear about what a local authority can realistically do and what it cannot (expectation management).



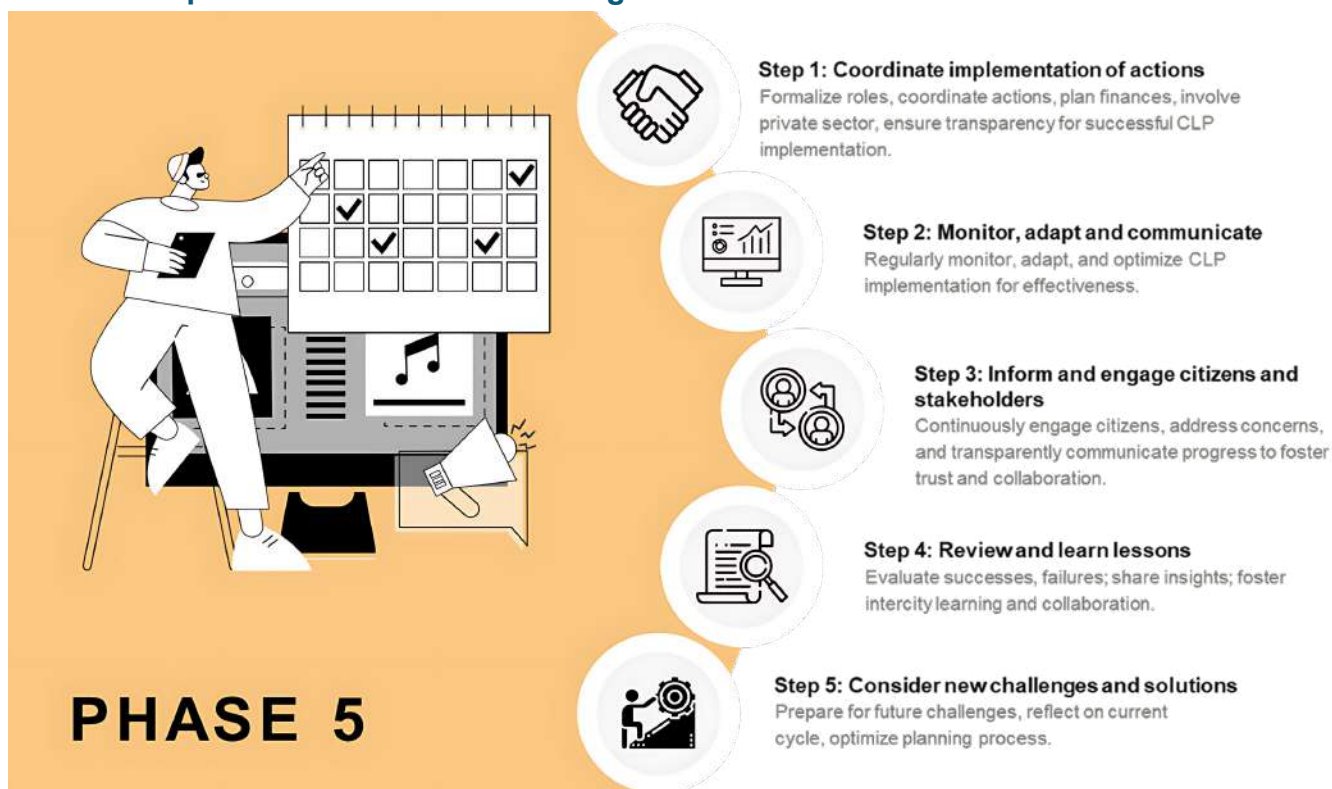


Highways congested with traffic
Image credits: Getty Images

5. IMPLEMENTATION OF THE PLAN

In this chapter, the steps required for implementation and monitoring of the CLP have been described. Detailed actions to be undertaken by the CLC for coordination, monitoring, communication and review of the success and failure of the logistics measure packages identified have been outlined.

Phase 5- Implementation and Monitoring



Step 5.1: Coordinate implementation of actions

Rationale

As previously explained, the complexity of measures correlates with the intricate levels of each component in the process and its proposal design. To deliver the objectives effectively, appropriate management needs to be applied to oversee the implementation and to manage risks and challenges, along with the associated mitigation costs. This requires agreements with all actors involved in action implementation as well as a handover from the city level committee to the technical staff and regular communication with them throughout the implementation of actions.

Identifying supportive conditions requires considering:

- Organisational, operational, and management aspects
- Business model-related concerns
- Contractual regulations among involved parties
- Potential structure of service providers and managers

In this context, cooperation of the private stakeholders in decision making, for instance, increasing load factors and decreasing the number of freight vehicles entering the city centre, is important.

Similarly, win-win cooperation schemes between public and private stakeholders for allowing innovative city logistics measures (micro consolidation, parcel lockers, bike logistics, urban consolidation centres, etc.) need to be examined to secure the long-term sustainability of the measures.



Tasks

1. Formalise the roles of actors involved in implementation of the selected measures.
2. Ensure sound coordination among all parties involved.
3. Facilitate an efficient and effective implementation process and sequence.
4. Address potential risks.
5. Ensure transparency of implementation.

Actions to be performed

1. Stay active as the city level committee to ensure continuity between process development and implementation. Continue to meet regularly (e.g., monthly/ quarterly) throughout the implementation phase to keep a good overview of progress and plan contingency activities in case actions are not on track.
2. Hand over factsheets describing the key aspects of each action to the departments and institutions in charge of their implementation. If not already developed before, prepare such factsheets. (For information on what to include in such factsheets see Step 4.7, where they are usually developed.)
3. Agree on management procedures and responsibilities. Each action should have one main person in charge of managing its implementation. Ensure that each action manager summarises the agreements in a work plan that serves as a common framework for all stakeholders involved in implementing the action.
4. Assess risks and plan for contingencies (continuation of analysis in Step 4.7). Which actions have strong effects on other actions, so that delays pose a risk to the success of the entire CLP? How to react if they get delayed?
5. Keep regular personal contact with the action managers. Agree in what format and how often to get status updates by them (e.g., short informal phone calls only between CLP coordinator and action manager to avoid bureaucratic overload). In case of difficulties, intensify communication, provide needed support, and use decision maker backup to enforce the implementation of actions.
6. Organise regular meetings to check the general status of action implementation. Meetings with the group of all action managers should be organised annually.



Box 14: Implementation Framework – Case of Bengaluru

Implementation framework for one such proposal on development of Urban Consolidation Centres (UCCs) on the periphery of the city. The matrix highlights the tasks to be performed, agency responsible for completing the task, nodal agency responsible for the project and estimated timeline and cost.

Implementation Model

S. No.	Facility	Implementation Model
1	Goods Terminal	By MoRTH, on PPP (DBFOT Basis) as identified under MMLP Program
2	UCC / DC	Public Private Participation (PPP) basis as identified in Master Plan 2015
3	APMC / sub-markets	By the Department of Agriculture Marketing and BBMP for sub-markets, on PPP

Nodal Agency

Bengaluru Development Authority (BDA) (outside city limits)
Bruhat Bengaluru Mahanagara Palike (BBMP) (within city limits)
Department of Agricultural Marketing, GoK (for perishables)

Estimated Timeline

Planning Phase – 1.5 years
Implementation Phase – 2 – 3 years

Cost Estimate

Goods terminal – 3,500 Cr
UCC/ APMC – 600-1000 Cr | DC/ Sub-market – 15-25 Cr

Source: City Logistics Plan, Bengaluru

Responsibility Matrix

S. No.	Order of Activities	Responsible	Support
Planning of hierarchies in distribution			
1	Hire consultant to assess the feasibility of development of identified freight hubs	BDA	-
2	Identify available land parcels within 500m from the National Highway / PRR and 30m road access	BDA	BFPC
3	Redevelopment of approach roads to existing and proposed freight hubs	PWD/ BBMP	BFPC
4	Provide parking facilities near the APMC	BDA/ BBMP	Private
Development of infrastructure			
6	Appointment of consultant for development of infrastructure	Dept.	
7	Development of Design and O&M plan	Consultant	Dept.
8	Permissions and Clearances	Consultant	Dept.
9	Financing and Construction	Consultant	Dept.
11	Operation and Maintenance	Consultant	Dept.
12	Monitoring, Statutory and Legal Compliances	Dept.	-

Dept. - Department of Agricultural Marketing, GoK / MoRTH and BBMP for APMC, Goods terminals, UCCs, Sub-markets & DCs respectively



a) Develop financial plans and agree on cost sharing

Rationale

The implementation of logistics plan actions requires a sound financial plan that defines how to finance the actions of the CLP, including the cost estimates that were prepared in and the financing and funding sources that were identified by the Nodal Agency during the implementation of CLP. With respect to the functional urban area of a city, funding and financing must come from different municipal, regional, national, private, and multilateral sources. Ensuring the long-term sustainability of the CLP measures requires strategically matching the funding needs of the measures with public budgets and a diversity of financing instruments, municipal loans, public utility loans, and, sometimes, private sector capital. Due to the long-time horizon of a CLP, it is often useful to plan financing in phases, with sufficient detailing for first phase measures in order to attract funding and financing from public and private sources.

