

Significance and Challenges of Non-Motorized Freight Carriers in the Unorganized Sector in Kolkata City

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Article Info

Volume 82

Page Number: 9394 - 9403

Publication Issue:

January-February 2020

Abstract:

Transportation is an important element in the logistic chain management. Although the growing trend of e-business has minimised the intermediary procedures, yet physical delivery to complete the operation involves transportation. A large proportion of freight transport services involving MT and NMT modes fall in the unorganized sector in India. Although the state of West Bengal has been showing efficient performance in the unorganized sector yet the performance of the transport sub-sector in the unorganized sector has been below average especially in the urban areas like Kolkata. In spite of being used intensively in freight transport, NMT modes have not received much attention and investment. They continue to operate without much care in an unplanned manner playing a complementary role. With the growing momentum of economic growth in Kolkata, the demand for movement of goods is going to increase further. This study aims to sensitize the transport planners and policy makers about the importance and problems of non-motorized freight carriers in the unorganized sector in Kolkata to help them enhance the effectiveness and efficiency of the service provisions of non-motorized freight carriers by positioning and developing them in integration with the MT modes within the urban transport planning framework.

Article History

Article Received: 18 May 2019

Revised: 14 July 2019

Accepted: 22 December 2019

Publication: 10 February 2020

Keywords: Freight, informal workers, Non-motorized transport mode (NMT mode), unorganized sector

I. INTRODUCTION

With growing demand, India's retail sector is all poised for economic growth. India is positioned to become a super economic power in the coming years. Logistics play an important role in optimizing the production and distribution processes and transportation is an important element in the logistic chain management. The performance of the logistic system largely depends upon the efficiency of the transportation system. Transportation is an important input in the production system. It links the different

steps involved in the conversion of resources to useful products for the consumer. It is required in manufacturing to delivery to consumer. Nearly one-third of the logistic cost is made up of transportation cost. Therefore minimising cost of transportation and providing maximum and efficient service to consumers forms the working principle of logistics. In recent times the there is a growing trend towards e-business. To maximise their business the e-firms have integrated e-business with logistics by developing a dependent and complementary relation.

This has reduced the role of intermediary procedures. The integration of e-business and e-logistics has facilitated the transfer of goods from the producers to the consumers. E-commerce and internet has made business more fast and efficient for the producer and the consumer. Yet physical delivery to complete the operation depends upon transportation. Thus it is imperative to improve the movement of goods to enable economic growth in the country.

This necessitates the need to review the characteristics of goods transportation in logistic activities. In 2016 Indian logistics made up 13% of the GDP, 8% of which was transportation cost. However a large proportion of freight transport services fall in the unorganized sector in India. The share of transportation in the NDP of the unorganized sector is very high. A considerable portion of goods transportation takes place using transport services of the unorganized sector. Although the state of West Bengal has been showing efficient performance in the unorganized sector yet the performance of the transport sub-sector in the unorganized sector has been below average in the state, especially in the urban areas.

1.1. Significance of the Study

Kolkata, a metropolitan city and the capital of West Bengal is a hub of a variety of economic and social activities. Road freight is the most common of all modes of transportation in the city. Both motorized and non-motorized transport modes are involved in freight transportation in the unorganized sector. NMT modes play a dominant role in the transportation of goods in the unorganized sector of the city. Like other urban areas of the country, the momentum of economic growth has set in Kolkata too. Growth in population will further expand economic activities and generate a considerable amount of freight traffic. This will further increase the proportion of non-motorized freight carriers in the city's traffic volume.

1.2. Study Objective

Likewise in passenger transportation, the role of the NMT modes in freight transport has not received much attention and investment. They continue to operate without much care in an unplanned manner playing a complementary role. Substitution is in most cases unconscious. Very few studies have been done to evaluate and understand the role and problems of NMT modes in freight transportation in urban areas. The growing demand of movements of goods in urban areas and its impact on urban economy makes it imperative to develop an understanding of the characteristics of NMT modes involved in the transportation of goods in urban areas.

