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Abstracts

The Urban Transportation Crisis in Developing Countries: Alternative Policies for an Equitable Space

Eduardo Alcantara Vasconcellos

KEYWORDS: Urban transport, Planning, Developing countries

Planners in developing countries have tended to use transport modelling techniques designed by and developed for cities in the west. Besides being unsuitable, they are inappropriate to the everyday needs of people in developing countries. Planners must reassess their approach, rid themselves of their assumptions and begin by asking a new set of questions.

Sustainable Transport Solutions for Calcutta

John Whitelegg

KEYWORDS: Sustainability, People, Economic growth

Like many cities in developing countries, Calcutta has a very small ecological footprint - it is relatively self-sufficient. However, Calcuttans can see, and wish to attain, the relative comfort of western lifestyles. In addition, they can see through the sustainability rhetoric of western governments who, while demanding that developing countries should become more sustainable, are doing little to initiate and implement sustainability themselves. Indeed, western consultants are pushing inappropriate and unsustainable transport infrastructure on Calcutta. In the meantime, Calcutta and Calcuttans will suffer.

Calcutta in Pollution Perspective

Dipankar Chakraborti

KEYWORDS: Pollution, Health.

Calcutta suffers from chronic pollution. It is pervasive, temporally, spatially and democratically. Every Calcuttan is affected and, as a result, many suffer ill health. There is no easy solution, but the main cause, poverty, is identified.

Transport predicament in Calcutta

Dilip Halder

KEYWORDS: Congestion, Land use, Pollution, Travel Demand

Urban transport in Calcutta is in crisis. Because of uncontrolled land use development, associated transport activity and an unrelenting increase in private motor vehicles, there is severe congestion and deteriorating public transport. In addition, air and noise pollution are insufferable.

The Left Alliance and the Unintended City: Is a civilised transition possible?

Jai Sen

KEYWORDS: Poverty, Rickshaws, Government, Society.

Attempts have been made to ban hand-pulled rickshaws in Calcutta in the past. Hand-pulled rickshaws are one of the last vestiges of feudalism and imperialism. The lives and livelihoods of those who pull the rickshaws are not normally considered because some politicians believe that "the poor must suffer a little for the good of the larger community".

Unco-ordinated public transport: Calcutta style

Debasish Bhattacharyya

KEYWORDS: Public Transport

Calcutta's public transport has developed in a very haphazard manner, with a mixture of public and private providers. The private operators are beyond any regulation. It is totally unco-ordinated and insufficient for the needs of the city. Levels of investment are low, the infrastructure is in poor condition and it is in urgent need of integration.

The underground railway system in Calcutta

Jayanta Basu

KEYWORDS: Investment, Metro, Integrated transport

Calcutta's underground railway has tremendous unexploited potential as part of an integrated transport system. However it is just one of many competing providers, is grossly underutilised and makes an operational loss. A variety of solutions are required to improve its fortunes.

Editorial

"IF AN ANGEL descends on earth or a shooting star asks me my wish, I would ask for a single thing from the inner core of my heart: Grant me the power to collect all the Calcutta people together and shift them to a better living environment in a wink and give me the power to build a fortress around this 100 square kilometre city in a jiffy. From then on everything in this city will stand still: its air which is visible; the slums where one out of every two Calcuttans live in subhuman living conditions; the rotten garbage which you have to breathe; the bellowing tails of black smoke from the exhaust of cars and buses; the rising smoke from the numerous chimneys of the industries and household chullas; the jam in the streets where thousands of shabby cars are emitting pollutants; the breathing air paralysing every unit of life; the hazy, dusty air

all over the city; the polluted water; the shadowy sky and the tainted horizon would suddenly freeze - as though the entire city was presenting a living proof of its environmental deterioration for the pages of eternity. And then I would slowly walk outside the city, and on the huge gate I would hang a placard. In a few words the signboards will welcome the visitors and will tell them the pitiful truth, how the beloved city of Calcutta had slowly crawled into the dreary arms of death, due to unworthy negligence from her guardians. It would also present a lesson for the future propagandist of what could happen to a megalopolis such as this when her environment is ignored and when development takes place in an unplanned manner. If I were granted my wish, finally I would zap the city into a life size museum." **Dipankar Chakraborti.**

THIS is a special issue of **World Transport Policy & Practice** on Calcutta. Calcutta (23.34N 88.22E), capital of British Imperial India from 1772 to 1912, is the capital of the state of West Bengal and one of the most densely populated cities in the world. It is a megacity. The city sits on the East bank of the river Hooghly and is 150 kilometres inland from the Bay of Bengal. The city of Calcutta Municipal Corporation has an area of 104 km², although the metropolitan area extends to about 1,300 km².

Calcutta has a rich cultural endowment, with a variety of museums, galleries, theatres and cinemas. The city is noted for its artistic diversity and musical heritage, in particular the All-Bengal Music Conference. The Corporation maintains more than 200 parks, squares, and open spaces. In addition, Calcutta boasts one of the oldest cricket grounds in the world. That such cultural wealth exists in Calcutta is no accident: the city's economy is primarily mercantile and many national institutions, such as the Indian Chamber of Commerce and the All India Institute of Hygiene and Public Health, are based there. Furthermore, there are three universities in the city.

Calcutta port handles approximately 10% of India's imports and exports; and with Haldia port further downstream, accounts for the bulk of India's foreign exchange. During British control, the Ganges plain and the whole of northern India became a hinterland for the port and the city.

Calcutta's international airport at Dum Dum has the dubious distinction of being close to the arsenal where the British manufactured the rather notorious (and thankfully, proscribed) Dumdum bullets which inflicted terrible wounds.

The city is known throughout the world for its myriad of problems. One of these has been the increase in population which arose, in particular, after the partition of Bengal at independence in 1947. Part of Bengal formed East Pakistan (now Bangladesh) and the other section became the Indian state of West Bengal. Calcutta lost the trade of a significant part of its hinterland and, simultaneously, millions of refugees from East Pakistan flocked to Calcutta, aggravating existing social tensions and worsening the already serious overcrowding. People continue to migrate to Calcutta from Bihar, Orissa and eastern Uttar Pradesh in the hope of finding employment.

In this special issue we begin with an article from Brazil, by Vasconcellos, which identifies the transport planning problems that afflict cities throughout developing countries. We follow with Whitelegg discussing sustainability, and what it means, for Calcutta. Chakraborti furnishes us with a frightening essay on the inhumanity of the pollution to which Calcuttans are subjected.

Halder provides an assessment of Calcutta's many transport problems. Sen enlightens us on the attempts to remove hand-pulled rickshaws from Calcutta, and the alternatives provided for the rickshaw pullers. While reading Sen's contribution, it is worth keeping in mind Chakraborti's profile of Calcutta's pollution. Bhattacharya relates the sad state of Calcutta's public transport provision, while Basu concentrates on the underground railway saga.

There are solutions to Calcutta's transport problems. These are people-based, people-oriented and people-centred.

John Whitelegg, Editor

The Urban Transportation Crisis in Developing Countries: Alternative Policies for an Equitable Space

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Keywords

Urban transport, Planning, Developing countries

Abstract

Planners in developing countries have tended to use transport modelling techniques designed by and developed for cities in the west. Besides being unsuitable, they are inappropriate to the everyday needs of people in developing countries. Planners must reassess their approach, rid themselves of their assumptions and begin by asking a new set of questions.

Introduction

Transport infrastructure and services in developing countries have been provided with the support of methodologies and assumptions originae in industrializing countries in the 1950s. These methodologies are used to propose transport solutions for hypothetical future conditions, based on forecast social and economic variables. In addition, they adopt market and efficiency paradigms and target mobility as a prime objective.

The actual results of these modelling procedures and their assumptions in the developing world have been widely disappointing. Used as supposedly neutral techniques, they have served as instruments of power for technocrats working mostly within weakly democratized environments. Resources have been abundantly used to create large transportation infrastructures with poor results, often supporting automobile use by a minority while neglecting the transportation needs of the majority. Local transportation technologies and all kinds of non-motorized transportation means have been permanently neglected or rejected (Banjo and Dimitriou, 1990).

Traditional approaches have been criticized as adequate tools to be used in developing countries by several independent researchers (Dimitriou, 1992). The World Bank, who played an essential role in exporting the traditional methodologies to the developing world, has also been suggesting alternative approaches (World Bank, 1986 and 1996). The continued use of traditional techniques is therefore inadequate and new approaches and methods are needed, to overcome present drawbacks and ensure more equitable, socially and environmentally sound transportation policies. Technical drawbacks of the modelling procedures are extensively treated in the literature (Dimitriou, 1992), and will not be repeated here. I intend to discuss instead how traditional procedures and assumptions have shaped inadequate

transportation and traffic systems in the developing world, and how alternative approaches could replace or complement conventional ones.

The Urban Transportation Crisis in Developing Countries

The urban transportation crisis can be identified first by the urban development process and the increasing commodification of social relations. While pre-automotive cities allowed unlimited consumption of space by any person, modern cities began to spread and occupy larger areas, requiring motorized transportation be physically accessible and economically affordable. In addition, as in the Brazilian case, changes in the nature of social relations have increased the share of commodified activities, especially for higher income groups (e.g., private education, private medical care and leisure). Thus activities once located within walking distances from the household (neighborhood drugstores, soccer fields) are now located faraway (regional supermarkets, sport clubs), and dependance on motorized transport means is inevitable. Consequently, the deep economic and social differences that are constantly being generated translate into deep differences with respect to access to transportation and activities in urban spaces, and it remains to be asked whether there is any possibility of restoring equity (Hagerstrand, 1987). In addition, in developing countries unemployment levels can be high and the informal job market can play a major role, posing two burdens on transportation policies. First, there is a wide variation in the origin-destination pattern, as people are constantly finding, losing and changing work activities. Second, programs designed to meet the needs only of formal employees can end up excluding a large part of the population, as with the Brazilian "vale-transporte" (transport bonus).

The main transportation and traffic problems faced by developing countries can be related to several categories of issues. All relate to each other in some way but analyzing them separately can permit a

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clearer understanding of the problems in question.