A proper phasing of projects is necessary to transition effectively to implementation and to ensure long-term financing sustainability. When thinking about the potential for raising private capital for initial investments, it is important to keep in mind that the cost of money, or the interest rate, that is typically paid by the private sector is higher than that paid by the public sector. This means that the private sector will require higher revenue streams (e.g., from higher rentals from operators for parking) to offset these costs. Successfully engaging the private sector also requires that the public sector takes on appropriate risks, particularly risks related to policy. The private sector also generally has a shorter investment time horizon than the public sector and requires a faster return on investment.

Tasks

1. Create a financing plan for all CLP measures, with indicative sources of funding and financing.
2. Create a detailed financing plan for priority actions, that contains all projected expenditures, including taxes and contingencies, as well as revenues on an annual basis for the duration of the financing plan.
3. Ensure the financial viability of actions, also beyond the initial funding period.
4. Plan for contingencies to help achieve resilience against potential changes in income streams.
5. Identify opportunities for private sector involvement.
6. Agree on the distribution of costs and revenues among all involved organisations.

Actions to be performed

- Coordinate with other municipalities, regional institutions (cost-sharing arrangements for cross-border freight facilities) and the national level. Explore possibilities to jointly fund measures.
- Assess the potential of private sector investor involvement in either capital, investment, operations, or a combination of both.
- Prepare financial projections for first phase actions that include capital expenditure (up-front investment) as well as operation and maintenance costs and related revenue streams per year.
- Discuss measures with potential financing partners and funding sources to ensure that the selected measures are well prepared.
- Allocate financing and funding sources for all actions, including potential changes in revenue streams per year; Consider political commitment for the resolution of arising funding gaps.
- Agree cost recovery arrangements (ratios, modalities) for shared systems and services, such as contribution to the operating costs of public transport services.
- Agree on the distribution of costs and revenues among municipalities, regional authorities, the national level, and public and private operators.
- Prepare a detailed financing plan by financier for first phase investment.

Upon development of agreeable actions and responsibilities of various measure packages, the next step is to develop an implementation plan. Details of how the CLP can be implemented by the nodal agency has been outlined in the following chapter.



Step 5.2: Monitor, adapt and communicate

Rationale

With implementation of the measures, it is time to apply the selected monitoring tools regularly and to check how much progress has been made towards achieving the targets. Through regular monitoring and reflection, problems can be identified early, and adaptations can be made. The kind of adaptation depends on the specific situation and local context of every city and its CLP. Flexibility is needed during the CLP process to guarantee that new developments and insights are considered. New and better measures or actions might be available that could address a specific challenge of the city or new knowledge could make a measure obsolete. Reasons to adapt measure implementation could include internal factors relating to planning (e.g., time or budget), or various kinds of external factors (e.g., public disagreement with an action, political legislature, regulation processes or planning activities that may influence the process, new technologies etc).

Tasks

1. Identify problems, bottlenecks, and other challenges for on-time implementation.
2. Keep track of progress towards achieving the targets.
3. Adapt to new technological, legal, funding, or political developments.
4. Adapt and optimise the implementation process.

Actions to be performed

- Keep track of implementation activities through regular personal contact with the action managers (outlined in step 5.4).
- Regularly measure indicators with the data collection methods and frequency. Use the measure-level indicators to monitor progress of individual measures or measure packages towards their targets (every 1-5 years, depending on the type of measures). Use the strategic indicators to monitor progress towards CLP targets (usually every 1-2 years). In both cases, compare measurements to the baseline values before the start of implementation - while also considering other contributing factors - to estimate the impact of the measures.
- Keep abreast of new developments, such as changes in national regulations, technologies, funding, or local politics. Regularly think about what current trends mean for the activities.
- Be flexible about updating measures and making changes to implementation activities. This may be needed to adapt due to:
 1. Difficulties in implementation activities. If, for example, a measure encounters strong opposition, consider turning it into a temporary experiment that will be properly evaluated after a certain amount of time (e.g., one year), and then keep or discontinue it depending on the results. Often, opposition decreases once people get used to the change and see the benefits (such as in the case of road pricing in Stockholm).
 2. Measures or the entire Sulp under-achieving important targets. If individual measures of the entire set of Sulp measures turn out to be less effective as assumed, investigate the reasons, and adjust in time. If, for example, new protected bicycle lanes do not get used as much as aimed for, find out if something is wrong with them or if important connections leading to them are missing and react accordingly. If air pollution in the city is stagnating despite efforts, for example because economic growth enables more and more people to own a car, consider reinforcing or adding air quality measures, such as higher parking fees or road pricing in combination with providing modern electric busses.
 3. Technological, legal, or political developments that render measures out of date or make other, more effective measures possible. New types of electric vehicles, for example, might require a redesign of planned infrastructure, or local elections might make measures to redistribute road space possible that would not have found a majority before.
- Adapt wherever necessary in cooperation with action managers. Be brave to stop a measure if it does not work. The implementation programme should be modified throughout the implementation period, based on monitoring results.
- Clearly state the changes to CLP measures that result from the monitoring process and get formal approval for the most important changes at the political level.



Step 5.3: Inform and engage citizens and stakeholders

Rationale

Communication and engagement with the local population should not end at the planning stage. It is an essential ingredient during all stages of the CLP process. As implementation is carried out, it is necessary to publicly communicate the progress of the implemented actions, articulating their contribution to the agreed vision and objectives. Citizens and stakeholders who are directly affected by certain actions should be particularly addressed in the process. That way, citizens can realise the connection between their earlier input at a strategic and detailed level and the real changes in their city or neighbourhood. This requires honest, ongoing, and respectful communication from the city administration to the public - but also vice versa: citizens, the ultimate experts in the actual performance of measures in real life, should be encouraged and should have convenient opportunities to share constructive views about ways to improve and fine-tune measures. Taking such views on board sincerely and responding to them fosters a sense of trust and provides opportunities for improving the implementation process and the final outcomes of measure implementation.

Tasks

- Make effective use of resources - taking advantage of both the expertise of professionals and the on-ground knowledge of citizens - to achieve the best results possible.
- Increase ownership of measures by involving citizens as much as possible in the monitoring and implementation process.
- Ensure residents are aware of the implications of the changes that are coming to their city, describing the benefits, and offering options where changes in daily travel habits will be possible or required. Improving freight supply chain also directly impacts in improving passenger mobility.

Actions to be performed

- Talk to citizens or stakeholders who are directly affected (positively or negatively) by a planned measure before starting the implementation and respond to their concerns. Bear in mind that those who fear being negatively affected will naturally make more 'noise' than those who benefit from a measure - even if they are in a minority.
- Mitigate negative effects that accompany implementation.
- Look for creative ways to engage stakeholders wherever possible.
- Keep the wider public well informed about the progress of implementation. Publish evaluation results targeted at citizens and politicians. Present a selected set of indicators in the form of high-quality figures that are easy to understand for non-experts. Provide a general update on the implementation status to the local council every one or two years to keep the CLP high on the agenda (e.g., in the form of a status report or presentation in a council meeting).
- Highlight milestones of measure implementation and celebrate accomplishments with the community.

Step 5.4: Review and learn lessons

a) Analyse success and failures

Rationale

Not everything turns out exactly as planned - sometimes it is for the worse, sometimes for the better. It is important to look carefully to see what went well and what did not go well as there is something to learn from every experience. This evaluation includes both the impact of efforts on urban mobility and beyond (level of achievement of vision, objectives, and targets) and the effectiveness of the planning process itself.

To identify and understand these successes and failures, involve engaged and affected citizens and actively listen to what they say about the process and its outcomes. These aspects are essential to learn and improve skills and knowledge, which, in turn, helps to provide a solid basis for the next planning cycle.



Tasks

- Evaluate the planning process, the CLP, and its implementation with an eye to understanding what led to successes and failures.
- Enhance understanding of the logistics planning process and overall measure impact with the help of citizens and stakeholders.
- Gather lessons for the preparation of the next CLP generation.

Actions to be performed

- Evaluate the successes and failures of the CLP through analysing the strengths and weaknesses of all phases and steps as well as their final outcomes.
- Analyse the process looking back to the entire cycle. This can include, for example, participatory observation, focus group discussions or interviews. Use these to critically review the effectiveness of stakeholder and citizen involvement to enhance participation activities in later stages and in future plans.
- Actively involve FPCs and citizens to identify accomplishments and improvable steps of the process from their perspective. After years of logistics planning, people standing outside the process can provide a quite different view and might have observed important aspects that have been missed.
- For impact evaluation, begin to assess the broader impacts of the implemented measures once a sufficient number of results are available. Analyse what went well and what went wrong. List objectives and strategic targets that could not be achieved, but that are still on the agenda.
- Communicate the 'lessons learned' to the city level committee and FPC.
- Reinforce success stories and ensure to learn from mistakes in the next round of planning.