The primary objective of this study is to evaluate the performance characteristics of NMT modes involved in transportation of goods in Kolkata to enhance our understanding of their role in freight transportation. It attempts to sensitize the transport planners and the city authority about the importance and problems of NMT modes in freight transportation. This will help them to position the non-motorized freight carriers within the urban transport planning framework and enhance their effectiveness through integration with motorized transport and better acceptability of their service provisions

1.3. Study Location

The study has been predominantly undertaken in Kolkata, the capital of West Bengal. About 100 kms from the Bay of Bengal at an altitude of 17 feet from the sea level, Kolkata spreads linearly along the Hooghly River in the eastern part of India. Kolkata is geographically located in the northern hemisphere, between 22° 30' North and 22° 37' minutes North latitude and 88°23' East and 88°23' East longitudes. The city stands on the eastern or left bank of the river Hooghly, at an average elevation of 6.40 meters above the mean sea level. Kolkata falls within the lower deltaic plain formed by the river Ganga and experiences a tropical climate characterized by high humidity and relatively high

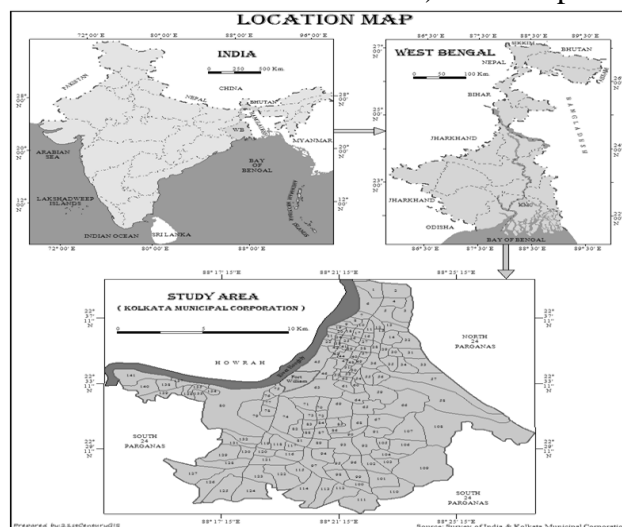
temperature.

Established only a little over three centuries ago, Kolkata is a relatively young metropolis. Kolkata was not born overnight. Job Charnock supplied the keystone on which the structure of the city of Kolkata was built up. The city limit has changed several times in the last three centuries. Kolkata along with Howrah, located on the other bank of the River Hooghly, forms the nucleus of a giant conurbation of human habitation, known as the Kolkata Metropolitan Area.

The Kolkata Metropolitan Area (KMA) extending over 1886 sq.km has a population of 14,112,536. The rapid Urbanization of the state is spatially skewed within the KMA. The city of Kolkata comprising the Kolkata Municipal Corporation (KMC) is the heart of the Kolkata Metropolitan Area. Extending over an area of 187.33 sq. km KMC has a population of 4,486,699. The Kolkata Municipal Corporation is further divided into 15 Boroughs consisting of 141 wards. For the evaluation of present NMT service characteristics, review of contemporary NMT policies and development programs and perception analysis of stakeholders for NMT performance in freight movement the study is focused on selected wards of KMC area.

The demand for transportation of goods in a region is a function of the economic development of the region. The need for transportation of goods

emanates from the demand of a consumer for a product manufactured by a producer. Therefore to understand and evaluate the present NMT service characteristics of goods transportation in Kolkata the focus of this study has been on wards with a mixed (residential /industrial /commercial) land use pattern.