The **political** issue derives from failure of the political system, which does not ensure democratic representation of the conflicting interests of social groups and classes in the formulation and implementation of transportation and traffic policies. Besides having highly centralized states, where decisions are taken by a limited elite, most developing countries still suffer from a lack of adequate means of political representation. They are not institutionalized democracies, but fragile democracies, with a deep bias in their decision-making processes (O'Donnell, 1989). As in the Brazilian case, besides being controlled by economic and political elites, the decision making process favors the middle classes, who have direct and indirect means of influencing policy outcomes. The main channel for this influence is provided by the technocracy and the bureaucracy, who are the middle class in power. The working class in general and public transportation users in particular are often kept out of the decision-making process. With traffic, the political issue derives from the peculiar nature of traffic conflicts, in the face of different needs and interests, and the social and political characteristics of developing countries. A large mix of non-motorized and motorized modes, coupled to the use of available space by street vendors and leisure activities, render traffic conflicts unusually critical. As traffic roles and their associated needs change in time and space, demands placed on traffic authorities concerning accessibility, fluidity, safety and environmental quality vary considerably. It is therefore impossible for the state to resolve all conflicting demands simultaneously and planners have to define priorities. Social and political conditions further complicate the issue. Deep class divisions, translated into social, cultural, economic and political differences between people, have profound consequences for the access to transportation modes and for the use of the street. Citizenship, as political consciousness about collective behavior, is weakly developed: there is a loose apprehension of rights and duties, which is weakened still further by the bias of formal justice in societies characterized by deep class differences: grave traffic offences are seldom punished. Drivers and pedestrians often develop informal ways of dividing space, that either ignore or interpret differently formal traffic laws. In addition, class differences translate into assumed differences in the right to occupy

space. While people in the role of drivers actually think that they have priority access to space, people in the role of pedestrians or public transportation passengers actually think that they do not have the same rights (Vasconcellos, 1996). In developing countries pedestrians are "second class citizens". This has an important social meaning, for most walking trips are made by low-income people, as independent or combined trips. Another important issue is that since roles, needs and interests change in time and space, no single issue can be called upon to influence traffic policies, and there are no strong, permanent and explicit social movements mobilized around traffic. Thus congestion, as the most visible traffic problem, appears as the dominant problem, further supporting automobile-oriented policies.

Institutional issues relate to the power to command and control transportation and traffic policies, and to the level of decentralization that would ensure the best results. In addition to the lack of proper agencies, technical personnel are rare and poorly trained. Agencies overlap in their jurisdiction, and conflicts over mutual problems are frequent. The problem is especially serious in metropolitan areas (Barat, 1985), where coordinated efforts are essential to ensure the implementation of large-scale transportation systems. Excessive centralization at national or regional levels also hinders local authorities from having the required autonomy to formulate and implement transportation policies.

Social issues relate to several inequities in transportation and traffic conditions. The first kind of inequity is unequal accessibility to transportation. This inequity can be broken down into several components: access time to transit (including waiting and transfer times), in-vehicle time, and access to the final destination. For all components, public transportation users face worse conditions than car users. The second inequity relates to comfort. Internal conditions in public transportation vehicles are usually inadequate, and average passenger density is sufficiently high to cause discomfort and tension. The third major inequity relates to activity. With longer distances to be traveled, and poor transportation services, most of the population have to increase their time and space budgets to cope with essential trips. Thus, in addition to the physical and psychological burdens, low-income individuals suffer a reduction in their social

lives, since most travel is confined to work-related and basic educational purposes.

Most inequity problems derive from different approaches to the supply of both transportation infrastructure and means. On the one hand, while the state provides infrastructure (streets and highways) with public resources, on the other hand the provision of motorized means of circulation is often left to the market: middle-income and upper-income strata purchase automobiles while lower-income citizens have to rely on private bus supply. Thus, while middle and upper-income groups can consume street systems efficiently (from their own point of view) with their automobiles, most people cannot do so unless affordable and convenient public transportation is provided, along with preferential traffic management measures. In other words, the assumption that streets are a means for collective consumption and should be paid for by everybody is a myth. Similarly, criticisms of public transportation subsidies are therefore unjustified in view of externalities caused by private transportation and the large subsidies provided to ensure its efficient use.

Technical issues relate to the commitment to applying traditional techniques borrowed from developed countries without proper adjustment to Third World conditions (Willumsen, 1990), and to the myth of traffic management as a neutral technique. The rationale of the transportation planning process is conservative, in that it is used to propose ways of accommodating present trends in the future, without questioning the forces that shape them. The lack of reliable data, coupled with high rates of demographic, social and economic changes, lead to forecasting activities that generate absurd results (May, 1991). Moreover, it is virtually impossible to verify forecasting exercises and it is always possible to explain any deviation from forecast figures by recourse to a set of "unexpected" social and economic changes. Thus, the use of these models characterized a "black-box" ethics, where only a few experts could decide which data to include and how to handle them. It has served to generate (and propagate) an unequal and unfair distribution of accessibility, further enhancing automobile dominance. This sort of procedure is possible owing both to the image of technology as a symbol of modernity and to the close nature of the political system, which keeps outside interference at very low levels. In addition, traffic management entails the use of

technical tools that avoid social and political considerations, and the pursuit of a form of distribution of the circulation space that supposedly benefits "everybody". It ends up providing a circulation space where the needs of the weakest roles (pedestrians, cyclists, bus passengers) are severely impaired to allow efficient conditions for automobile use.

Technological issues relate to the commitment to an automotive development model that militates against non-motorized and public transportation systems. Traditional transportation means have been constantly neglected and even banned (Banjo and Dimitriou, 1990) and railroads have been dismantled (Barat, 1985). This commitment has strategic reasons (development policies), economic reasons (relevance of the automotive industry) and sociological reasons. In the latter case, it relates to the political and economic importance of middle classes for capitalist modernization. As the main fuel for modernization is social mobility, the middle classes, who have the best historical conditions to benefit from the process, pursue this mobility fiercely. Considering prevailing transportation supply and urban patterns they see the automobile as one of the main tools for their efficient social reproduction, and the result is a symbiosis between the middle class and automobile (Vasconcellos, 1997a and 1997b). Thus automobile-oriented transportation and traffic policies are generated, and space is adapted to cope with the increasing use of cars, in a way that neglects the basic needs of pedestrians and public transportation users.

Economic issues relate first to the fiscal crisis of the state, which hinders support for efficient public transportation systems and distributive social policies. Large transportation infrastructures, which rely on public investments, are becoming less feasible, and subsidies to special groups are subjected to mounting opposition. Second, this same crisis helps keep most of the population in poverty, which prevents people from having access to convenient public transportation. Third, inefficient and negligent operation of public transportation services - especially by large public operators subject to weak public controls - generate persistent economic deficits.

Operational issues relate both to the irregular provision of transportation services, and to the erratic quality of traffic conditions. Private provision of public transportation is permanently subject to instability, owing both to a market-driven approach to the

business and to a never-ending conflict between fare levels and expected revenues (Figueroa, 1991). Public supply is also irregular, in the face of continuing economic deficits, operational deficiencies and increasing demand, especially by low income sectors. Traffic management is highly skewed towards automobile traffic fluidity, so that scant attention is paid to the circulation needs of pedestrian and transit users, who require specific priority treatment.

Finally, **environmental** issues concern the steady degradation of the quality of urban life, represented by high traffic accident rates, increasingly intolerable air pollution (Faiz, 1993), and disruption of residential and living spaces by undue motorized traffic. All effects are related to the adaptation of space for the automobile, within a context of deep social, political and economic differences among social classes and groups. The most striking proof of this irresponsible adaptation is the increase in the number of traffic accidents and the nature of the accidents themselves. In developing countries, accident rates are several times higher than those found in developed countries (TRRL, 1991) and pedestrians are the most jeopardized (Hill and Jacobs, 1981; Guitink and Flora, 1995). Thus safety problems derive primarily from the organization of a new, unsafe built environment, rather than from particular causes such as "individual behavior."

Alternative Assumptions

Alternative assumptions underlying transportation and traffic policies in developing countries may now be proposed.

First, **accountability** refers to the right to participate in policy decisions and to evaluate the results. Planners are political beings, committed to perceptions of reality and political beliefs, however naive the idea of neutrality that prevails in their discourse. Transportation and traffic policies are not an isolated field of "technical expertise" divested of political interests and influences, and therefore capable of promoting neutral solutions for the general "well being." The object of policy is not the "community," perceived as a set of equal people seeking the same collective "well being", but social classes and groups with specific needs and interests, often conflicting and sometimes contradictory. Hence, transportation and traffic policies are intervention techniques of both a technical and political nature, which must use technical tools to negotiate politically the distribution of accessibility among these classes and groups. Neutrality is therefore a myth and solutions will always entail judgments and preferences, through involving distribution of benefits and handicaps. As stressed by Healey (1977), "high energy methodologies," of which transportation models are a prime example, are antithetical to participatory processes and should be put under public control. Those who have the power over the information surrounding the decision process should be accountable. Thus, accountability requires an ethical and formal obligation to open up the decision-making process to society. This does not mean a trend towards "assemblyism," but refers instead to the organization of open and fluid channels for communication and control, operated by democratically selected groups and agents, such as labor unions or neighborhood and professional organizations. It also entails the proper decentralization of tasks, to ensure policies are formulated as close as possible to their targeted groups. Moreover, an open decision-making process does not mean that technical skills and knowledge are useless and that politicians should take care of everything. The political nature of policies does not diminish the importance of planners and their technical skills and it should not be used as an excuse for not doing the job, or insisting on looking for an idealized neutral participation. In fact, this political dimension

Table 1: Issues in developing countries urban transport crisis

<i>Issue</i>	<i>Content</i>
political	highly centralized states; fragile democracies; uneven distribution of power; coalition between technocracy and middle classes; uneven right to use road space
institutional	disco-ordination between agencies; lack of proper human and technical resources
social	unequal accessibility; comfort inequity; activity inequity
technical	use of techniques borrowed from developed countries; irresponsible forecasting exercises; conservative planning in support of private transport
technological	commitment to automotive transport; neglect of non-motorized means
economic	fiscal crisis of the state hindering social policies; persistent poverty; negligent operation of public transportation; over-investment in roads for private transport
operational	irregular provision of public transportation; poor traffic conditions; priority to private automobiles in traffic management
environmental	high traffic accident rates; increasing pollution; disruption of residential areas

enhances the importance of transportation-related policies, especially in highly stratified societies as those of developing countries. The broadening of social analysis in transportation “renders indefensible the confusion of technical and political processes” (Healey, 1977). Transportation and traffic planners have to be able to work with both fields of knowledge, enhancing the need for an alternative, diversified university training.

The second assumption is **social progressiveness**. It proposes that the central task is to detect and fill existing accessibility and equity gaps (Moseley, 1977), rather than adapting space to accommodate present tendencies in the future. This argues for an alternative strategy of priority financing of improvements in transportation (and living) conditions for low-income groups, rather than middle classes. Thus the assumption argues against the possibility and convenience of accurate forecasting of the relationships among land use, social and economic conditions, and transport demand, as a support to conservative proposals. Forecasting techniques are not assumed to be conclusive instruments, used to justify vital decisions. Instead, the new assumption requires planners to be more modest and to use short-term forecasting simply as a way of identifying approximate trends and “ceilings” to the amplitude of the analysis. It also requires the use of simplified models adapted to local conditions (Willumsen, 1990). The new assumption also questions strict use of the words “transport planning” as representing a willingness to control the future, focusing instead on defining transportation policies (Proud’homme, 1990). In short, forecasting exercises are to be replaced by detection of inequalities and inefficiencies in present transportation and traffic systems, and designing solutions to decrease or eliminate them in the present, rather than generate proposals for the hypothetical future.

Thus, instead of asking how present trends can be accommodated in the future, the planner should concentrate on some fundamental initial questions: How was the present built environment organized? Who can use it and under what conditions? The answers to these questions have to rely on the analysis of household travel patterns, as a complement to individual ones. Mobility in developing countries cannot be reduced to isolated statistics about individual trips, but should instead consider a “household

survival strategy” (Henry and Figueroa, 1985). Social reproduction, and the related transport needs, are defined in the household context, besides being constrained by exogenous factors such as transportation supply and the location of activities. Thus travel and distance budgets (Goodwin, 1981; Hagerstrand, 1987) are essential for both understanding social reproduction in the light of prevailing conditions and identifying constraints on the equitable appropriation of space.