Monitoring impact of interventions

- Develop a dashboard for monitoring freight system performance using existing monitoring infrastructure (as an additional use case in ICCC, BTRACK, etc).
- Enable monitoring through a unique fast tag/ RFID passive tag affixed on the vehicle.
- Adopt an Incentives Framework for environment-friendly freight transportation measures.

b) Share results and lessons learned

Rationale

All cities have strengths and weaknesses and can learn from others and teach others in different areas and aspects of the CLP process. Sharing knowledge and experience first helps cities across India to move forward and improve together. Secondly, it gives the opportunity to reflect on experiences and to learn from the others. What is chosen to be shared is also important. People are generally happy to share their successes, but most prefer not to talk publicly about their failures. While this is understandable, some of the best lessons can be learnt from what did not go as planned (either in a positive or negative way).

Tasks

- Find opportunities to share lessons learnt with other cities across the county (and beyond, if possible).
- Find opportunities to learn from the experience of others. This could be on the CLP content, process, or measures.
- Be willing to share fewer positive experiences openly as well as - importantly - what was learned from them and how to do things differently the next time.



Actions to be performed

- Reflect on and document 'lessons learnt'.
- Share the results of the analysis of successes and failures so that other cities can learn from experience.
- Reach out to other cities that already have links to and invite them to share and exchange. This could be in the form of a simple - half day workshop with actors from one or two other cities invited to share, exchange, and reflect together.

Step 5.5: Consider new challenges and solutions

Rationale

Before starting the work on the next generation of CLP, consider new challenges and solutions for urban transport and mobility in the city. Since the process is already adapted and reviewed during its implementation, now arises the opportunity to stand back and take a more strategic view of how conditions and expectations have changed - to optimise the planning process and measure selection for the future.

At this stage, an assessment of the lessons learnt, solutions, and knowledge sharing is required to understand the measures that should be taken forward to the next cycle. Experience shows that each planning cycle helps to improve the expertise and to increase the effectiveness of the next planning round. A first analysis of challenges can influence the design of the new planning process and close the circle between the current and the new CLP.

Tasks

1. Get prepared for the next planning round.
2. Reflect on experiences in the current planning cycle with a view to new challenges ahead.

Actions to be performed

3. Consider new challenges for the future (society, technology, logistics system) that could have an impact on the planning cycle and the CLP implementation. Especially new developments of technologies and data usage might lead to major changes in the near future (e.g., Logistics as a Service, automated driving, big data, shared logistics).
4. Identify how policies in other areas could create synergies with logistics policy (land use, mobility, energy, environment, economic development, social inclusion, health, and safety).
5. Get prepared to develop the next generation of CLP.
6. Consider which activities in Phase 1 to 4 of the cycle do not need to be repeated.





Large Industrial District
Image credits: Pexels

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Mini trucks on the streets on Pune, India
Image credits: Getty Images

7. ANNEXURES

7.1: Glossary

- **City Logistics Plans:** CLP is a strategic plan designed to adequately address the urban freight and logistics needs of the city's population and businesses to achieve an economic growth together with better quality of life and environment.
- **Citizens:** Citizens refers to all people living and/or working in the functional urban area for which the city logistics plan is being prepared. In this document, it is used largely interchangeably with the terms people, residents and the public.¹³
- **Stakeholders:** Stakeholders are the people, firms or organisation, or associations that are affected by the goods movement.¹⁴ In this document, the term stakeholders are identified from various organisations in the chapter 2.
- **Vision:** A vision constitutes a qualitative depiction of the desired urban future, providing guidance for setting objectives, strategic indicators, targets, and the selection of appropriate measures in preparing the City Logistics Plan (CLP). Typically, it has a long-term perspective, spanning 20-30 years, and serves as a guiding beacon for urban development.
- **Objective:** Objectives are specific directions for achieving the vision statement and priority areas, but not the means for achieving it.
- **Scenario:** A scenario is a description of a specific set of developments in the future which are relevant to freight activities encompassing the anticipated impacts of external factors like demographic and economic conditions as well as those of strategic policy priorities.
- **Target:** Targets should be 'SMART' (Specific, Measurable, Achievable, Relevant, Time-bound) that can be achieved, in a specific timeframe.
- **Measure:** A measure is a broad type of action that is implemented to contribute to the proposals of one or more targets indicated in the CLP process. Examples range from infrastructure upgradation, regulations, management and information sharing.
- **Measure Package:** A measure package is a combination of complementary measures, often from different categories, which are well coordinated to address the specific dimensions of a problem more effectively than single measures and to overcome the barriers to their implementation. An example would be the developing the urban consolidation centres along the periphery of the city and combining the measure with enforcing the restrictions within the city.
- **Action:** Actions are the concrete tasks to be carried out in the implementation of measures. They include information on priorities, timing, responsibilities, budgets and funding sources, risks and contingencies, and dependencies among them.
- **Indicator:** An indicator is a clearly defined data set used to monitor progress in achieving a particular objective or target. Strategic indicators enable monitoring of the overall performance of the CLP process and therefore provide a basis for its evaluation.
- **First mile:** Within a supply chain management and transport, the first mile is used as a way to describe the freight movement to the freight terminal from the origin of goods to be transported such as raw material to manufacturers or manufacturers to wholesalers.

[13] Guidelines For Developing and Implementing a Sustainable Urban Mobility Plan, European Commission

[14] Integrating Freight Considerations into the Highway Capacity Planning Process: Practitioner's Guide (2013), The National Academies Press.



- **Last mile:** Within a supply chain management and transport, the last mile is used as a way to describe the freight movement from the freight terminal to the final destination.¹⁵
- **Financing:** Financing typically denotes the funds required from external sources to initiate a project, which must be repaid or returned eventually. Financial instruments commonly encompass debt, equity, or a combination of these resources. Taxpayers can indirectly contribute to initial expenses through investment grants and subsidies.
- **Funding:** Securing funding for a project typically pertains to determining the entities responsible for covering the project's long-term costs. It is important to bear in mind that establishing a financially sustainable CLP requires a combination of financial planning and securing adequate funding. For instance, when considering utilizing loans to finance public transport infrastructure, one must assess the capacity of funding sources to repay these loans, which can impose limitations on the feasibility of the project.
- **Multi-criteria analysis (MCA):** MCA is a systematic approach for evaluating and selecting decision alternatives based on conflicting criteria. MCA includes variables that may be quantified but are not so easily valued. For example, cost, time taken, project sustainability, social and environmental impacts etc.¹⁶
- **Cost-Benefit analysis (CBA):** A CBA is a systematic evaluation of the economic advantages (benefits) and disadvantages (costs) of a set of investment alternatives. CBA has been used as a tool by project managers to help evaluate preliminary concepts during early planning phases and to evaluate alternatives if necessary.¹⁷
- **Freight:** Goods, but not passengers, that are carried from one place to another, by ship, aircraft, train, or truck, or the system of transporting these goods.
- **Logistics:** All activities involved in the management of product movement; delivering the right product from the right origin to the right destination, with the right quality and quantity, at the right schedule and price.¹⁸
- **Consolidation Centre:** Regional small scale stocking points used by some retailers to consolidate loads from large numbers of smaller suppliers.¹⁹
- **Distribution Centre:** The warehouse facility which holds inventory from manufacturing pending distribution to the appropriate stores.²⁰
- **Truck Terminals:** A storage and distribution facility that specialises in the transfer of freight.
- **Supply chain:** Starting with unprocessed raw materials and ending with final customer using the finished goods.²¹
- **Value Chain:** A value chain is a series of consecutive steps that go into the creation of a finished product, from its initial design to its arrival at a customer's door.
- **Inventory management:** Inventory management is the tracking of inventory from manufacturers to warehouses and from these facilities to point of sale.
- **Growth Centre:** A growth center is a geographic area that has been identified as having the potential for economic growth and development.

[15] Whatever you call it, just don't think of last-mile logistics, last. Global Logistics & Supply Chain Strategies, Goodman 2005

[16] Vulnerability and Adaptation Assessment, United Nations Framework Convention on Climate Change

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[20] Freight Glossary and Acronyms, US Department of Transportation

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- **High Traffic Zones:** An area where there is excessive traffic due to a high number of vessels utilizing the route or a narrow passageway.
- **Congestion Points:** Locations where the transport demand exceeds transport supply at a specific point in time and in a specific section of the transport system.

7.2: Sample Terms of Reference for consultancy firm to preparation of a CLP

Outlined below are the terms of reference for hiring a consultancy firm as explained in the step 1.2 of Phase 1 in preparation of developing a CLP.

The project will deliver four key outputs to achieve this:

- Strategic and institutional framework conditions for climate friendly and efficient freight traffic on a national and state level as part of the national logistics policy.
- Measures for implementation in a selected logistics area from the national Action Plan for climate friendly and efficient freight traffic.
- Capacity development for implementing measures for climate friendly and efficient freight traffic on an operational level in a demand-oriented and systemic way.
- A method for measuring GHG emissions and emissions of harmful substances in the freight sector for reporting in NDCs.