Map 1: Location map of KMC showing the wards

To understand the goods transportation characteristics in the city a study in ward numbers 81, 87, 97, 117 and 119 was conducted. Figure 1 shows the map of KMC with the focus area of the study highlighted

Table 1. Basic statistics of study locations

Sl.no.	Ward No.	Area (sq.hm)	Population	Population Density (Persons/sq.hm)	Total No. of Households	Male	Female
1	81	127.3	41501	326	10211	21131	20370
2	87	74.7	12675	170	3227	6285	6390
3	97	193.4	37199	192	10222	18613	18586
4	117	73.1	21824	298	5226	11121	10703
5	119	62.9	16491	262	4081	8319	8172

(Source: 1. Census Abstract 2011; 2.Kolkata Municipal Corporation Handbook, 2016)

Wards 81, 87, 87, 117 and 119 are located in the south-central part of Kolkata. They are characterized by low population density (Table 1). They have mixed land use with a predominance of residential and commercial land use in wards 81, 87, 97 and

117 while ward 119 has a predominance of residential and industrial land use. Commercial land use refers to land dedicated to activities through which profit is made by serving customers. An area with commercial land use is used for trade and

receives heavy traffic from potential customers. It is a trip attractor. Industrial land use refers to land devoted to activities relating to manufacturing of goods. An area with industrial land use serves as a site of production. Raw material needs to be brought to these production sites and the finished products need to be delivered to the commercial houses. Such an area not only attracts trips but is also a potential trip generator. Wards 81, 87, 87, and 117 are dotted with shops, malls, departmental stores, and business centres where goods and services are traded. Ward 119 has a wide variety of small scale industries. The area is dotted by corporation and private markets, a mall, government schools and private schools, colleges, private hospital and polyclinics, parks and quite a few temples. Besides major roads these wards are traversed by several arterial roads and narrow lanes carrying heavy traffic.

2. DATABASE AND METHODOLOGY

To meet the objectives the study has been designed to evaluate the performance characteristics of NMT modes in movement of goods in Kolkata. Several transport planning studies like the Basic Development Plan: 1966-86 (BDP), CDP of Kolkata, Jawaharlal Nehru National Urban Renewal Mission, Comprehensive Mobility Plan, Kolkata Master Plan, Vision 2025 Kolkata, etc. have been undertaken in the city. These studies serve as secondary source of data for this research and also provide a scope for literature review for the evaluation of the role of NMT. Thus the KMA & KMC data has been used for contemporary review and assessment of NMT services in freight movement in the unorganized sector. In the absence of potential secondary data on goods transportation by NMT modes, much of this study is based on primary surveys. The primary surveys carried out include establishment survey, informal sector workers survey and classified traffic volume count (Table 2). Surveys were carried out by personal interview of the stakeholders using a structured questionnaire. To get a realistic picture care has been taken to collect a fair representative sample for all

the aforementioned surveys.

Table 2: Representative sample for primary survey

Sl. No	Type of Survey	Site of Survey	No. of respondents	Objective
1	Establishment survey	In-house	5	Freight share
2	Informal sector workers survey	On-road	100	NMT trip characteristics
3	Classified traffic volume count	On-road	3 categories of road	Proportional modal share in freight movement

In course of the establishment survey detailed information of the location and size of the establishment/shop, nature and volume of trade was collected. Data acquired from the establishment survey has been analysed to assess the daily movement of goods from a particular establishment with reference to type of product, mode of freight transport, weight of freight carried and cost of transport incurred by non-motorized modes. Data collected from survey of transport operators of NMT modes of freight transport has been analysed to get information about the fleet size, type and amount of freight carried by different types of non-motorized freight carriers, their tariff, parking space, cost of maintaining the freight vehicle and the time of loading and unloading. Data from the informal sector workers survey has been used to understand the performance characteristics of the NMT modes with respect to freight movement and the economic aspect of its users. The classified traffic volume count survey was conducted to get proportional estimate of on-road modal share of NMT modes in freight transportation

3. ROLE OF NMT IN FREIGHT TRANSPORTATION - AN OVERVIEW

Kolkata's economic development finds reflection in increased freight movement. All products moving in and out of the city depend on road transport before they connect with other modes. Therefore road transportation plays an important role in the

movement of goods in the city. Over 95% of goods were dispatched by roads and the city roads handled over 15lakh tonnes of freight in over 2 lakh vehicles in 2015-2016. (Economic Survey Report-2016)