Equity relates to the targeting of transportation and traffic policies to ensure an equitable appropriation of space, from the standpoint of accessibility, safety and environmental protection. This involves submitting the prevailing efficiency paradigm to equity requirements (Healey, 1977). Such submission does not mean neglecting efficiency, but considering it differently: instead of asking what is the most efficient way of ensuring the highest mobility, the question is what is the most efficient way of ensuring the equitable appropriation of space. The first concern - equitable access - relates to the collective nature of the street system and to the provision of public transportation services. With the former, the challenge is to make streets a public asset. On one side, the myth of streets as a means for collective consumption has to be challenged, by submitting all investments in transportation infrastructure to equity evaluations. On the other side, the use of the streets should be reorganized according to priorities given to the most numerous and vulnerable roles, which in developing countries are indisputably the pedestrian, the cyclist and the public transportation passenger. This need not entail eliminating private transportation, but will require submitting it to others’ needs and interests. With the latter, the right to public transportation should be seen as the right to participate in the social, economic, political and cultural activities that are essential to living. Thus the prevailing market paradigm must be replaced by a social paradigm, in which transportation is an essential tool for ensuring the right to access and the achievement of broader social goals. This may entail the subsidization of public transportation services, whenever necessary to ensure equitable access, provided they reach the targeted groups and are not used to support inefficiency.

The second equity concern relates to safe circulation as a right. As automobile-adapted built environments in developing countries

are natural producers of accidents, the crude views of accidents as “fatalities” or “inevitable costs of development” must be firmly rejected. The same rejection applies to the blind importing of assumptions from industrialized countries, as the overweighting of human factors as causes of accidents. Thus the central task is to reorganize the built environment to ensure a safe traffic for the most numerous and vulnerable roles. Finally, the right to environmental quality may also be pursued according to the same objectives, to ensure acceptable levels of noise and air pollution, and controlled urban changes. This implies that efficiency must be subjected to safety and environmental needs.

This leads to the fourth assumption, **sustainability**, as the only assumption focused on the future. In practical terms, it means that instead of searching for the modes of highest efficiency regardless of their environmental impacts, it is necessary to ask what is the most environmentally sound and sustainable way of ensuring an equitable appropriation of space. This assumption does not neglect efficiency: instead of dealing with limited technical efficiency, it embodies the broader notion of social efficiency, by representing the levels of technical efficiency within which broad social and democratically determined objectives are being achieved. Central to this objective is the change in urban development

patterns to reduce both average distances and dependence on motorized transportation, coupled to the adoption of effective measures to ensure priority circulation and efficient operation to both public and non-motorized transportation.

The equity and sustainability assumptions can then be translated into a final single question: What are the most efficient, environmentally sound and sustainable ways of ensuring an equitable appropriation of space? This question implicitly carries a positive answer to Hagerstrand’s (1987) question about the possibility of restoring equality, and represents the main challenge for transportation and traffic planners in developing countries.

Answering this basic question has a very important political meaning in the developing world. It indicates that it is not sufficient to search for efficient, environmentally sound and sustainable means of transportation if equity is not achieved. It is better to have an equitable and environmentally unfriendly space than an environmentally friendly but inequitable space. While the former can in the short term lead to a change of course to ensure sustainability - as political power is more democratically distributed - the latter can be “frozen” in an unequal situation with few opportunities for change. This is the current situation in some developing countries that have been pursuing automobile emission

Table 2: Alternative Assumptions and Questions

<i>Objective</i>	<i>Content</i>	<i>Current question</i>	<i>Proposed questions</i>
Accountability	Ensuring the right to participate in policy decisions and to evaluate results	What are the most adequate instruments to support transport and traffic policies?	What are the most democratic ways of using the most adequate instruments to support transport and traffic policies?
Social responsiveness	Identifying and filling existing accessibility gaps	How may current transport demand tendencies be accommodated in the future?	How is the built environment organized? Who can use it and under which conditions? What are the main differences in access to transport and space? How can we eliminate or minimize these differences?
Equity	Targeting of policies to ensure equitable accessibility, safety and environmental conditions	What is the most efficient way of providing the higher mobility?	What is the most efficient way of ensuring the most equitable appropriation of space?
Sustainability	Reorganizing space and transport technology	What are the technological alternatives to ensure the highest mobility?	What are the most efficient, environmentally friendly and sustainable means of ensuring the equitable appropriation of space?

controls as a priority, while keeping most of the people subject to poor transportation conditions. Planners in developing countries should be aware of not falling into the traps laid by biased approaches, and should instead promote policies inside a broader equity framework.

Conclusions

The results of traditional transportation planning techniques in developing countries have been widely disappointing. Used according to a "black-box" ethics within weakly democratized environments, and supported by unreliable forecasting techniques, they have been generating transportation systems that propagate an unfair distribution of accessibility. Private transportation has often benefited from this state of affairs, while public transportation means have been neglected, subject to permanent crisis. Economic restructuring and the fiscal crisis of the state have prevented still further the organization of an adequate supply of public transportation for most of the population.

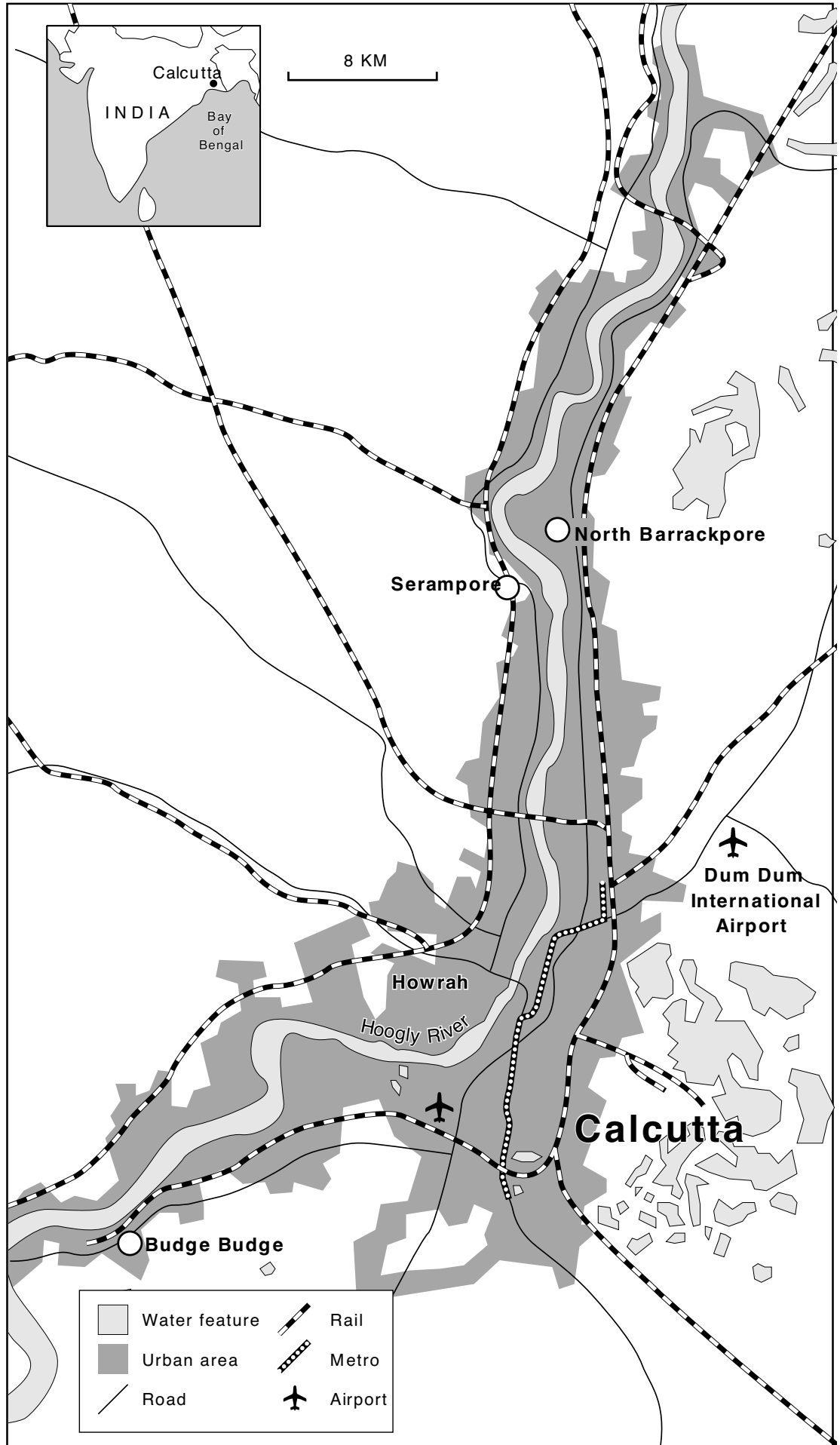
The urban transportation crisis in the developing countries requires a radical change in the transportation planning process. The assumptions that have supported traditional procedures have to be

replaced by others that are capable of supporting new, socially and environmentally sound transportation policies. Recent trends toward privatization and deregulation further stress the need to clarify assumptions. Thus, the transportation decision-making process has to be accountable, and decentralized as close as possible to the targeted users. Planners and engineers have to be able to work with both the technical and political aspects of transportation and traffic policies, instead of looking for an idealized neutral participation. Conservative proposals based on unreliable forecasting exercises have to be replaced by the targeting of immediate measures to fill equity gaps. Central to the objective is the analysis of household time and space budgets, to identify constraints on the equitable appropriation of space. The myth of roads as a means for collective consumption has to be challenged by submitting investments to equity evaluations, and by redefining the use of streets in favor of the most numerous and vulnerable roles. Traffic safety and environmental quality have to be seen as rights, and the prevailing automobile-adapted built environment has to be profoundly modified. Finally, urban development patterns have to be gradually changed, to decrease both average distances and dependence on motorized transportation.

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Figure: Calcutta, showing principal transport infrastructure. The shaded urban area is home to nearly 12 million people.



Sustainable Transport Solutions for Calcutta

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Keywords

Sustainability, People, Economic growth

Abstract

Like many cities in developing countries, Calcutta has a very small ecological footprint - it is relatively self-sufficient. However, Calcuttans can see, and wish to attain, the relative comfort of western lifestyles. In addition, they can see through the sustainability rhetoric of western governments who, while demanding that developing countries should become more sustainable, are doing little to initiate and implement sustainability themselves. Indeed, western consultants are pushing inappropriate and unsustainable transport infrastructure on Calcutta. In the meantime, Calcutta and Calcuttans will suffer.