Objectives of the assignment

- To analyse baseline condition by studying existing freight flows and logistical challenges in the city.
- To develop Freight Partnership Committees (FPCs) and provide them with technical support.
- To prepare a City Logistics Plan (CLP) for <insert name of the city>.
- To build capacities of key stakeholders in urban freight planning and management.

As part of the Freight Smart Cities initiative, cities need to prepare a City Logistics Plan to ensure efficient and sustainable movement of goods within the city. Under the technical support provided to <insert name of the city> on logistics planning, a City Logistics Plan (CLP) will be developed.

The consultant is responsible for providing the following services:

Task 1: Conduct Baseline Assessment of Logistics in the City

Understanding the city context from various angles is crucial for successful logistics planning. Accessing and integrating multiple sources of data will provide a holistic understanding of the city's logistics scenario. The consultant will deliver the following:

- Identify and engage with relevant government agencies, private companies, and technology providers involved in urban logistics.
 1. Gather statistical reports, political decisions, past traffic surveys, and strategic planning papers, essential for understanding the city's logistics landscape.
 2. Examine current and future investments focused on transport and logistics to assess their impact on urban freight.
 3. Collect figures and data related to different transport modes to comprehend the city's mobility and traffic patterns.
- Study land use plans and establishment details to identify locations influencing freight traffic, offering a broader perspective on traffic attractors.
- Review available technological systems and urban infrastructure supporting logistics and freight distribution.
- Examine existing regulations governing the movement of goods in urban areas.
- Establish data sharing agreements adhering to privacy and legal regulations and emphasise the benefits for logistics improvements.
- Engage with industry associations to evaluate existing supply chains, develop a matrix, and identify priority sectors based on high-scoring contributions to freight activities.



Task 2: Develop Freight Partnership Committees (FPCs) for key sectors

FPCs constituted for each sector are important to identify problems, collect necessary information, assess various solutions, and reach consensus on actions to be undertaken. The consultant will deliver the following:

- Conduct Stakeholder mapping and analysis (including public, private, civil society, academia etc.).
- Constitute a Freight Partnerships Committees (FPCs) for each sector.
- Provide required technical assistance to each of the FPCs
 1. Preparing schedule of meetings
 2. Designing and convening of workshops
 3. Inviting stakeholders
 4. Moderating sessions
 5. Preparing concept notes, briefs, presentations etc. as and when required
 6. Compiling discussions and outputs from meetings in required format
 7. Identifying key issues, data gaps and data acquisition from concerned stakeholders

Task 3: Prepare CLP for <insert city name>

An action plan to address freight related issues for identified priority sectors will be developed based on the urban freight assessment.

Key activities to be performed for CLP preparation are:

- Develop a structure (in alignment with the objectives of Comprehensive Mobility Plan (CMP)) for CLP including background, mission, vision, goals etc. on urban freight.
- Analyse issues of freight mobility in 3 priority sectors imposing huge impact on urban freight operations:
 1. Prepare a framework to undertake sector specific assessment.
 2. Undertake sector specific assessment through analysis of supply chain mapping of each sector in terms of load and number of vehicles, vehicle-kms, time, cost, parking, network, accidents, etc.
 3. Conduct deep dive analysis of identified issues and challenges in each sector.
 4. Discuss outcomes of the analysis with FPCs and incorporate relevant inputs and suggestions.
- Recommend suitable measures/proposals to address issues identified:
 1. Develop strategy on mitigating issues and recommend potential measures/proposals to address the same.
 2. Discuss with FPCs on suggested measures/proposals for each sector and establish consensus on priority measures to be taken up for implementation.
- Develop Sector-specific Action Plan:
 1. Create an action plan (assign stakeholders to each action and a timeline for implementation) for sector specific implementation.
 2. Identify roles and responsibilities of key stakeholders through FPCs for implementing the Action Plan.
- Develop a framework for periodic monitoring implementation of Action Plan. Prepare a comprehensive CLP
 1. Prepare an integrated document with sector specific action plan in alignment with overall structure of CLP (refer Task 2)
- Prepare and share learning document for undertaking urban freight assessment for other similar cities

Task 4: Conduct Capacity Building of Stakeholders and other Cities

Capacity building enables cities to learn from the real experiences and provides city officials with the technical know-how on urban freight and logistics planning. The consultant will:

- Conduct capacity building workshops for the members of the FPCs on a periodic basis on topics pertaining to urban freight planning, management and implementation and share best practices from other cities.
- Disseminate learning and know-how on CLP and urban freight management.



7.3: Data Collection Methods

Table 9: Sources of data from government agencies

#	Data	Source	Availability in public domain	Ease of obtaining data (as of 2023)
1	GDP Data	Dept of Economics and Statistics / Department of Trade and Taxes	Published	N
2	GST Data	Commercial Taxes Department	Not published	Y
3	Commercial Establishments	Ministry of Commerce and Industries GoK / Labour Commission Office	Published	N
4	No. of Factories	Dept of Economics and Statistics	Published	N
5	Major Industries - District	KSIDC - Open data	Published	N
6	Warehouses Loading / Unloading	Karnataka State Warehousing Department Airport Authority of India (Bengaluru Airport) Indian Railways (South-west Railway) CONCOR KIADB Central Warehousing Corporation	Published	P
7	Vehicle Registration no.	RTO website	Published	N
8	CCTV Camera	Law and Order Department Traffic Department	Not published	N
9	Congestion Data	Traffic Police	Not published	P
10	Road Crashes	Traffic Police	Published	N
11	Pollution Data	KSPCB	Published	N
12	Postal Route Data	DULT. Collected from India Post	Not published	Y
13	Restrictions on Freight Vehicles	Traffic Police	Not published	N
14	Penalty on Freight Vehicles	Traffic Police	Not published	Y
15	Industrial Estates	KIADB / KSIIDC	Published	N
16	CONCOR Data	CONCOR	Not published	Y
17	PT Bus route	Online govt. website	Published	N
18	Freight Terminal	Indian Railways	Published	N

Table 10: Sources of data from other sources

1	Vehicle Type	Porter / and Good Aggregator website	Secondary Data	P
2	Wholesale Markets locations	Open Source/Research Papers/Available reports	Secondary	N
3	ICD Locations / IFC	Open Source/Research Papers/Available reports	Secondary	N
4	NHAI Toll Data	NICE Infrastructure	Secondary Data	Y
5	Annual Commodity	APMC	Secondary	N
6	Daily vehicle inflow for each Mandi	APMC	Secondary	N

Y	Yes	N	No	P	Partially
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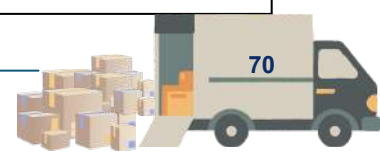
The sources of data mentioned in the table below come in various formats – PDFs, Excel files and the data mapped spatially on a GIS software.



Table 11: Details from primary surveys

Surveys	Addressed Stakeholders	Data collection / Type of questions asked
A. Establishment Survey	Shop Owners	- Company information - Type of establishment - Type of primary activity in the establishment - Procurement and selling of commodities - Type of commodities transported and commodity flow - Volume of goods in each trade - Number and type of freight vehicles used everyday - Storage availability and cost (Un)loading peak hours and cost associated - Cost of transportation (per day) - Peak business months - Primary concerns faced
B. Driver Survey	Drivers	- Vehicle information - Type of commodities transported - Origin and destination of trips - Route and time taken by the drivers - Duration of halt - Extent of loading of goods in a vehicle - Kilometres travelled in empty vehicle - Association with logistics aggregator - Number of trips (per day) - Parking facilities during (un)loading - Time taken for (un)loading commodities - Delivery charges - Technology inputs - Key challenges and obstacles faced
C. Freight Operator Survey	Transport Operators	- Business information - Type of vehicles used for transportation - Number of drivers employed - Type of commodities transported - Route taken - Delivery hours and cost of transportation (per day) - Parking and storage facilities (Un)loading cost - Monitoring of shipments - Primary concerns faced

D. Roadside interview	
Explanation	- Normally involves working with police or suitable law enforcement agency to pull over moving vehicles/drivers and interview them at the roadside about their current trip. Typically used to capture data about origin/destination, trip purpose, goods carried, and vehicle type. - Usually, a relatively brief survey so as not to disrupt drivers and avoid causing unnecessary traffic congestion. - Far less frequently used than it used to be due to cost and need for other agency involvement.
Addressed stakeholders	Logistics drivers
Which aspects of urban freight it is most suited to addressing	Trip details and patterns of goods vehicles in the urban area Origin location of goods flow/vehicle trip to establishment in the urban area