On the city roads the freight is handled by a wide variety of modes. The choice of the mode of transportation is an important consideration for movement of goods from one place to another. Besides the size, weight and value of goods, the urgency and the cost of transportation are important factors which need to be considered. Motorized and non-motorized transport modes play a crucial role in freight movement. Among the motorized modes HCVs, trucks, matadors, vans, etc. are commonly seen on the city roads. Different types of non-motorized vehicles with varying structure and designs are used for the movement of goods. Cycle-vans, four-wheeled push carts, two-wheeled carts, two-wheeled barrows, cycles, rickshaws, etc. Specially structured and designed non-motorized vehicles are used to transport specific goods. In the absence of a dedicated freight corridor the MT and NMT modes use the same corridor.

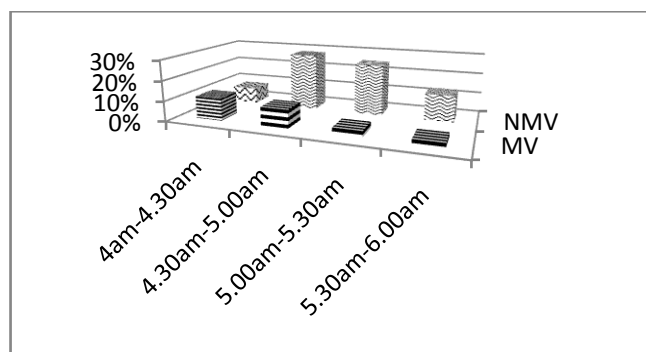


Figure 2: Classified Freight Traffic Volume Count (2017)

A two way classified freight traffic volume count conducted for duration of 2 hours, from 4am to 6am along three categories of roads through which freight traffic moved up and down revealed a dominance of non-motorized freight vehicles on road (Figure 2). Nearly 70% of the traffic comprised NMVs like cycles, cycle vans, and push carts. The goods unloaded by the MVs which enter the city at night are carried by the NMVs to warehouses, retail outlets, etc. In the absence of dedicated stands or terminals the non-motorized freight carriers are parked along the roadside occupying 30%-40% of the road space.

The different commodities transported by non-motorized vehicles are fish, vegetables, bricks, cement, consumer durables, newspaper, milk, utensils, etc. (Table 3). A moderately large wholesale fish market and vegetable market generate nearly 10 tonnes of freight every day. About 63-64% of fish and vegetables are transported over a distance of 3-4 Kms by non-motorized freight vehicles like cycle, cycle-vans and hand-carts. About 31% of 11.8 tonnes of construction material is transported by NMVs over short distances. NMVs play an important role in the delivery of consumer items from the warehouse of the store to individual households

Table 3: Sectorial Composition of Daily Freight Profile

Sl. no.	Commodity market	Total freight generated/day (in tonnes)	Total freight movement by NMT (in tonnes)	Total freight movement by MT (in tonnes)	Per cent of freight carried by NMT	Per cent of freight carried by MT	Total distance covered by NMT (Km)	Total distance covered by MT (Km)
1	Fish	4.1	2.6	1.5	63	37	41	26.2
2	Vegetables	5.9	3.8	2.1	64	36	33.1	23.7
3	Construction Material	11.8	3.7	8.1	31	69	26.9	34.8
4	Household Appliance	0.4	0.3	0.1	75	25	56.1	19.6

(Source: Primary survey, 2016)