Introduction

Cities in developing countries represent a fundamental paradox in the discussion about sustainability. They experience appalling levels of air and noise pollution, poor sanitation and drinking water quality, inadequate housing provision and under investment in most aspects of social infrastructure, including health care and education. At the same time, countries such as India are experiencing high levels of economic growth and motorisation which in its turn imposes an environmental burden on vulnerable cities. Compared with western, particularly North American and Australian cities, cities in developing countries have a small ecological footprint (Wackernagel and Rees, 1996). Their per capita requirements for food, energy and materials is small and their need to monopolise land elsewhere in the world for these purposes (and carbon absorption) even smaller. Cities in developing countries are very good at conserving resources and managing within environmental limits and they do this in a way that is not simply a result of poverty.

Calcutta is a well documented example of a city in crisis. This crisis is now deepening

under the onslaught of over half a million vehicles and their associated noise, pollution and space requirements. The debate in the developed world surrounding sustainability has failed to address the needs and problems of this city. It has failed to recognise the global importance of motorisation in India, which is far more important than small reductions in traffic levels in Europe. It has failed to translate global concerns about atmosphere and climate into policies that are meaningful in a country and a city that is concerned with survival as a top priority, and it has failed to inform the global multinational enterprises who are now feeding the car-hungry Indian middle classes with new models and the roads to drive them on.

Calcutta is a globally important test bed of the relevance and importance of sustainable development. Testing is now under way and the concept has already started to show the signs of irretrievable destruction.

Sustainable development and sustainable transport

The developing world meets many of the criteria for sustainable transport and sustainable development. Most transport is still accomplished by human and animal power, car ownership levels are low, fossil fuel dependence is low, and in large cities population densities are such that accessibility indices register values that would make many cities in North America and Europe very jealous. Most people in most cities in developing countries live very close to most things they need to do and produce very small amounts of greenhouse gases. This does not excuse or condone the grinding poverty of hundreds of millions of urban residents in developing countries but it should make the developed world more conscious of its own profligacy and more sensitive to the needs of societies whose ecological footprint is so tiny.

Most developing countries are experiencing a seriously deteriorating situation in terms of growing levels of motorisation, rapidly increasing concentrations of pollution and increases in health problems related to traffic and pollution. Road traffic accidents are also increasing rapidly in Calcutta, Delhi, Bangkok and African cities. In an important sense developing countries are moving from relative sustainability to rampant non-sustainability and are doing so at the behest of their own middle classes anxious to reap the rewards of affluence, and as a consequence of the activities of the World Bank, motor vehicle manufacturers and economic deregulation. The investment opportunities, rising demand for infrastructure and voracious appetite for fossil fuels generate increases in standard measures of economic activity but also produce greater economic inequalities and the impoverishment of millions of those at the lowest levels of income and security.

In Bangladesh, John Howe (Howe, 1996) has shown how the heavy investment in roads has contributed to landlessness and poverty. He concludes "*it is difficult to understand why one of the poorest countries of the world tries to support and relentlessly enhance a road density far in excess of its neighbours when measured against the resources available for the task.*"

Bangladesh is exhibiting strong tendencies in the direction of non-sustainability, largely led by the transport sector. In Tanzania, Sieber (1997) has shown how non-motorised transport investments can substantially alleviate rural poverty and enhance agricultural production. In a detailed study of the Makete district he shows how investment in donkeys and bicycles are likely to produce the greatest level of benefits. These investments are much cheaper than that required by roads and motorised transport and yet the bias of large scale investment, development and overseas aid is still in favour of roads and vehicles.

Sustainable transport in developing countries is suffering dramatically from the depredations of increased vehicle manufacturing capacity, vehicle ownership and use and pollution. This can be seen very clearly in Calcutta where recent events have brought the city to the brink of an irreversible decline in the potential for sustainability (Whitelegg, 1996).

Calcutta brings into very sharp focus all the issues associated with sustainable development and sustainable transport. Imagine sharing your living space with a diesel generator, 24 hours a day and very close to you. The resultant noise and air pollution levels would be off the end of the scale and beyond anything to be experienced in a European or North American city. This pollution is the daily reality in Calcutta. This city of 14 million inhabitants has greater than 500,000 vehicles but these vehicles emit clouds of poisonous black smoke, grind around heavily congested streets and constantly block the trams and the buses. Calcutta is essentially a pedestrian city and a highly accessible city. The vast majority of the population walk everywhere and where they do not walk they use the ubiquitous cycle rickshaws and Calcutta's unique hand-pulled rickshaws. Within walking distances there are hundreds of shops, businesses and schools. Calcutta is the ultimate expression of a city that is accessibility-rich and mobility-poor. The problem is that the physical conditions for those moving around on foot or by human powered vehicles are appalling.

Calcutta is a beautiful city. It has large areas of parkland, green space, water, a rich architectural heritage and an efficient tram and metro system. The metro system is about 16 km in length and runs north-south through the city. The tram system is 70 km in length with about 28 km on segregated track. There is a "circular railway" and an extensive bus system but every part of this system is suffering from underfunding, breakdown, zero integration and unacceptable overcrowding. The tram and metro system each carry only about 200,000 passengers per day and have a capacity of 10 times that number. The buses are vastly overcrowded, with passengers clinging on to the outside, and they insist on stopping in the middle of the road, exposing passengers and boarders to traffic danger. The two railway stations in Calcutta (Sealdah and Howrah) handle two million passengers between them each day and neither are served by the metro and tram system, though the tram system used to serve Howrah.

Calcutta's tram system is under threat. US consultants have persuaded the State Government of West Bengal that it is an outmoded system, causes congestion and should be removed from central areas. Japanese consultants have persuaded the

same government that 6 new concrete flyovers should be built to increase highway capacity at a cost of just under £50 million. There is no money for routine maintenance of trams or upgrading the metro. Trams and metro could be integrated very easily. There is no common ticketing system and there are no buses feeding directly into the metro line. Trams could be connected into the two railway stations and have available up to 2 million new passengers each day. There is no concept of assisting those who walk and cycle or use rickshaws. The pedestrian environment is highly dangerous and more than 1,000 pedestrians are killed each year in Calcutta. The pedestrian pavements are seriously damaged, filled with rubbish and in places filled with people who only have the pavement for their homes.

Calcutta now faces serious choices. Under pressure from the developed world as well as its own internal growth imperative it is moving to abandon large sections of public transport and encourage motorisation. The flyovers will be built next year and will make life much more difficult for all those who live near them (more than 250,000 people) and all those who want to use trams, walk or cycle. The State Government has banned cycle rickshaws, rickshaw pullers and hand-pulled carts in the central areas. This will cause untold misery to the lives of well over 100,000 people for whom these activities are their only source of income. Car factories are being built throughout India and car ownership is growing at over 25% per

annum. In the summer of 1996 Ford opened their first factory to make the Escort, and Daewoo opened a car plant.

Conclusion

The developed world has now embarked on the mass motorisation of the developing world in a way that closely mirrors in its irresponsibility the activities of the tobacco and pharmaceutical / biotechnology multinationals. The citizens of Calcutta will suffer as a result of this change in their fortunes and those supporting sustainable policies will only be taken seriously if they have the moral and practical authority that can come from serious traffic reduction and serious sustainability progress in their own countries. Why should the Indian or West Bengal government have the slightest interest or respect for sustainability arguments when our comfort and economic success has been built on burning fossil fuels and mass motorisation? Time is now running out and a solution to Calcutta's problems depends on a solution to our problems. Global sustainability depends inexorably on developing countries moving in the direction of sustainable development. That movement depends on the extent to which the developed world can reduce its own materials, energy and water consumption and offer a more equitable global economic system on which sustainability can flourish. At the moment the signs of this happening are not encouraging.

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Calcutta City in Pollution Perspective

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Keywords

Pollution, Health.

Abstract

Calcutta suffers from chronic pollution. It is pervasive, temporally, spatially and democratically. Every Calcuttan is affected and, as a result, many suffer ill health. There is no easy solution, but the main cause, poverty, is identified.

Introduction

Calcutta city is a metropolis with rich cultural heritage and a long glorious tradition of political and social struggles. Located in West Bengal, its influence cuts across the state boundary. In a sense the entire eastern region of the country with a population of more than 200 million constitutes its hinterland. Calcutta is a vast melting pot where people from different states of culture, discipline and heritage meet and work side by side.

Table 1: Some characteristic features of Calcutta city and surroundings:

West Bengal area	88,752 km ²
Populatyion of West Bengal	68 million
Core Calcutta CMC area	104 km ²
Population of core-Calcutta	3.3 million (night time)
.....	about 6 million (day time)
Total urban area of West Bengal	2,600 km ²
Total urban population	15 million (approx.)
Calcutta Urban Agglomeration Area	852 km ²
Calcutta Urban Agglomeration Population	9.2 million
Calcutta Metropolitan Area	1,350 km ²
Calcutta Metropolitan Population	11.86 million

This city in the early part of this century, was called the, "City of Palaces" or "City of Gardens". However, the same city in the middle part of the century was called, "The dirtiest city in the world". With time the city received all sorts of contempt and ridicules - "The city of garbage", "The city of darkness", "The city of slum", "The dead city". Finally, the last ornament was added by the German writer Günter Grass in 1988. He writes "Calcutta city appears to me as if blood dropping from Kali's tongue. A city that can swallow the whole country the whole world".

The questions come ... what are the reasons for such deterioration of the city; whom should we blame; and what is the

present status of the city in pollution perspective? What is the significance of pollutant pollution? The following pages will describe the present environmental situation of Calcutta and a discussion as to how we can combat the situation.

A thorough study of the data in Table 1 clearly indicates the population pressure in Calcutta. In fact almost 9% of West Bengal's population during day time is in Calcutta city in an area of about 100 km² which is just a dot compared to West Bengal's total area (Figure 1). This is the unique feature of Calcutta city. Another feature of Calcutta which is not comparable to other cities all over the world is the population density per square km. Out of 100 municipal wards of Core-Calcutta there are 4 wards where the population is about 1.0 lakh (100,000) per km² and 20 wards with a population of about 70,000 per km². At present in Calcutta Municipal Corporation (CMC) area (1,350 km²) the population is 11.86 million and has open space 690 km². But in AD 2011, the population of CMC will be 18 millions and open space under present land use strategies will reduce to 300 km². Should this happen it will be a great disaster from an environmental point of view.

Big trees and open space help to maintain the healthy environment and oxygen balance of the urban area. Moreover, for an ideal city the road area compared to the city should be around 25%. A comparative study of Calcutta with other cities is shown in Table 2.

Table 2: A comparison of space

Open space per head	Road area	No of trees per sq km
Calcutta 20	Calcutta 6%	Calcutta 21
London 250	Delhi 20%	Ideal 100
Moscow 450	Bombay 16%	
	West 25-30%	

The Calcutta city of 100 km² was originally built for only one million people, but now in the same city we are accommodating more than 6 million during the day. This results in constraints in all spheres of life. Looking at some of the services like hospitals, railway stations, transport, etc., we can easily



Figure 1: Population

understand this.

The World Bank in its recent report had mentioned, "India is among the poorest of poor nations in Asia" with per capita income of US \$ 290 a year (Japan US \$ 33,950). It is only just above Nepal, Bhutan and Bangladesh.