E. Vehicle observation study	
Explanation	Involves surveyor/s being positioned on street at establishments to record data about total goods vehicle trips to/from establishments by time of day (and can be used to study variation by day of week). Can also capture information about vehicle type, time taken for delivery/collection/servicing, methods of moving goods from vehicle etc and provide a better quality of information about vehicle activities on the streets near establishments Limitations: 1. It is difficult to capture details of all goods delivery/collection trips using if more than one location is used to access the establishment (e.g. rear or side access as well as frontage). 2. Captures data only for as long as surveyors present so usually misses activity outside the normal working day. 3. Can prove difficult to determine the establishments at which delivery/collection is taking place if vehicle/driver visits several establishments without moving vehicle.
How it is conducted	Survey or observation either in real-time or at a later date using film/camera footage
Which aspects of urban freight it is most suited to addressing	• Vehicle delivery/collection trips at establishments • Service trips to establishments • Loading/unloading activity of goods vehicles • Parking activity of service vehicles • Movement of goods between vehicles and establishments

F. Parking survey	
Explanation	Similar to vehicle observation survey but only used to capture information about vehicle loading/ unloading/ parking activity, (such as vehicle type, time taken, illegal activity etc.) rather than total delivery/collection trips at establishments, and method of moving goods from vehicle.
How it is conducted	Surveyor observation either in real-time or at a later date using film/camera footage
Which aspects of urban freight it is most suited to addressing	• Loading/unloading activity of goods vehicles • Parking activity of service vehicles • Parking activity of other road users in space used by goods and service vehicles

G. Vehicle trip diaries	
Explanation	• Used to collect detailed information about the activities of a single vehicle (usually over a single day or a few days). • Type of goods/ service and exact locations served • Freight routes • Arrival and departure times • Time taken for delivery/ collection/ servicing
How it is conducted	Self-completion by driver or other suitably informed employee of freight operator
Which aspects of urban freight it is most suited to addressing	• Trip details and patterns of goods vehicles • Trip details and patterns of service vehicles • Loading/unloading activity of goods vehicles • Parking activity of service vehicles • Movement of goods between vehicles and establishments



H. GPS survey	
Explanation	Equipment can provide data on vehicle location at frequent intervals (thereby providing route information), as well as speed. Can also be used to record stops for loading/ unloading/ parking.
How it is conducted	Equipment / transmitter fitted in vehicle
Which aspects of urban freight it is most suited to addressing	• Trip details and patterns of goods vehicles • Trip details and patterns of service vehicles • Loading/unloading and parking activity of goods vehicles

I. Vehicle traffic counts	
Explanation	Road vehicle traffic is counted and disaggregated by vehicle type. This can provide details of types of goods vehicles on selected roads or route, or crossing specified cordons by time of day and day of week. The area covered by the traffic counts can range from a single road up to an entire urban area.
How it is conducted	This can be achieved either by manual counts (i.e., the use of surveyors positioned at the road side who count vehicles as they pass by) or automated counts (which can use either sensors in the roads or camera technology in conjunction with computing software). The extent of the vehicle type disaggregation is dependent on the needs of the study, and the method used for collecting the traffic data. In manual counts the extent of disaggregation may be limited by the degree of expertise of the surveyors. In automated counts disaggregation may be limited by the sophistication of the technology. For instance, road sensors that quantify vehicle length cannot easily distinguish between vehicles of similar length such as cars and light goods vehicles.
Which aspects of urban freight it is most suited to addressing	Only provides data about goods vehicles travelling on the selected roads/ in the selected areas surveyed, insight into the spread of goods vehicles traffic flows by time, day, and month and the proportion of total traffic flow they account for. Limitations: Does not provide information about trip purpose (i.e. whether the vehicle is being used to make goods deliveries, collections, to provide a service), whether the vehicle will visit establishments in the survey area or is just passing through, or the origin or destination of the trip.



7.4: Sample Survey Forms

A. Establishment survey

This survey is an interview-based survey to be interviewed the shopkeepers/ managers or supervisor of the market areas.

Mandi Name:		Shop No.:		Shop: Big Shop/ Small Shop
Date:	Time:	Interviewer:		Respondent:

1. Working hours:

1a. Opening Time:

1b. Closing Time:

2.Commodities Handled:

Commodity 1	Commodity 2	Commodity 3	Commodity 4
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3.Average Daily Tonnage inflow (Tonnes):

4.Storage Capacity:

5.Operational Details:

	Commodity 1	Commodity 2	Commodity 3	Commodity 4
Transport Cost (Cost/unit)				
Type of Unit				
Weight per Unit				
Loading Cost per Unit				
Unloading Cost per Unit				
Origin of Commodity				

6.Destinations of Commodity:

Outside city limits:

	Commodity 1	Commodity 2	Commodity 3	Commodity 4
Destination 1				
Destination 2				
Destination 3				
Destination 4				
Destination 5				

Within city limits:

	Commodity 1	Commodity 2	Commodity 3	Commodity 4
Destination 1				
Destination 2				
Destination 3				
Destination 4				
Destination 5				



7. Transportation cost of delivery within Delhi:

Vehicle Type	10T	6T	HMV	LMV	E-Rickshaw	Cycle Cart
Up to 5 km						
5 to 10 km						
10 to 20 km						
More than 20 km						

8. Loading Details:

Vehicle Type	10T	6T	HMV	LMV	E-Rickshaw	Cycle Cart
No. of Vehicles Loaded per day						
Avg. no. of units loaded in a vehicle						
Time taken for loading (duration)						

9. Unloading Details:

Vehicle Type	10T	6T	HMV	LMV	E-Rickshaw	Cycle Cart
No. of Vehicles Loaded per day						
Avg. no. of units loaded in a vehicle						
Time taken for loading (duration)						

10 Any other Cost that you incur (if yes, Specify):

Sr. No.	Cost Item/ Component	Cost (in Rs)
1		
2		

11 Any Problem faced in operations?

- Driver survey Safety:
- Circulation:
- Mandi Restrictions:
- Cleanliness:
- Others:



B. Driver survey

The enumerator is expected to identify the trucks, LGV, E- Rickshaw, hand cart drivers carrying good to the market and conduct the interview survey.

Sr. No.	Shed No./ Shop No./ Waiting area/ Parking Area:	Date:	Time:
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1. Activity **Loading** ☐ **Unloading** ☐ **Waiting/Parking** ☐

A. Vehicle Information				Registration No.:				
1. Vehicle Type:	☐ 10T	☐ 6T	☐ HMV	☐ LMV	☐ Cycle-Cart	☐ Hand-Cart	☐ E-Rick	☐ OTH
2. Fuel Type:	Diesel		CNG	Electric				
3. Age of Vehicle (Years): () > 2 () 2-4 () 4-6 () 6-8 () 8<				4. Avg. no. of trips per day				
5. Avg. Driving hr/ Day:				6. Cost/Trip:				
7. Vehicle Km's / Day:				8. No. of Empty Km's Travelled:				
9. No. of Operational Hours:				10. No. of Idle Hrs in a day:				

B. Commodity Information	
Commodity 1:	Weight (tons/KG):
Commodity 2:	Weight (tons/KG):
Commodity 3:	Weight (tons/KG):

C. Waiting Information:			
	Duration	Where (Location)	Why (Reason)
1. How much time do you wait outside the markets			
2. Did you halt/wait at city border prior to visit the markets			
3. Any Preferred Parking Locations near markets or within the city limits:			



D. Travel Details (for loading vehicle):		
1. Market Entry Time:		
2. Is the vehicle empty before entering the market? (Y/N)		If yes, place of origin
3. Did wait to start the Loading? (Yes / No) i.) If yes, then for how much time		
ii.) Reasons for waiting:	☐ Looking for Loading	☐ Loading bay not available
4. Expected Duration of Loading Time:		5. Expected Leaving Time:
6. Destination Details:		
	Location	Nature of Destination/ Drop Point
Drop Location 1:		
Drop Location 2:		
Final Destination		

E. Travel Details (for unloading vehicle):		
1. Origin:		2. Market Entry Time:
3. Did you wait to start the Unloading? i.) If yes, then for how much time		
	☐ Waiting to get sold (Auction)	☐ Unloading bay not available
ii. Reasons for waiting:	☐ Shop Owner does not have enough Storage space	☐ Others
4. Expected unloading Time:		5. Expected Leaving Time:

F. Any Other Issues Faced:	☐ Parking	☐ Entry/Exit Restriction	☐ Congestion	☐ Next Order Waiting
☐ Other, Please Specify				



C. Freight Operator Survey

The objective of the Logistics Service Provider/ Truck Operators Survey is to gather important information from fleet operators about their operations, challenges, and needs.

Date -	Location -	Sample no. -
---------------	-------------------	---------------------

1. Name of the Truck Operator:
2. Nature of business:
3. Address with pin code:
4. What is the size of your fleet (by type)?

a) ☐ 3-wheeler [No.: _____]	d) ☐ Truck [No.: _____]
b) ☐ Mini LCV [No.: _____]	e) ☐ Other [Mention _____]
c) ☐ LCV [No.: _____]	

5. How many drivers do you have employed?
6. Do you deliver any of the following commodities?
 - Perishables
 - Construction (building) material
 - Parcel / boxes
7. By vehicle type, please provide an average daily number of trips, KM travelled, and empty run (km travelled without goods) ?