4. THE INFORMAL SECTOR WORKERS AND NMT MODES

Urbanization fostered by economic development has stimulated migration from the rural areas into the capital city Kolkata. Such rural-urban migration has influenced the development of the informal sector of the city. Economic incentives have been the main cause of migration but very few managed to get secure jobs in the formal or organized sector. The urban formal sector has failed to keep pace with the growing demands and employment needs of the ever increasing population in the city. Therefore a considerably large number of migrants are absorbed in the informal sector. Consequently the informal sector has gained eminence in the city. Kolkata has a large and heterogeneous informal sector comprising jobs like wage labourers, retailing and self-employment activities. The informal jobs in Kolkata can be classified into three sectors. They are manufacturing, construction and the service sector. The manufacturing sector includes activities like manufacturing of furniture, small scale edibles, tailoring, etc. The service sector includes jobs of the van puller, rickshaw puller, barber, etc. Transportation plays an integral part in all these activities of the informal sector.

The urban informal sector workers have unique travel patterns influenced by their needs and work requirements. Non-motorised transport modes play an important role in the urban informal sector. NMT modes are important means by which people and light freight achieve mobility in the informal sector. Despite their significance and distinctive benefit in the informal sector NMT modes have escaped the attention of transport planners and authorities and continue to exist in an adhoc manner as the 'forgotten element' in the urban transport planning process. They continue to face major challenges in the form of inequitable urban planning design and lack of infrastructure.

To ensure sustainable transport development in the city enhancement of the effectiveness of NMT modes in the urban informal sector is an absolute necessity. This requires an understanding of the

utility and significance of non-motorized transport modes in the mobility of goods and services in the informal sector of the city. Data obtained from the informal sector NMT mode users has been studied and analysed to understand the performance characteristics of the NMT modes with respect to freight movement in the retail sector and the economic aspect of its users

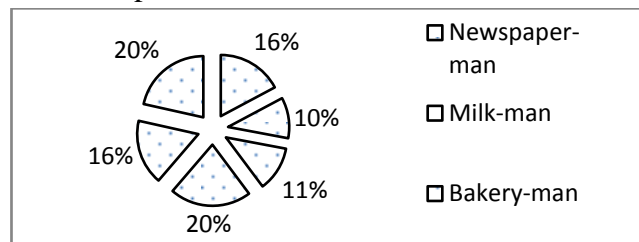


Figure 3: Pie-chart showing proportional share of informal workers using NMT modes (Source- informal workers survey, 2017)

Table 4 highlights the job profile of the sample informal workers and the role of NMT modes in their activities. The informal sector workers who serve us in our day to day life are the newspaper-man, the milk-man, the bakery-man, the garbage-collector and several travelling sales-men. They market a wide variety of products like newspaper, milk, bakery products, edibles, fruits and vegetables etc., through the streets of the city. They are involved in sourcing raw materials and supplying finished products and different kinds of services to customers. Thus they form the link between the manufacturer/distributor/dealer/wholesaler and the customers. All this requires movement which is completed using a wide variety of modes. They mostly depend upon NMT modes for their trips. The commonly used NMT modes are the bicycle, tri-cycle van, two-wheeled barrows, four-wheeled carts, push carts, specially designed ice-cream van, bread van, rickshaws, etc. With vehicles loaded with merchandise the workers move through the streets selling their wares. These travelling salesmen do not have to incur any establishment cost to sell their products. Moreover the inexpensive non-motorized transport modes with a very low cost of maintenance ensure maximum profitability. The NMVs not only help in movement of goods but are also used to exhibit their merchandise for sale.

Table 4. Use of NMT modes by informal workers in Kolkata

Sl. No.	Informal Sector Workers	Nature of work	Merchandise	Type of mode	Origin	Destination
1	Newspaper-man	Marketing	Newspaper	Cycle	Newspaper distributor	Multiple houses
2	Milk-man	Marketing	Milk	Cycle	Milk-depot	Multiple houses
3	Bakery-man	Marketing	Bread ,biscuit, cake	Structured Cycle-van	Bakery	Multiple retail shops
4	Garbage-collector	Waste disposal	Household garbage	Cycle-cart	Corporation-garage	Local area waste dispenser
5	Stationary Sales-man	Marketing	Edibles, Vegetables &fruits, etc.	Cycle Cart	Manufacturing/ Distributing unit, Dealer, Wholesaler	Fixed spots- near schools, parks, metro St., bus stand
6	Rickshaw-puller	Service	Transportation	Tri-cycle Rickshaw, man-pulled rickshaw	Rickshaw-garage	Customer's drop point