India has 17% of the world population, with just 2.3% of the world's land resource and 1.7% of the world's forest. Roughly 40% of India's population is affected by malnutrition. Among major Indian cities, Calcutta's status is one of the worst.

Calcutta grew in an unplanned manner. About Calcutta, it is said "Site selected, sight erected". This is even true today. Interesting

enough, the alarming condition of Calcutta was perceived even 86 years ago. The Calcutta Improvement Act of 1911, which came into force on 2 January 1912, clearly mentions the necessity for improvement of the city by opening up congested areas, laying out or altering streets, providing open space for purposes of ventilation. Again in 1935 the First Chief Engineer of the Calcutta Improvement Trust mentioned the same thing. The pity is that even 50 years after Independence we could not do what was felt to be done immediately 86 years before. Furthermore, knowing full well that Calcutta has substantially less open space, we continue to encroach unabated on many gardens and parks, and construction in these open spaces is advancing. It seems that ecology does not bother the town planners and engineers.

Trend of Calcutta's air pollution during winter from 1985 to 1994

From a health perspective, air pollution is regarded as an important factor in Indian cities. It is generally agreed that Calcutta's city air is heavy and difficult to breathe. The climate of Calcutta has an important impact on the city's air pollution. During the monsoon season (July to October) the air is comparatively clean due to heavy rainfall (but city water quality becomes worse) and during summer (April-June) high winds blow away the pollutants, thus air pollution is not severe. Air quality is worse during winter months, i.e. November to February. Inversion occurs during these months and the pollutants cannot disperse. Conditions for Calcuttans during winter is not unlike that of fish in polluted water.

Following his visit to Calcutta during the winter of 1994, Patrice Riemes, Department of Human Geography, at the University of Amsterdam, Holland wrote to the Director of the School of Environmental Studies, Jadavpur University: "You may not be surprised to know that for 6 weeks after coming back from Calcutta, I am still spitting black when clearing my throat. For the last two weeks this has become only a few greyish streaks, but before, real chunks of black slime used to come out. Another boost to the Calcutta pollution legend."

We have studied Calcutta's air pollution during winter from 1985. We have observed that from 1985 there is an increasing trend of air pollutants. Some data are given in the following Table.



Figure 2: A school going child with air mask

Figure 3 (opp.): SPM in Calcutta city (the left hand side shows the unexposed filter and right hand side after SPM collected for six hours)



Table 3: Calcutta's air pollution

Year	Nitrogen Dioxide (NO _x)	Sulfur Dioxide (SO ₂)	Suspend. Particulate Matter (SPM)
1985	159 µg/m ³	69.3 µg/m ³	757 µg/m ³
1994	182 µg/m ³	110.0 µg/m ³	1395 µg/m ³

Since these air pollutants are related to the increasing number of motor cars, we have found that from 1985 to 1994 the number of cars within the city has doubled (no. of cars in Calcutta city up to August 1993 was 525,482). Therefore, the number of cars passing through the street junctions has almost doubled. Table 4 shows the number of cars in the city during 1985 and 1994 passing through strategic junctions per minute.

Table 4: Cars passing through key junctions

Year	Shambazar	Dalhousie	Moulali	Gariahat	Jadavpur
1985	15	41	-	24	12
1994	34	56	60	49	23

We have made a comparative study on three available data of air pollutants of Delhi from January 7, 1994 - February 7, 1994 with that of Calcutta. The results show that Calcutta during winter is more than three times more polluted than Delhi with respect to measured pollutants. The 1990 data of New York city is also given below.

Table 5: Pollution in three cities

	January 7, 1994 to February 7, 1994		
	Calcutta	Delhi	New York
SO ₂	108 µg/m ³	26 µg/m ³	40 µg/m ³
NO _x	183 µg/m ³	49 µg/m ³	-
SPM	1352 µg/m ³	421 µg/m ³	54 µg/m ³

One of Calcutta's big problems is very high concentrations of Suspended Particulate Matter in the air. The WHO recommended maximum value is 90 µg/m³. In winter, we

have observed an average value of about 1300 µg/m³ and it goes as high as 3,000 µg/m³. To estimate the impact on city residents, we developed an experiment where air was sucked through a filter at the rate we inhale air while at rest (7 litres/minute).

Figure 3 illustrates the change in the appearance of the filter after 2 hours of inhalation and this indicates why we find a high rise in respiratory problems among to Calcuttans during winter. Asthma among children is very common now and even some school going children use air masks in an attempt to improve the quality of air which they inhale.

Researchers in the U.K. (*The Guardian*, Feb. 17, 1994) showed that an increase in air pollution is related to higher incidence of asthma, and in London it has almost doubled in last 10 years.

In an editorial, "No hiding place, dirty air threatens the nation's children", *The Times* (London, Feb. 17, 1994) writes: "Children are particularly vulnerable. Those under three breathe in twice as much air for each pound of their body weight as adults. Their airways are narrower and their lungs still immature. Pollution can affect them permanently."

Benzene Soluble Organic Matter, Polynuclear Aromatic Hydrocarbon and Organolead in Calcutta city air during winter

Higher Benzene Soluble Organic Matter (BSOM) in city air means that the air is more polluted. Automobiles and coal burning are the main sources for higher BSOM levels. The BSOM concentration in city air increased by more than 30% over what we observed in 1987.

Table 6: BSOM in Calcutta air

1987	82 $\mu\text{g}/\text{m}^3$
1992	105 $\mu\text{g}/\text{m}^3$
1994	125 $\mu\text{g}/\text{m}^3$

In BSOM there lie a group of compounds known as Polynuclear Aromatic Hydrocarbons (PAH) and some, such as Benz(a)pyrene, are suspected carcinogens. The School of Environmental Studies has analysed 16 PAHs in Calcutta city air for 4 years in the last 10 years. Like Benzene, the higher Benz(a)pyrene in city air is due to excessive coal burning. The amount of Benz(a)pyrene in Calcutta city air is compared with other cities in the world.



Figure 4: A fruit seller in the main city crossing. Pollutants pollution is meaningless to those where to earn bread is the problem.

Table 7: Benz(a)pyrene in city air ($\mu\text{g}/\text{m}^3$)

Calcutta	London	Brussels	New Jersey	Paris
30-120	2-14	3.9-12.0	0.69-1.06	4.6 - 15.0

We have made a calculation on the basis of benz(a)pyrene intake by hawkers sitting for eight hours near strategic junctions and the probability of developing cancer. This calculation suggests that if the hawker sits for 8 hours each day for 15 years, he is running the risk of getting cancer, whereas the same risk for a London hawker is about 50 years. Evidence from epidemiological studies suggests that an increase of 1 $\mu\text{g}/\text{m}^3$ of benz(a)pyrene corresponds to an increase of 5% in the lung cancer death rate.

The concentration of Lead in the urban environment is due to the use of Tetraalkyllead in petrol. The ill effect of Lead is well documented. Children, in particular, are susceptible to Lead pollution. Tetraalkylleads are more poisonous than many other Lead compounds. The levels of Lead and Organolead in Calcutta city are much higher during winter as compared to some important cities.

Table 8: A comparison of lead concentrations

	Calcutta	Berlin	Brussels	Kanpur	Bombay
Lead ($\mu\text{g}/\text{m}^3$)	6.6	1.40	2.32	5.35	0.463

Table 9: A comparison or organolead concentrations

	Calcutta	Frankfurt	Belgium	London	Los Angeles
Organolead (1993)	(1993)	(1980)	(1981)	(1980)	(1977)
(ng/m^3)	443	45	166	94	100

Coal Chulla and Benzene in Calcutta city air

Benzene, Toluene and Xylene are three Volatile Organic Compounds (VOCs) present in urban air mainly due to the use of petrol and diesel in automobiles. Of these three compounds, Benzene is a suspected carcinogen. The limit of Benzene in air for health safety should not exceed around 10 mg/m^3 . The School of Environmental Studies has measured Benzene, Toluene and Xylene in Calcutta city air during the winter for the last 3 years.

During winter (1994-1995), someone breathing Calcutta's air at main street crossings for 12 hours, is inhaling the Benzene equivalent of smoking at least 100 cigarettes each day. London, in comparison, is equivalent to 15 cigarettes per day.

Calcutta city is unique from a pollution perspective. While in most western cities concentrations of Benzene in urban air is less than Toluene and Xylene, in Calcutta city the Benzene level is more than Toluene and Xylene. The main reason for such deviation is due to use of a coal chulla. In Calcutta more than 80% of the families still use coal for energy and Benzene emission is highest out of these three from coal combustion. Thus, excessive Benzene in Calcutta is due to coal burning. Most of the Calcuttans get up from bed in the morning after inhaling smoke from the coal chulla and in many houses the smoke crawls from kitchen to bedroom. In slum areas during morning and evening when they fire the coal chulla the whole area is covered with smoke and this becomes unbearable during winter months.

When a coal stove burns, the concentration of Benzene may be 5497 $\mu\text{g}/\text{m}^3$ (average of 8 results) near the chulla. A comparative study of ambient Benzene concentrations in a few cities of the world is given below

Table 10: Benzene concentrations around the world

Calcutta	London	Boston	Los Angeles
1500 $\mu\text{g}/\text{m}^3$	40 $\mu\text{g}/\text{m}^3$	60 $\mu\text{g}/\text{m}^3$	140 $\mu\text{g}/\text{m}^3$

(* Average value during 1994 - 1995 winter)

Calcutta City Dweller

The vast majority of the people in Calcutta city are poor or middle class. Although we have elegant mansions, beautiful monuments, underground metro, etc., we cannot hide a great majority of our people - beggars with pot bellies and begging bowls, pavement dwellers in huts made of plastic sheets and bamboo stick of 1.0 m x 2.0 m area and 0.75 m in height, shanty huts, rickshaw pullers carrying other humans on their rickety shoulders, rag pickers with their dirty sacks, and scavengers fighting among themselves for a metal scrap on the garbage dump. The city of Calcutta can be divided according to living status of the people in this respect:

Table 11: From rich to poor

< 1% Elite
8-9% upper middle class (PCPME Rs. 700+)
40% poor lower middle class (PCPME Rs. 185 - 255)
50% very poor and slum dwellers (PCPME Rs. 0 - 185)
3 lakhs people sleep on footpaths.

PCPME = Per Capita Per Month Expenditure

Within core Calcutta there is not a single ward without a slum. About 50% of city people live in slums and close to 70% of slum people live below poverty level. The city of Calcutta is often referred to as the slum city of the world and most probably it is so because of the subhuman living conditions in the slum and pavement of the city.

In recent years thousands of pavement dwellers are crowding the city streets, parks and vacant places. Poverty and hunger drove them from the villages and they are using the city pavements and parks as public latrines.

The growth of slum population is much higher than the overall growth of the country. In the course of time these people who are not getting nourished food and education will be our major population. The urban quality of life is defined in terms of the physical quality of life index (PQLI). The PQLI has been defined in terms of longevity, child mortality, shelter, sanitation, educational facility, power, health, etc. The PQLI of Calcutta city people is of the lowest value as the majority of people do not get these facilities. In West Bengal there are about 40,000 villages and nearly about 150 towns. All these villages and towns were neglected for the last 200 years. Whatever attention given was only for Calcutta city and we are now paying the cost of that. Thousands of people rushed to Calcutta in the last 100 years and are still rushing to Calcutta - the only hope they have for

survival. If this continues the day is not far off when all Calcutta and its metropolitan area will be a big slum.