	Number of vehicles	Average daily number of trips (all vehicles)	Distance travelled (km per day) (all vehicles)	Empty run (km per day) (all vehicles)
LCV Vehicles				
HGV Vehicles				
Two-wheeler deliveries				

8. Where are the major delivery hotspots?

a) ☐ West Zone	e) ☐ Mahadevapura
b) ☐ East Zone	f) ☐ Byatarayanapura
c) ☐ South Zone	g) ☐ Dasarahalli
d) ☐ Bommanahalli	h) ☐ RR Nagara
9. Where are freight vehicles usually parked?

i) ☐ Within premise (off-street)	k) ☐ Other parking space (off-street)
j) ☐ Kerbside/ footpath (On-street)	
10. How do you track / monitor your shipments? What tools and technology do you use?
11. Do you have warehouse/ storage?

a) ☐ Yes	b) ☐ No
---------------------------------	--------------------------------



12. If yes, then,

i. How many warehouses/ storages do you have?

a) ☐ 1

c) ☐ 2

b) ☐ 3

d) ☐ > 3 [Mention_____]

ii. Location of warehouse/ storage

a) ☐ within the premise

c) ☐ 1-2 km

b) ☐ <1 km

d) ☐ > 2 km [Mention_____]

iii. What is the capacity of warehouse/ storage? (in tons)

13. If, no in case of delay in transfer from larger to smaller vehicle, where do you temporarily store goods?

a) ☐ Within premise (off-street)

b) ☐ Kerbside/ footpath (On-street)

c) ☐ Both

14. What is the cost of transportation?

a) ☐ short haul

b) ☐ long haul

please mention distance and unit cost

15. What is the cost of loading?

_____ (in Rupees) _____ (Unit – per bag/ per kg/ per ton)

16. What is the cost of unloading?

_____ (in Rupees) _____ (Unit – per bag/ per kg/ per ton)

17. Any permission required for intra-city transportation?

a) ☐ Yes

b) ☐ No

18. If yes, then, how much amount is paid to obtain permissions?

(Unit - Per trip/ per vehicle per day/ daily/ monthly) [Tick to select]

a) ☐ < Rs. 50

d) ☐ Rs. 151-200

b) ☐ Rs. 51-100

e) ☐ Rs. 201-250

c) ☐ Rs. 101-150

f) ☐ > Rs. 250 [Mention_____]

19. What are the current time restrictions in the city?

a) For mini LCV and LCVs

_____ (AM/PM) to _____ (AM/PM)

_____ (AM/PM) to _____ (AM/PM)

_____ (AM/PM) to _____ (AM/PM)

b) For HCV

_____ (AM/PM) to _____ (AM/PM)

_____ (AM/PM) to _____ (AM/PM)

_____ (AM/PM) to _____ (AM/PM)



20. Do any of the following conditions acts as a problem for the functioning of logistic service? If yes then tick and rate the problems

Problem -	Rate from 1 to 5	1 - not a problem	5 - very serious problem
• Access to your premise	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5		
• Parking and (Un)Loading space at your facility	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5		
• Parking and (Un)Loading space at destination	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5		
• Idle time prior to (Un)loading (at origin or destination)	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5		
• Interference of law enforcement agencies	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5		
• Restrictions on entry to specific areas in the city	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5		
• Enforcement of time restrictions	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5		

21. Could you propose possible solutions to mitigate these issues/ concerns highlighted by you?

22. Can you share a sample (December month) of your trip diary (if available)



D. Roadside Interviews

Goods vehicle O-D survey at key approach roads to be carried out for 24 hours along with TVC. This survey is conducted for 24 hours to capture at least 30% of the goods vehicles of all kinds both incoming and outgoing vehicles including NMT goods vehicles.

Enumerator Name:	Gate No:	Date:	Time:
------------------	----------	-------	-------

To be surveyed only for all the vehicles entering Mandi													
Sr No.	Vehicle Reg. No.	Entry Time	Vehicle Type	Fuel Type	Origin		Commodity Type	Tonnage (Weight)	Route followed		Distance Travelled (Km)	Time Taken (Mins)	Transport Cost (Haulage Cost)
					Within Delhi	Regional (District)			Entry Border Point	Via points			
1													
2													
3													
Enumerator Name:	Mandi Name :	Gate No:	Date:	Time:									

O-D Survey for Loaded Vehicles only										
Sr No.	Vehicle Reg no.	Exit Time	Vehicle Type	Fuel Type	Entry Time (Through Slip)	Destination	Destination Nature	Tonnage (Weight)	Route followed – Via Points	Trip Cost
1										
2										
3										



E. Vehicle Observation Study

The enumerator is expected to identify the vehicles, which are about to start the loading or unloading activities and record the loading and unloading characteristics.

Sr No	Shop/ Shed No.	Start time of the activity	End time of the activity	Vehicle Type	Commodity and Labor Information						
					Commodity Handled	Type Of Unit/ Packaging ²	No. of Units Loaded	Weight per unit	Labor Cost per unit	Total Labor Cost for Loading	No. of Labor deployed
1											
2											
3											
4											
5											

Sr No	Shop/ Shed No.	Start time of the activity	End time of the activity	Vehicle Type	Commodity and Labor Information						
					Commodity Handled	Type Of Unit/ Packaging ²	No. of Units Loaded	Weight per unit	Labor Cost per unit	Total Labor Cost for Loading	No. of Labor deployed
1											
2											
3											
4											
5											



F. Parking Study

On street/ off street parking survey for goods vehicles is required to be conducted during activity hours for one day.

Vehicle Type	Registration No
	(State code and Last 4 digits)

Vehicle Type	Registration No
	(State code and Last 4 digits)



7.5: Process of conducting FPC meetings

Tasks

1. Research any precedents by other cities that engage the freight stakeholders
2. Identify members of the various stakeholder organisations that are to be a part of the city level committee and the state level committee
3. Contact the relevant stakeholders who are willing to participate in the planning and implementation action
4. Prepare a list of potential advisory committee members with their contact information and share the stakeholder list with the CLC. This advisory group can be institutionalised or ad hoc and should consist of stakeholders with pertinent experience for being an advisor.
5. Gauge the interest of the stakeholders for participating at various stages. Try to engage them by explaining the benefits achieved from their participation.
6. The group needs to be big enough to include all the key stakeholders, but not big enough that meetings are difficult or impossible to run.
7. Create a smaller steering group focusing on specific objectives
8. Establish a single point of contact for the meetings. This can be promoted on all communications as the access point for other stakeholders and other partners alike to find out the latest activities on the process

Assigning realistic timelines for engagement meetings

1. In the initial stages of the project, involving stakeholders is crucial as it fosters robust relationships among involved parties and enables proactive identification of potential challenges.
2. Discuss the appropriate timing, location, and frequency of the meetings. The scheduling of meetings can impact the availability of potential partners. It is advisable to align the frequency of these consultations with the pace of progress in formulating the city logistics plan.
3. A formal meeting invitation such as a Government Order, including the date, time, and agenda, should be distributed to all stakeholders no less than 15 days prior to the scheduled meeting.
4. A formal notification through official government channels must be dispatched to pertinent government stakeholders as per the government directive.
5. Stakeholders should be allotted ample time to deliberate on the issues, brainstorm potential solutions, and organise their thoughts.
6. The process of engaging stakeholders is dynamic and continuous. Hence, meetings should remain adaptable. Scheduled committee meetings should be regularly reviewed and adjusted in preparation for subsequent sessions.

Design consultation meetings

1. Meetings can be conducted where in the meeting can start with a presentation by the nodal agency upon the agenda and proceedings of the discussion.
2. Then facilitate a round table discussion or conduct a consensus building on the
3. Anonymous polling to understand preferences
4. Meetings may commence with a presentation given by the nodal agency outlining the agenda and proceedings for discussion.
5. Following this, facilitate a round table discussion or engage in consensus-building activities.
6. Employ anonymous polling methods to discern stakeholder preferences.
7. Subsequent to the meeting's conclusion, the Minutes of Meeting (MOM) detailing the discussions must be shared with all identified stakeholders, including those who were absent, and their approval sought for the discussed matters.



Identifying mode of engagement required

1. Initial meetings should be conducted in person to establish strong interpersonal connections and foster rapport among participants.
2. Subsequently, meetings can transition to a hybrid format, incorporating both in-person and virtual to accommodate diverse stakeholder needs and preferences.
3. Particularly when engaging with blue-collar workers, it is recommended to conduct face-to-face interactions to directly observe and understand the challenges they encounter, ensuring a comprehensive grasp of their concerns.