Source: Primary survey 2016-2017

4.1. Trip Profile of Informal Workers Using NMT Modes

The informal workers engaged in marketing of commodities are seen to travel an average distance of 5 Kms/day (Figure 4). On an average these workers are out for work for 6 hours (Figure 5). The day starts early in the morning for the newspaperman and the milkman who deliver essential products to fixed houses.

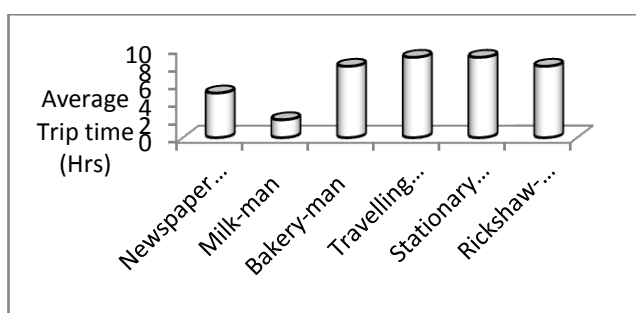


Figure 5: Average Trip Time (Source: Primary survey 2016-2017)

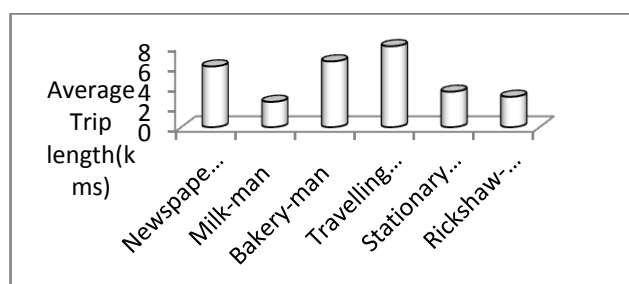


Figure 4: Average Trip Length (Source: Primary survey 2016-2017)

They deliver their products to multiple houses. Therefore they have multiple stops in the course of their trip. Their trips wrap up in about 4 hours. The destination of the bakery man is the retail shop to which he delivers the products. He makes his own living by travelling 6-8Kms/day for nearly 8 hours catering to the orders of retail shops. They generally follow fixed routes. The travelling salesmen move around with their merchandize for 9-10 hours covering 8-10Kms. They often change their route

depending up on the demand for their product. The rickshaw pullers trip length and resultant trip time is conditioned by the on-board passenger's travel need. Their average trip length is short and varies between 2-4Kms

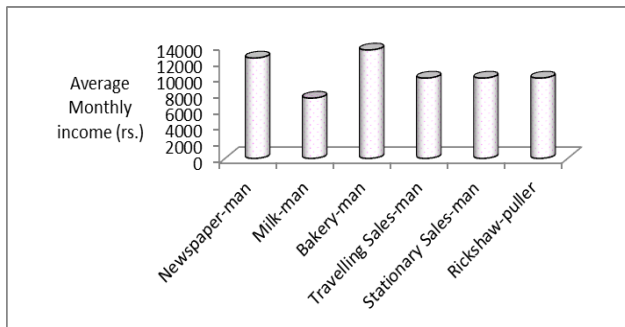


Figure 5: Average Monthly Income (Source: Primary survey 2016-2017)

NMV's being low maintenance cost modes, not only play a crucial role in mobilizing commodities and services but also help in earning livelihoods. The informal sector workers with the help of NMT modes manage a monthly earning of about Rs. 10,500/- (Figure 5).

5. FINDINGS & OBSERVATIONS

USE OF NMT MODES IN MOVEMENT OF GOODS

□ NMT modes are used for small, low volume or light weight freight delivery.