Industries within Calcutta city

Within just 100 km² of core Calcutta, there are 11,516 small and big factories registered with Calcutta Municipal Corporation. In addition to that there are unregistered factories. There is not a single ward where there are no factories. There is not a single ward where some people are not complaining about their miserable condition due to factory activities. The problem is even worse on the opposite bank of the Hooghly river in Howrah district. Because of this high concentration of factories, the area is known as the "Sheffield" of West Bengal.

Furthermore, after western countries decided to reduce smelting operations, more and more Lead factories are growing in the countryside. The problem will further aggravate if the Government of India agrees to accept the industrial wastes of western countries, e.g. battery waste for Lead recovery from Australia is not yet decided, but if it is agreed the consequence will be serious in terms of pollution and health.

We want industrial growth but not at the cost of peaceful and healthy life. We should follow the proper land use pattern for sustainable industrial growth.



Figure 5: Poor lady collected coal from the city garbage and will use it as fuel to prepare food in the evening (in front of the Writers Building)

Of these factories a few hundred are using or manufacturing toxic chemicals. Due to negligence at these factories, environmental hazards often occur and people are seriously affected. In P.N. Mitra Lane, Behala, a factory producing Paris Green (Copperacetoarsenite) discharged the Arsenic-rich effluent without treatment. As a result the aquifer got contaminated with Arsenic which 10,000 people unknowingly continued to drink. Many people in the area are suffering from Arsenical skin lesions. A few died from Arsenic related diseases. At present the people of that area have got a piped water supply but due to leaching and flow of Arsenic from the contaminated aquifer, the tube wells of some nearby areas have become contaminated. Again, in the Picnic Garden area of Calcutta (68 Ward) there are 27 Lead factories producing Lead ingots and Lead alloys.

About 200,000 people live in the surrounding areas. The concentration of Lead in the soil, in dust on leaves and road dust is very high (5,000-20,000 $\mu\text{g/g}$). Even on dining tables the concentration of Lead in dust exceeds 5,000 mg/g . The School of Environmental Studies studied the area and found that Lead is not the only contaminant. Other than Lead the area is highly contaminated with Arsenic, Nickel, Chromium, Mercury. In the Tiljala area there are many tanneries and these factories are discharging the Chromium-rich effluent without pretreatment. Occasionally high concentrations of Chromium from tube well water were reported from the nearby residential areas. About 250 small acid chemical processing (HCl , HNO_3 and H_2SO_4)

Is it due lead?

- *Shyam Kumar Shom, aged 14 months, of Picnic Garden, is receiving regular blood transfusions. His doctor recommended that his father bring him to the School of Environmental Studies to ascertain the Lead concentration in the child's blood. Mr. Shom is neither suffering from Leukemia nor Thalassemia.*
- *Two young women from Rajarhat, Kalipark, Dum Dum complained to the School of Environmental Studies that they had miscarriages. They live very close to a Lead factory. Seven days a week they can detect the sweet smoke from the Lead works which crawls through their window. They inhale Lead smoke 7 days a week.*
- *The milkman at a cow and buffalo dairy near Picnic Garden Lead factory briefed the School of Environmental Studies that all of their cows and buffaloes always gave birth to premature, defective calves.*
- *Shombhu Shau of Picnic Garden complained that his poultry business flopped as all the eggs were premature and without any shell.*

units are situated in Ward 14 of the CMC area. The people of the locality have complained many times to local authorities about the acid smell and pungent odours of other gases. The problem becomes acute during winter when, due to inversion, the acid fumes cannot easily disperse.

Calcutta's Garbage

Calcutta is producing an average of 2,600 tones of solid waste per day from its 600 collecting points within the core area. Is 2,600 tones of garbage very high compared to the city population? According to the statistics of a modern city, for 1 million inhabitants the solid waste output should be around 1,800 tones per day. So Calcutta is producing much less than what it should have. Although the quantities of garbage of London and New York are much higher compared to the city population of Calcutta, still Calcutta is called the 'city of garbage'. The reason is not the quantity. The obvious reason, the collection and transportation of garbage is far below the optimum level. There are deficiencies both in personnel management and in the management and maintenance of equipment, which pushes up the cost of waste disposal and also creates backlogs. About 10-20% of refuse is never collected and sometimes the garbage pile can remain stagnant for days. Under Calcutta's humid meteorological conditions, a most unhygienic situation is created.

Calcutta's Transport and Vehicular Pollution

Transport is a headache for the authorities in Calcutta and the biggest inconvenience to the people of the city. The transport system in Calcutta is unique as it consists of buses, local trains, metro, trams, taxis, auto-rickshaws, ferry services, side-by-side with bicycle rickshaws and rickshaws pulled by human beings. Despite these varied modes of transport the entire system is under severe strain. Every day 6.6 million commuters travel in different conveyances but the capacity of the transport network is 2.8-3.0 million. The percentage of overloading during peak hours is 250-300% of the capacity of buses trams and trains.

Present statistics show that about 50% of the total passenger cars in India are plying in only five cities, viz. Delhi, Bombay, Calcutta, Bangalore and Madras. Table 12 indicates (1991) that Delhi registered the maximum number of vehicles.



Figure 6: Picnic Garden's Lead factories. Twenty seven Lead factories in the Ward of 68 of the CMC. About 200,000 people live surrounding these factories.

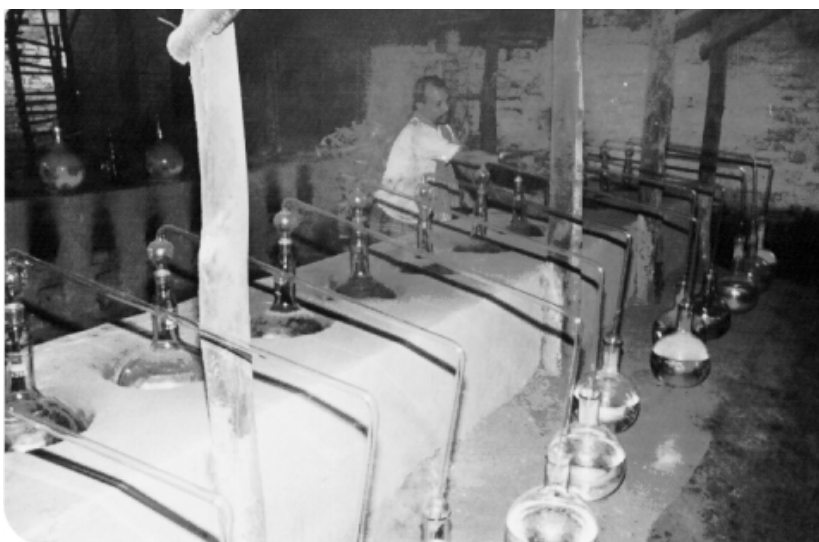


Figure 7: Worker working in one of 250 acid factors - thousands live alongside.

Table 12: Car registrations

Name of the cities	Number of Vehicles
Delhi	1 598 000
Bombay	576 400
Calcutta (August, 1993)	525 482
Madras	415 100
Bangalore	391 500

The total number of vehicles registered in Calcutta municipal city during 1992 is about 0.5 million. The growth of the number of registered vehicles has been approximately 2 times the increase in total registered vehicular population during 1983-1993. The growth of vehicles in Calcutta during the aforesaid period has been:

- two wheelers 300%
- four wheelers 25%
- taxis 200%
- & goods carriages 300%

It is evident that the number of registered two wheelers constitute approximately 40% of total registered vehicles in Calcutta and more than 80% of the cars in West Bengal are plying in Calcutta alone. Although the number of cars in Calcutta is much less compared to any western city, the car density, (849 vehicles per kilometre of road length in 1989) is much higher than in Delhi and Bombay.

In a modern city the expected emission of air pollutants per million of inhabitants may be around 850 tonnes per day. In Calcutta this value is around 1100 tons for 3.3 million of people (night time population), of which the auto exhaust contribution was about 400 tonnes per day (1991). Thus, compared to most cities of the world Calcutta's emission load is much lower (for example, in New York city the total emission was around 16,000 tons per day during 1970 with a population of 7.5 millions and area of 512 km²).

From an environment perspective Calcutta is unique in all spheres and transport is not an exception. Problems are very much localised in the inner city. Only a few kilometres away from the downtown the surrounding area would definitely appear as a big village. This difference between Calcutta city and its suburbs is in all aspects of life and the main reason is that people want to stay as close as possible to the city because of the concentration of facilities there. Thus Calcutta city has become a human ocean. The pressure on Calcutta city will not subside until its hinterlands are developed with good metal roads and fast transport communications.

In Calcutta the transportation infrastructure is old, worn and has outlived its life. The tramway tracks and rolling stock are more than a century old. The complete infrastructure of public transport is in a poor state of health. The new venture 'Metro' is running at a loss and suffers from many problems.

During last 10 years two new transportation corridors were included in Calcutta - the E.M. Bypass and the Second Hooghly Bridge. Apart from them a number of road widening programmes and flyovers have been completed.

Nevertheless, the general feeling of every Calcuttan is disgust. The reasons are many and include:

- knowing that roads in Calcutta account for less than 6% of the city area,
- hawkers occupy the footpaths with and without permission,
- increasingly callous traffic management,
- lack of parking facilities,
- new bus and minibus routes are introduced without proper termini (private bus stops are anywhere on the road sides),
- hardly any traffic lights,
- traffic rules are there but most of the drivers do not obey them,
- road conditions are miserable,
- most vehicles plying on the streets are in various states of disrepair (80% would fail a basic vehicle safety test),
- traffic jams are a common phenomenon and thousands of cars remain gridlocked for hours,
- overloaded goods vehicles run everywhere within the city and cause significant traffic problems beyond the core, and
- almost 90% of the motor cars emit black smoke.

Water Quality of Calcutta City

The problem of water pollution in Calcutta can be analysed from two viewpoints. The first is the problem related to water supply and the other is related to sanitation. In Calcutta, different diseases related to pollution of water are very common among the city dwellers, during summer and monsoon enteric diseases create panic throughout the populace. The following table shows the percentage of people getting drinking water and approximate percentage of people under proper sanitation in four major cities of India.

Table 13: Provision of water & sanitation

	<i>Population in million</i>	<i>% of Population getting drinking water</i>	<i>% of People under proper sanitation system</i>
Bombay	9.9	95	95
Calcutta	10.1	88	50
Delhi	7.9	98	90
Madras	4.1	95	84

The actual problem of polluted drinking water in Calcutta is different. The main cause of this is not the source but the distribution system. This is the most critical problem in Calcutta's community water supply system. Calcutta has thousands of kilometres of pipeline in the drinking water distribution system. But the portion of newly laid or renovated pipeline in this system is little and the major network has long outlived its natural life and is in a bad state of repair. Moreover, the water system suffers when the public utility services (such as telephone, electricity supply, Metro Railway, etc.) repair their operations. Bursting of pipelines along with major and minor leakage are common features in Calcutta's system and there lies the main problem of drinking water contamination. Contamination of the drinking water occurs when the water supply is stopped at source, leading to a drop in pressure and leaching of contaminated water into the pipeline from outside. The risk of pollution peaks during monsoon flooding when there is greater likelihood of contaminated water entering the system through standposts and other entry points. Every year during monsoon the city is flooded 15 to 20 times. The All India Institute of Hygiene and Public Health carried out a bacterial experiment on samples collected from all over the city and has reported that almost 35% of the samples were contaminated with faecal Coliform bacteria.