7.6: Comprehensive list of Interventions / Solutions

Table 9: A comprehensive list of measures

	Strategies	Actions	Implementing Agencies	Indicators / Possibility
1	On-Street Parking and Loading-Unloading	Freight parking and loading-unloading zones or bay	Planning: CLC (UMTA) Execution: Municipality	Low
		Loading-unloading & Parking restrictions	Planning: CLC (UMTA) / Municipality	Moderate
		Peak-hour clearways (Regulated loading-unloading hours)	Monitor: Traffic Police / Municipality	High
		Timeshare of Parking space (Shared Parking)	Planning: CLC (UMTA) Monitor: Traffic Police / Municipality	Low
2	Access and vehicle related restrictions	Vehicle size and weight restrictions	Planning: CLC (UMTA)	Already implemented
		Low emission zones (Environmental restrictions)	Execution & Monitor: Traffic Police	Moderate
		Load factor (Capacity utilisation) restrictions		Low
		Digitised enforcement for Road space use & Parking (Fines / Charges / Pricing)	Planning: CLC (UMTA)	High
		Congestion feebates	Execution: Municipality through 3rd party	High
3	Time access restrictions	Daytime delivery bans / restrictions	Planning: CLC (UMTA)	Already implemented
		Night time / Off hour delivery	Monitor: Traffic Police	Already implemented
4	Traffic and Lane Management System	Restricted multi-use lanes (Dynamic Lane management)	Planning: CLC (UMTA) Execution & Monitor: Traffic Police	Moderate
		Exclusive freight / truck lanes	Planning: CLC (UMTA) Execution: Municipality / PWD	Low
		Developing freight / truck routes	Planning: CLC (UMTA) Execution: Municipality	Moderate
		Hasardous load route	Monitor: Traffic police	Low
		Traffic control for freight	Planning: CLC (UMTA) Execution & Monitor: Traffic Police	Already implemented
		Enhanced traffic impact analysis	Planning & Execution: CLC (UMTA) / Municipality / Development Authority (Through surveyors)	Low



	Strategies	Actions	Implementing Agencies	Indicators / Possibility
5	Off-Street parking and Loading-Unloading	Upgrading off-street parking areas and loading-unloading docks	Planning & Execution: Municipality	Low
		Truck stops / Long-term parking	Planning: CLC (UMTA) / Municipality / Development Authority	Low
		Staging areas	Execution: Municipality	Low
6	Demand Management	Voluntary off-hour delivery programs / Staggered work hour programs	Planning & Execution: Logistics Service Providers / Freight Operators	High
		Receiver-led delivery consolidation programs		Low
7	Last Mile Deliveries	Time slotting for pick-ups and deliveries at large traffic generators (Staggered / Dedicated time slotting)	Planning: CLC (UMTA) / Logistics Service Providers	High
		Pick-up delivery to alternate locations (Collection & Delivery points) OR, Delivery lockers	Execution: Logistics Service Providers / Warehouse Operators	Moderate
		Parcel delivery terminals (Micro hubs /depots) OR, Nearby delivery area	Planning: CLC (UMTA) / Municipality	Moderate
			Execution: Municipality / Warehouse Operators	
		Promoting NMT (Mode shift program)	Planning: CLC (UMTA) Execution: Freight Operators	High
		Shared passenger-cargo systems	Planning: CLC (UMTA) / Public Transport Operator	Low
		Crowd shipping		Low
8	Capacity building & Awareness Programs	Foster an industry-led best practices dissemination program	Planning: CLC (UMTA)	High
		Driver training programs	Execution: CLC (UMTA) / Logistics Service Providers / Freight Carriers Association	High
		Demonstration (pilot) programs		High
		Public awareness campaigns		Moderate
9	Partnership	Engage a freight quality partnership	Planning and Execution: Public and Private Stakeholders	Already implemented
		Formation of freight advisory board / committee (Technical advisory)		Already implemented
		Formulation of a Sustainable Urban Mobility and Logistics Plan		Already implemented
10	Intelligent Transportation Systems (ITS)	Vehicle parking information & reservation systems (Digitisation of parking & unloading infra)	Planning & Execution: CLC (UMTA) / Municipality	Moderate
		Artificial Intelligence and Fuzzy Logics	Planning & Execution and Operation: Logistics Service Providers	Low
11	Optimisation	Network Optimisation	Planning & Execution: CLC (UMTA) / Municipality	Moderate



	Strategies	Actions	Implementing Agencies	Indicators / Possibility
12	New Infrastructure	Urban Consolidation Centres - Developing multimodal urban freight	Logistics Service Providers	Moderate
			Planning & Execution: CLC (UMTA) / Municipality	
			Planning: Development Authority	
		Ring road or By-pass development	Execution: Development Authority / PWD through 3rd Party	Moderate
		Truck Terminal Or, Urban Logistics Space	Operation: 3rd Party	Moderate
		(Cross ducking facility + Vehicle parking)		
13	Infrastructure enhancement	Removal of geometric constraints at intersections	Few major barriers / obstacles can be identified and rectified	High
		Ramps for handcarts and forklifts	As pilot (Demonstration) such rectifications can be done in a small part of city	High
14	Electrification of Urban Freight	Incorporate freight vehicles into EV policies & promotion	Planning: State Department (Transport/ Energy) & LAC	High
		Incentives for EV / low emission vehicles adoption and EV infrastructure development	Execution: CLC (UMTA)	High
15	Reverse Logistics	Waste material collection	Planning & Execution: Municipality	Low
16	Urban Planning / Land use	Integration of Urban Freight considerations into Land use planning, Zoning & Building ordinances	Planning & Execution: Development Authority	Low
		Industrial planning		Low
17	Vehicle related strategies	Emission standards	Planning & Execution: Municipality	Moderate
		Low noise delivery program	Planning & Execution: Development Authority	Moderate
18	Promoting clean vehicles	Vehicle and Fuel Standards and Regulations	Planning: CLC (UMTA)	High
		Accreditation/Recognition/Certification schemes	Execution: Logistics Service Providers, Freight Operators	High
		Clean Fuels and Vehicles Support Schemes		High



These are the other possible measures that can be implemented by the private stakeholders

#	Strategies	Actions	Implementing Agencies
1	Intelligent Transportation Systems (ITS)	Real-time information sharing systems (Communication system / platform) Dynamic routing & sequencing	Planning & Execution and Operation: Logistics Service Providers
2	Optimisation	Route planning / Route optimisation Load optimisation & Optimised use of delivery vehicle Package reduction / optimisation	Logistics Service Providers
3	Electrification of Urban Freight	EV fleet (Electric cargo tricycle / SCV / LCV deployment and Infrastructure development)	Planning: CMC (UMTA) & Municipality with help of Transport Department Execution: 3rd Party
4	Reverse Logistics	Picking up returned goods to avoid empty running	Logistics Service Providers

7.7: Estimating potential for reduction of GHG emissions from interventions / measure packages

Rationale

Transport sector in India is the second largest contributors to the GHG emissions emitting nearly 142 million tonnes of CO₂ in 2007. The National Action Plan on Climate Change (NAPCC) launched in 2008, recognises the importance of reducing the GHG emissions and has included sustainable transport under the National Mission on Sustainable Habitat.

GHG emissions generated by the vehicles are dependent on many factors including vehicle type and age, fuel type, engine efficiency, vehicle maintenance, current traffic scenario, turnaround time, route taken (distance travelled), ton capacity (weight), operations and management and fuel efficiency standards. For preparing the city logistics plan, supply chain emissions, specifically emissions generated during transportation of goods are considered.

Improving the supply chain can contribute significantly to reduce emissions by enhancing efficiency and sustainability.

- 1. Optimizing the logistics:** Enhancing transportation and logistics is vital for emission reduction in the supply chain. Optimizing routes, employing advanced logistics systems, and integrating technology enhance efficiency. Introducing fuel-efficient vehicles and minimizing empty return trips not only lowers carbon emissions but also improves cost-effectiveness and resource utilisation in transportation operations.
- 2. Effective operations:** Improving energy efficiency through IoT sensors and automation, adopting renewable energy like solar panels, and embracing eco-friendly packaging minimizes the environmental impact of the supply chain. Prioritizing sustainable sourcing and partnering with eco-conscious suppliers are key strategies for emission reduction.
- 3. Collaborative initiatives:** Businesses can reduce emissions by supporting carbon offset programs like reforestation and renewable energy projects. Collaborating with suppliers for a carbon-neutral supply chain strengthens sustainability commitments, enhancing the company's environmental responsibility and positively influencing financial results and reputation.



Tasks

1. List down the possible measures being considered for improving the freight scenario in the city that will directly or indirectly contribute to reduction in GHG emissions
2. Gather relevant data and calculate the baseline GHG emissions stating the existing conditions of emission due to freight vehicle activities including the number of vehicles, their types (e.g., trucks, vans), fuel types (e.g., diesel, electric), average fuel efficiency and emission factors associated with different vehicles and road condition. Identify the typical routes, distances, congestion, delays, and frequency of deliveries. This provides a reference point against which the emission reductions can be measured.
3. Implement the recommendations over a specified period, ensuring proper tracking and documentation.
4. After the implementation period, collect updated data on the number and types of vehicles, fuel types, fuel efficiency, routes, distances, idling time and frequency of deliveries.
5. Ensure that the data collection process is consistent with the baseline data to enable accurate comparisons.
6. Utilise the post-implementation data to calculate the fuel consumption for each vehicle type.
7. Compare the total fuel consumption and emissions from the baseline period to the post-implementation period and calculate the percentage reduction in fuel consumption and carbon emissions using the formula:

$$\text{Percentage Reduction} = \frac{(\text{Baseline Emissions} - \text{PostImplementation Emissions})}{(\text{Baseline emissions})} \times 100$$

8. Account for any external factors that may have influenced the results, such as changes in overall traffic patterns, economic activities, or fuel prices.
9. Adjust the results if necessary to isolate the impact of the implemented recommendations.