□ They are used to supply raw material to the small scale industries which depend mostly upon local resources.

□ They are used in the distribution of low volume or small products from producers to local retailers. Example: 1) Bakery products, edibles, etc. are transported by NMT modes to local retailers from where they are sold to consumers.

□ NMT modes are used to market commodities.

Example:

1) Travelling salesmen selling edibles, plastic ware, fruits and vegetables.

2) NMT modes are popularly used in door to door delivery of products like newspaper, milk, etc.

□ Products for sale are displayed on non-motorized carts which are parked at potential

locations and used as retail outlets to sell the products.

□ Cycle vans and carts are used to collect and dispose household waste.

NMT modes are widely used for the "last kilometre" delivery from the city's logistics space

6. CHALLENGES FACED BY NMT MODES IN FREIGHT TRANSPORTATION

Despite their significant role in the movement of goods in the city, they are faced with several challenges.

1. Due to increase in the volume of motorized traffic, limited urban transport infrastructure and traffic congestion the non-motorized freight carriers are pushed to the road side and negotiating their loaded vehicles through limited road space is hampered.
2. Regular and timely movement of freight vehicles is important for the economic viability of the economic activities undertaken by them as well as for the welfare of the people. However increasing traffic congestion and limited road space staggers their movement leading to delays.
3. In the congested core areas of the city no parking space is available for the non-motorized freight vehicles. They are parked on road sides encroaching upon the road space for loading and unloading activities.
4. Non-motorized freight vehicles are vulnerable to accidents in corridors with dense vehicular traffic due conflicts with on-road pedestrians and other modes.
5. Overloading of non-motorized freight vehicle to minimize transportation cost of goods raises safety issues and takes a toll on the health of the person operating the vehicle.
6. Toilsome work with uncertain and low income coupled with stiff competition from motorized LCVs is forcing the non-motorized freight vehicle drivers to shift to other occupations.
7. In the absence of proper secure space to

garage vehicles at night they are left in the open on the roadside exposed to theft and vagaries of nature.

8. The movement of non-motorized freight vehicles is banned or restricted in many corridors. So they are sometimes forced to ply through routes which increase their trip length.
9. In the absence of definite rules and regulation for non-motorized freight vehicles, they are often subjected to harassment by police and local touts

7. RECOMMENDATIONS & CONCLUSIONS

This study clearly brings to light the important role of non-motorized vehicles in freight transportation and in the informal sector in the city. Yet they are not recognized and considered in transport development planning. The poor conditions in which non-motorized freight vehicles are operating is due to prejudices against them. In recent years as we speak of sustainable development a shift towards NMT awareness has taken place. The inherent modal characteristics of non-motorized vehicles make them a popular choice of the users. It is time for the policy makers and planners to focus on planning and development of non-motorized vehicles within the urban transport framework. The city needs to promote and support training of officials and stakeholders with respect to transport planning and infrastructure design so as to equip them to develop an inclusive urban transport strategy. A dedicated NMT cell should be included in the city level planning authority which will handle funds for planning, implementation and maintenance of infrastructure facilitating non-motorized freight vehicle movement. The city authorities should take stock of non-motorized freight vehicles used in the city including safety data. Regulations on their use, operation and infrastructure design must be made. They should be integrated in the city transport master plans.

Recommendations-

- Dedicated lanes for NMT vehicles

- Reduction in speed at intersections where NMT and MT modes cross
- Providing priority to NMT modes at junctions in mixed traffic
- Designated stands for non-motorized freight vehicles with enough parking space
- Provision of basic civic amenities at stands for pullers and users
- Provision of insurance of the puller and user
- A uniform fare structure
- Medical assistance schemes.

Thus NMT transport modes which play a significant role in the unorganized sector and in freight transportation need to be included within the transport planning system of urban areas to increase their efficacy and ensure sustainable transport development in urban areas.

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