The School of Environmental Studies carried out a study of tap water quality in 100 wards over 12 months. Twenty percent of this water was unsuitable for drinking purpose from a bacteriological point of view and 25% of the samples contained high amounts of Chlorine and even in some water samples the free Chlorine was up to 2.0 ppm, when the maximum permissible limit is 0.2 ppm. The School of Environmental Studies has also found the Arsenic concentration in water from some shallow tube wells in places like Jadavpur, Bansdrani to be above the maximum permissible limit of 0.05 mg per litre.

Some of the factories within Calcutta are

also contaminating the drinking water through untreated effluent discharge, as Arsenic in tube well water in P.N. Mitra Lane and Chromium in Tuljala area testify.

Conclusion

Calcutta city in pollution perspective is different from most other cities around the world. Methods adopted by other countries to reduce their urban pollution may not work in our system. Our major pollution problem is not the pollutant pollution but it is socioeconomic pollution. Furthermore, India's huge population (heading towards one billion) is the pivot of all our major problems. A simple example will probably make it clear. In one of our studies on Benz(a)pyrene (a suspected carcinogen) in Calcutta air and its effect on health, we estimated that people selling goods sitting on footpath for 8 hours a day and inhaling the Benz(a)pyrene (30-120 $\mu\text{g}/\text{m}^3$) may be affected by cancer after about 15 years. If we

inform the hawkers, will they stop selling their goods? It is their livelihood. I think hunger here is more important than cancer. The World Bank believes that "India is among the poorest of poor nations in Asia". Most of our population live in poverty and suffer grossly from inadequate access to resources, such as health services, education, infrastructure, land and credit. Malnutrition is another big problem. At present in India, 63% of the children below six years of age are malnourished and enjoy the dubious distinction of being second only to Bangladesh in terms of number. Thus, our environment is one of the greatest development challenges in the world today. The reason is not the complexity of the environmental issue but the complex linkages between growth, population, poverty and environment. For environmental development in India, we need grassroots development. The chance of a cancer patient being cured by applying superficial ointment is bleak.

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Transport predicament in Calcutta

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Keywords

Congestion, Land use, Pollution, Travel Demand

Abstract

Urban transport in Calcutta is in crisis. Because of uncontrolled land use development, associated transport activity and an unrelenting increase in private motor vehicles, there is severe congestion and deteriorating public transport. In addition, air and noise pollution are insufferable.

Introduction

Calcutta, a primate city of India and the first capital of British India, crossed three hundred years some six years back counting its age from August 24, 1690, the date of arrival of Job Charnock at Sutanati. Vicissitude of the city's life today attracts world attention as one of the most crisis stricken metropolises arousing a genuine concern about its survival in those who really care for the city. The most spectacular manifestation of the crisis could be found in the urban predicaments and particularly in those which are associated with urban transport. Road congestion and pollution both from the common source of transport have assumed alarming proportions flouting all remedial measures to date.

Maybe the root cause of the crisis was never identified or, even if it was, adequate care was not taken. This paper attempts to pinpoint the basic cause of congestion on the roads by highlighting the population density of Calcutta Metro Region which intensifies in the Metro Core, the built up area, and reaches its peak in the Central Business District (CBD), and suggests some immediate and long term measures. The paper also suggests some measures to be adopted to combat air and noise pollution.

Travel Demand

Urban transport being the problem area, naturally the discussion may begin with the difficulties associated with demand for and

supply of commuter services in the city at present and in future. To provide for commuter services what is primarily needed is the estimate of future travel demand. Projecting travel demand in a metropolitan area is indeed a challenging task to the planners. The main difficulty lies in the absence of a universally applicable model and the wide range of accurate cross-section and time series data which are not available, particularly in developing countries. Calcutta is no exception to that. Notwithstanding these limitations I make use of the projected travel demand for Calcutta city available from official sources in order to highlight the seriousness of the problem facing the city. In Table 1 projected travel demand of Calcutta along with four other metropolitan cities in India are presented.

The figures in Table 1 are in terms of passenger kilometres (km). Another official source (*A Perspective Plan for Calcutta to 2011*) offers that "about 11.23 million passenger trips had been performed on an average weekday in 1988-89 via buses, trams minibuses, suburban railways, taxis and auto-rickshaws within Calcutta. By 2011 the number of passenger trips would be at least double reaching almost to 23 or 24 millions."

We can roughly say on the basis of the first official estimate that over 20 years (ranging from 1981 to 2001) the percentage increase of the projected travel demand is less than double by 33% and according to the other estimate in terms of number of trips it is more than double in about 22 years (ranging from 1988-89 to 2011) which again is at a later period of time and over a longer run. Adjusting these two figures it may be predicted that by 2011 travel demand in Calcutta will be doubled. The latter estimate further states that a trip-length of about 10 km per commuter will be maintained on an average. This is more or less consistent with the global trend as it has been claimed that the world motor vehicle population will double between 1990 and 2020 (Faiz *et al.*, 1993).

Congestion

Naturally the pressure on the available transport facilities will increase further if they are not doubled in the meantime. As of today the scope for increasing facilities on the existing space is limited. The road network in the city is 6% of the built-up area, comparing quite unfavourably with two other metropolitan areas in India - Bombay and Delhi - who maintain 16% and 23% respectively. These percentages are also far below the desired percentage, which is said to be about 25% of the built-up area. With this handicap of space the possibility of increasing the number of registered vehicles to cope with the increased demand has been reduced. It has reflected itself in the decline of the rate of growth of registered vehicles per 1,000 persons in recent years.

It may be seen in Table 2 that the number of registered vehicles per 1,000 people has dropped from 132.60 in 1988-89 to 117.19 in

1995-96. Indirectly, this indicates overcrowding in the vehicles and frustration among intending commuters. Side by side with overcrowding the indirect indication of congestion on roads is also evident from the drop in speed of motorised vehicles. During peak hours speed regularly drops to 5 kph (kilometres per hour). In a paper recently presented by Calcutta's Deputy Commissioner of Police (Traffic), the total number of reported road accidents in 1992 numbered 472 while speed was recorded at 6 kph. It went up to 494 in 1993 when speed was 7 kph, and it went up to 507 when speed rose to 11 kph. If it is true, even partially, it is a good enough proof that the existing road network cannot bear any more load, and if it has to, it would result in a very high social cost.

Population density

This load will continue to increase if the population density in the Central Business District is intensified as a result of the inflow of people into the city from the hinterland. This is what is happening in Calcutta and many other metropolitan cities in India. This phenomenon has been neatly captured in an empirical exercise (Chakraborti, 1990) by making use of the census data.

Two interesting indices were calculated by making use of the population statistics of the last two decades (i.e. 1971-81). They are the Index of Crowding and the Index of Spread Effect. Those indices were calculated for six metropolitan cities in India namely, Calcutta, Bombay, Delhi, Madras, Bangalore and Hyderabad.

In order to appreciate the implications of these two indices - Crowding and Spread Effect - they should be read together. It may be noted that in Calcutta and Bombay crowding indices (calculated as a ratio of the population of metro city and population of hinterland towns) are much higher than those of Delhi, Bangalore, Hyderabad and Madras. But correspondingly, the indices of spread effect calculated as a ratio of the annual rate of population growth of hinterland towns and the annual rate of growth of metro city run proportionately in reverse order. In other words, if the ratios of the indices of spread effect are divided by the corresponding indices of crowding, the quotient corresponding to the highest crowding will score the lowest value and that

Table 1: The projected travel demand in five metropolitan cities

City	Passenger PTPD (in millions of km.)		Percent Increase
	1981	2001	
Calcutta	111.8	182.0	63
Bombay	112.2	204.1	82
Delhi	95.9	225.1	135
Madras	47.2	82.2	74
Bangalore	18.4	54.8	198

(PTPD = Projected Travel Per Day). Source: Report of the National Commission on Urbanisation August 1988.

Table 2: Registered Vehicles in Calcutta

Year	Total Number	Per 1000 Persons
1950-51	49,693	18.40
1960-61	74,337	25.37
1970-71	92,043	29.31
1980-81	172,323	59.96
1988-89	424,372	132.60
1995-96	560,000 (approx)	117.19

Source: A Perspective Plan, 1990

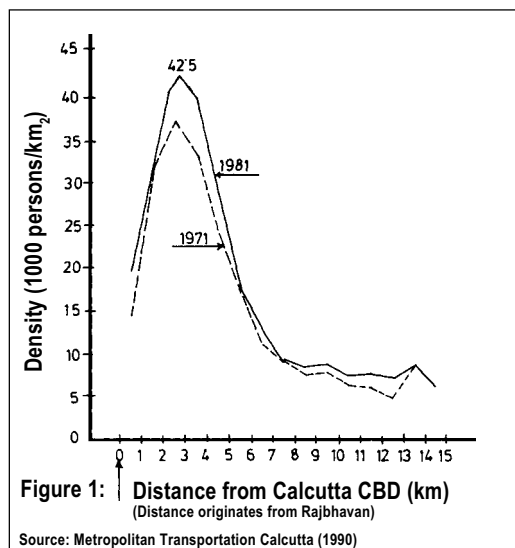
Table 3: Index of Crowding and Index of Spread Effect

City	City population 1981 (M)		City population growth (%)		Hinterland population growth (%)	
	Order of crowding	Order of spread effect	Order of crowding	Order of spread effect	Order of crowding	Order of spread effect
Calcutta	9.19	1.38	6.66	2.69	3.04	1.13
Bombay	8.23	1.27	6.52	3.26	5.09	1.56
Delhi	5.71	2.07	2.76	4.59	5.83	1.27
Madras	4.28	0.97	4.41	3.04	2.93	0.96
Bangalore	2.91	1.13	2.58	5.82	3.40	0.58
Hyderabad	2.53	0.64	3.95	3.42	5.08	1.49

Notes : Index of Crowding = city population / hinterland population
Index of Spread Effect = annual rate of population growth of hinterland / annual rate of population growth of city

of the lowest will score the highest value. It implies that the spatial distribution of population is skewed in favour of metropolitan cities and the degree of skewness corresponds to the population density. This phenomenon is due largely to land use pattern and spatial distribution of facilities, particularly transport facilities. The metropolitan cities being the main activity centres, all facilities are concentrated there. People living in the hinterland without having adequate employment opportunities and linkage facilities with the cities throng on the city surface and add to the existing crowding. Calcutta with the highest crowding index records and the lowest demographic rate of growth bears testimony to that.