Actions to be performed

The emissions can be calculated based on the availability of data, however, to evaluate the freight activities efficiency and carbon emission by any method, it is important to capture data on weight of goods being carried and distance travelled. There are two broad methods to derive the emission based on availability of data, which have been explained in detail in this section:

1. Activity based approach
2. Energy-based approach

1. Activity based approach (CO₂ emission factor)

Since the freight activity in the cities are complex with multiple stakeholders involved, it is difficult for the transport operators to access the direct fuel consumption data for each of their trips. In the absence of such data, the private and public agencies can extract the CO₂ emissions of their transport operations by using an activity-based calculation method. This calculation is based on weight (tonnes), distances (kilometres) and the emission factor. These data can be collected from the E-way bill data. It is important to select the most appropriate standard (emission factor) for the calculations based on the mode of the transport and associated assumptions.

$$\text{Total } gCO_2 \text{ emissions} = \sum_{trip=1}^n [total \text{ tkm} \times \text{emission factor}(gCO_2/tkm)]$$

Tonne-kilometres serves as a consistent "common denominator" to express the efficiency of freight transportation. To find tonne-kilometre data, the weight and loaded distance of each leg of the chain are multiplied individually and then added together.

$$\sum_{trip=1}^n tkm = \text{tonne}_{trip 1} \times \text{kilometer}_{trip 1} + \dots + \text{tonne}_{trip n} \times \text{kilometer}_{trip n}$$



Emission factor by mode of transport: These factors are generally expressed as gCO₂/tonne-km. It is possible to calculate the factors for each segment of the supply chain separately (involving interchange of modes) for calculating segment-wise CO₂ emissions. It is important to choose the factor based on the mode of transport as well as the load factor (degree of vehicle utilisation), % share of empty running, energy efficiency associated with transport activities and combustion engines and fuel type of the vehicles. The average emission factors shown in the table below are recommended by Prof. Alan McKinnon, in his report 'Measuring and Managing CO₂ emissions' prepared for Cefic.

Weight: The amount of goods being transported (unit as kg) should be calculated at each point of the supply chain. For inter-city movements, information on weight of commodity carried can be found on e-invoices/ e-way bills, or with transport operators. It is important not to use proxies like 'chargeable weight' for accuracy.

Distance: The distance is the distance travelled by the vehicle end-to-end. Many goods in the supply chain are handled by multiple stakeholders, routes can be changed based on the location and traffic conditions which may differ the total kilometres travelled by the vehicle. In this case, the distance for each leg of the supply chain should be considered separately.

Box 10: Emission Factors Understanding

Table 12: Recommended Average Emission Factors (gCO₂ / tonne-km)

Sr. No	Mode of Transport	(McKinnon, 2007)
1	Road	62
2	Rail	22
3	Barrage transport	31
4	Short sea	16
5	Pipelines	5
6	Airfreight	602
7	Intermodal road-rail	26
8	Intermodal road-short sea	21
9	Intermodal road-barrage	34

Source: (Measuring and Managing CO₂ Emissions, 2007)

Table 13: Sample Calculations for gCO₂ emissions

#	Weight (tonne)	Distance (km)	Total tonne-km	Emission Factor (McKinnon, 2007)	Total gCO ₂ emissions	Total kgCO ₂ emissions
1	70	36	2,520	62	1,56,240	156.24
2	55	22	1,210	62	75,020	75.02
3	130	78	10,140	62	6,28,680	628.68
Total					8,59,940	859.94



2. Energy-based Approach (Fuel efficiency factor - GLEC Framework)

Calculating carbon emissions for logistics sector is relatively a new practice, GLEC framework provides a comprehensive overview of road freight emission calculations. It is simple and a practical base approach that can be used as a guide to calculate CO₂ emissions per tonne-km.

The emission factor for CO₂ emission was assumed from the fuel emission factor divided by the fuel efficiency of the vehicles running on respective fuels (WRI, 2015). The emission factor derived by this methodology will be in kgCO₂/km.

$$\begin{aligned} \text{emissions } \frac{\text{kgCO}_2}{\text{km}} &= \sum_{\text{trip}=1}^n \left(\text{total tkm} \times \text{fuel efficiency factor} \left(\frac{\text{kg fuel}}{\text{tkm}} \right) \right) \\ &\times \text{fuel emission factor} \left(\frac{\text{kgCO}_2}{\text{kg fuel}} \right) \end{aligned}$$

The emission factor for diesel vehicles (WRI, 2015):

- LGV (<3T): 0.307 kgCO₂/km
- MGW (3T-12T): 0.593 kgCO₂/km
- HGV (>12T): 0.735 kgCO₂/km

According to India Specific Road Transport Emission Factors for Stakeholder Consultation, 2015 report gasoline emits 2.27 kgCO₂ per litre, diesel emits 2.64 kgCO₂ per litre and CNG is 2.69 kgCO₂ per litre.

Mileage/Fuel efficiency factor: Many different sources of data can be used to estimate fuel efficiency, each with varying levels of accuracy and usefulness. The factor is calculated as the total distance travelled divided by the total fuel consumed. Its unit is kilometres per litre (Km/L).

$$\sum_{\text{trip}=1}^n \frac{\text{km}}{\text{l}} = \frac{\sum_1^n (\text{kilometer}_{\text{trip}})}{\sum_1^n (\text{total fuel consumed}_{\text{trip}})}$$

Average Fuel Efficiencies for diesel vehicles (WRI, 2015):

- LGV (<3T): 8.58 Km/L
- MGW (3T-12T): 4.46 Km/L
- HGV (>12T): 3.59 Km/L

Emission factor by fuel type (total CO₂ emissions): The final calculations brings together the weight, distances and fuel efficiency factor of the specified supply chain for each travel mode. Typically, it depends on various factors such as vehicle type, age of the vehicle, maintenance, fuel type and usage of the vehicle.

Fuel type: Different fuel emit different amounts of CO₂ in relation to the vehicle type and age. Two major fuels used by transport sector are diesel and gasoline. These fuels are carbon intensive as they contain 80-85% of carbon by weight contributing to GHG emissions.



Box 11: Further guidance on calculations

- MIT Case Studies in Carbon-Efficient Logistics: These real-life case studies provide great reference materials for how carbon calculations are done for specific Green Freight initiatives.
 1. Ocean Spray: Leveraging Distribution Network Redesign
 2. Caterpillar: Light-Weighting and Inbound Consolidation
 3. Boise: Leveraging Rail Direct Service
- DEFRA Guidance on Measuring and Reporting Greenhouse Gas Emissions from Freight Transport Operations: This document includes step-by-step calculation guidance for logistics service providers and carriers. It's created for operations within the United Kingdom. Calculations guidance can translate to the U.S. context, but emission factors are not valid for operations in the U.S.
- Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard: This standard, from the World Resources Institute, is the most widely used carbon accounting protocol for corporations. The framework includes specific guidance on most aspects of calculating emissions.
- The Climate Registry: General Reporting Guidelines. This is a U.S.-focused corporate climate accounting framework, based largely on the World Research Institute protocol.
- Carbon Footprint of Supply Chains: A Scoping Study. This is a detailed recommendation on the development of a complex carbon calculation tool. It's for those who want to dive in deep and get very precise with calculations.
 1. EN 16258 suggested boundaries (page 22)
 2. Review of existing freight carbon footprinting tools (page A-1)
- Network for Transport and Environment (NTM): EU-based non-profit that established guidance on calculating the environmental performance for various modes of transport. The group offers a calculation method and relevant environmental data and tools for supplier evaluation.

Source: (The Green Freight Handbook - A Practical Guide for Developing a Sustainable Freight Transportation Strategy for Business)

Box 12: Emissions Factor Resources

1. EPA SmartWay Carrier-Specific Emissions Factors: For-hire trucking emissions factors by truck industry segment. Good for over-the-road emissions calculations.
2. Collaborative Progress: Clean Cargo Working Group Progress: Maritime trade lane specific factors. Good reference if you are calculating emissions for international ocean cargo.
3. EPA SmartWay Shipper Partner Tool: Technical Documentation. Background information and emissions factors for U.S. freight operations.
4. Cefic ECTA: Guidelines for Measuring and Managing CO2 Emission from Freight Transport Operations. A source for emissions factors for European Union operations.

Source: (The Green Freight Handbook - A Practical Guide for Developing a Sustainable Freight Transportation Strategy for Business)