The skewness discernible between the metropolitan cities and their hinterlands is also present within the metropolitan areas for the same imbalance in the spatial distribution of activities and facilities. The skewness in Calcutta City has been borne out graphically by the Transport Planning and Traffic Engineering Directorate of the Government of West Bengal making use of the population census data of 1971 and 1981 on inner metropolitan regions (Figure 1).



There was already a heavy concentration of people in the central area of Calcutta. It further increased during 1971-81 and onwards. Within the metro core the average population density which was 12,350 persons per square kilometre in 1971 increased to 15,320 persons per square kilometre by 1981. The area encircled by a radius of about seven kilometres from Raj

Bhavan (located in the CBD) is the most densely populated area and the peak density zone which extended geographically by one kilometre is about 177% above the average metro core density. The density of this peak increased by about 14% between 1971 and 1981. It may be noted that the size of the population in Calcutta Metropolitan District (CMD) will be around 17 million in 2011. If this prediction proves correct, *ceteris paribus*, then everything will come to a standstill.

Pollution: Air

Before turning to other things, which should not remain the same if the imminent crisis is to be averted, let us take up the other urban predicament which has also assumed alarming proportions in Calcutta. That is pollution. Calcutta has been bracketed with the most polluted cities in the world (Whitelegg, 1996) and transport is the main culprit in this regard. In both air and noise pollution Calcutta has crossed the permissible limit. It is, however, true that the transport sector alone consumes 25% of the world's primary energy resource and emits 22% of Carbon Dioxide (CO₂). Both are on an upward trend in almost all the countries in the world - developed and developing - resulting in a 50% increase in the use of energy between 1973 and 1990 (OECD, 1991). In a recent estimate (Grubler, 1993) it has been worked out that if the present GDP growth trends continue then by 2020 developing countries will own one third of the world's car fleet which at present is 14% of the world's car fleet strength. In developing countries, approximately 50% of cars are concentrated in the capital cities and in most of these cities oil consumption has risen by 50% since 1980 as against 10% in developed countries (World Bank 1992). It can therefore be easily inferred that air pollution in the urban areas of these countries has already reached alarming levels. To assess the emissions by vehicular traffic in Calcutta a survey was conducted (Public Health, Calcutta 1993) on eight important road-crossings. The levels of Carbon Monoxide (CO) at those crossings have been presented in Table 4.

Looking at the table the common reaction will be that the air quality of Calcutta has deteriorated to such a level that it would soon cross the permissible limit, if it has not yet crossed it. This will be due mainly to

Table 4: Levels of Carbon Monoxide at important Road Crossings in Calcutta

Location	Average CO	Maximum CO
Gariahat	8.92	18.0
Bank of India (Bipin Behari Ganguli St.)	6.80	17.0
Howrah Bridge	7.00	16.0
Khidderpore	7.63	12.0
Mouali	7.73	26.0
College Street	6.92	17.0
Syambazar	7.23	18.0
Jadavpur	9.07	16.0

vehicular emissions whose decadal growth rate has worked out to be 297% between 1980 and 1990 (Halder, 1995).

Pollution: Noise

Noise pollution also is very severe in Calcutta. *“The worst contributor to this noise problem is the traffic. We now live in an atmosphere of noise generated by blasting horns, rumbling tyres and screeching brakes. The noise coming from the vehicle is the cumulative effect of noises from a variety of sources.”* (Mitra et al., 1992).

Traffic volume (which has doubled between 1985 and 1994), poor road condition, overaged vehicles and universal use of horns contribute to above 90 dB (A) on average during day time. The maximum permissible limits of the sound level (Table 5) are never administered. These limits are supposed to be lowered by 3 dB (A) every five years up to 2005.

Not only sound limits of automotive vehicles were ignored by the operators, the sound limits specified for the four zonal divisions of the city also could not be administered. The Central Pollution Control Board (CPCB) divided the city into four zones - industrial, commercial, residential and silence - and recommended permissible sound levels during day and night (Table 6).

The results of study on traffic noise level based on a twenty-four hour survey conducted at twenty-four selected road transections of Calcutta by West Bengal

Pollution Control Board revealed that, among the various noise sources, vehicular noise was the major noise generating source in residential, commercial and silence zones and no significant improvement in terms of lowering the ambient noise level could be achieved (Table 7) though quite a good number of measures were suggested earlier.

This validates some of the earlier apprehensions about the effectiveness of the measures adopted. One such apprehension was that in *“Calcutta has many unplanned commercial and residential zones. The permissible levels fixed by the CPCB on the basis of international regulations cannot be applied in this unruly metropolis where the ground floor of a residential building is rented out for commercial purposes.”* (Majumder, 1992).

Summing Up

The two dreadful urban predicaments - congestion and pollution - are in sum due to excess travel demand and predominance of oil driven vehicles in the modal mix of the city transport system. The phrase excess demand has been used here in a spatial or geographical sense and not in an economic sense, because the existence of travel demand may be quite consistent with the level of economic activity of the city as it is directly proportional to that. But it may be too high for the surface modes to satisfy this demand as their supply is limited by the road or line capacity. Clearly the aggregate travel demand generated mainly by economic compulsions of commuters far exceed the supply provision which is feasible on the city space, particularly during peak hours. Only the grade separated rapid transit systems, overhead or underground, though not foolproof, may give some relief to the captive commuters. But the high capital requirement and displacement costs act as the main deterrents to their construction in a heavily built-up and densely populated city like Calcutta. Even then the city has gone for a 16.45 km underground metro system (Fig. 5), located at the middle of the city stretching in a north-south direction. Introduction of this system endows the modal mix of the city with the latest urban travel technology side by side with a primitive mode - handpulled rickshaws.

Table 5: Maximum Limits of Sound Level for Automotive Vehicles

Type of Vehicle	Sound Level dB (A) in 1990
1. Motor Vehicles, Scooters, Three Wheelers	80
2. Passenger Cars	82
3. Commercial Passenger Vehicles up to 4 tons	85
4. Commercial Passenger Vehicles up to 12 tons	89
5. Commercial Passenger Vehicles exceeding 12 tons	91

Table 6: Recommended Sound Levels (dB (A))

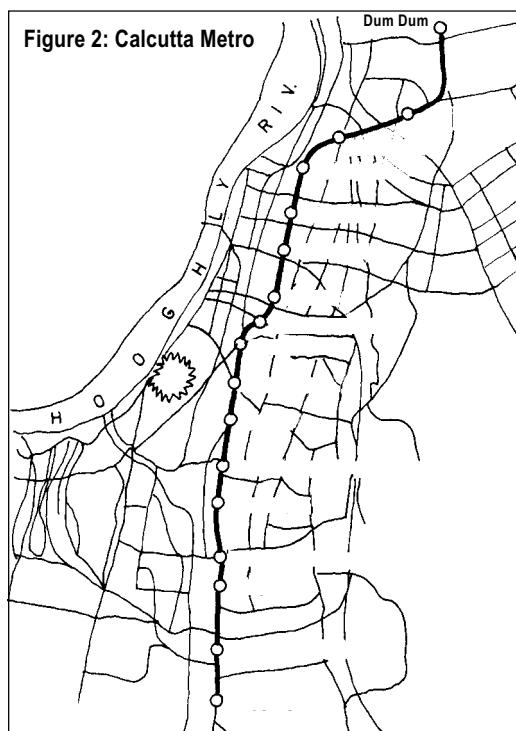
Zones	Day	Night
Industrial (I)	75	65
Commercial (C)	65	55
Residential (R)	55	45
Silence* (S)	50	40

*Silence zones are areas up to 100 metres around Hospitals, Educational Institutions, courts etc.

Things to be changed

In the list of other things which should not remain the same to solve the present crisis and to forestall further deterioration the

programme of physical changes within the CMD, such as widening the roads, constructing eight or ten flyovers at major road junctions, and extending metros to other parts of the city, etc., will only marginally improve the situation, if at all. These changes will not only be too costly but may prove to be socially undesirable if comprehensive social cost benefit analysis is done. Two recently completed projects - one, Suburban Dispersal Line (SDL), popularly known as circular rail and the other, the third bridge across the river



Hooghly stand testimony to this doubt. The former is literally inoperative and the latter has failed to perform up to the expectation. The other systems namely, the metro (Figure 2) and suburban rail, are overworked though not financially viable. Lack of coordination in planning, operation and management also go a long way in explaining the malady. The basic drawback remains in the misplaced emphasis on the effect rather than the cause of congestion.

Land use

The land use pattern of the city, determined historically, has been intensified, as has been stated earlier, by the inflow of people from neighbouring towns and states mainly for economic and political reasons. Check should have been put on them much earlier in a systematic way. On the contrary free entry and right of residence on the metro core encouraged vertical expansion of the city making it a paradise for real estate promoters. As a result site rental increased by leaps and bounds, along with pressure on the existing civic amenities and other facilities, including transport. Calcutta Municipal Corporation (CMC) failed to exert effective control on this expansion. The old dilapidated structures were demolished and plans for the construction of new multistoried residential buildings sanctioned, housing several times more people than they initially accommodated. This is one of the main causes of congestion. As an immediate step to stop further intensification of land use what should be done is:

- no plan for construction of more than three storied buildings should be sanctioned in the CMD, and;
- immigration should be made less attractive by increasing employment opportunities and extending essential facilities in the peripheral areas of the CMD and beyond.

Calcutta being basically an unplanned city, its peculiar land use has gone a long way in determining the choice of mode the commuter uses. For instance in the old parts of the city, in northern and central Calcutta, neighbourhoods are connected by narrow lanes and by-lanes, most of which are blind. As such, they cannot provide access to any vehicle other than hand-pulled rickshaws. During heavy rain when all mechanised vehicles become inoperative on inundated

Table 7: Recorded Noise Level (L_{eq} in dB (A)) at Selected Sites in Specified Zones During Winter 1990 and Winter 1995.

Serial No & Survey Site		Noise level (L_{eq} in dB (A))					
		1990			1995		
		morning	afternoon	night	morning	afternoon	night
1. New Alipore (P block)	(R)	79	76	65	70	64	64
2. Jadavpur (8B stand)	(C)	-	78	67	78	78	69
3. Jodhpur Park	(R)	-	80	58	69	63	66
4. Ballygunge (Ekdalia Park)	(R)	86	82	59	71	67	66
5. Gariahat (Market Area)	(C)	83	87	60	77	81	75
6. Rashbehari (Shopping Area)	(C)	88	86	-	76	78	81
7. Bhawanipore (Post Office)	(R)	76	78	59	70	67	69
8. Victoria Memorial (Tomb)	(RC)	78	78	57	68	66	69
9. Park Street (Shopping Area)	(C)	80	81	70	79	81	77
10. Park Circus Maidan	(C)	86	81	62	81	76	76
11. N.R.S.Hospital (Sealdah)	(S)	82	83	70	64	68	66
12. Sealdah Station (outside)	(C)	70	70	64	69	76	71
13. S.N. Banerjee Road (Taltola)	(C)	-	-	-	77	77	71
14. Esplanade (Bus terminus)	(C)	79	84	74	78	77	74
15. High Court Gate	(S)	72	69	-	66	70	64
16. B.B.D. Bag (Shopping Area)	(C)	80	81	-	85	73	74
17. Barabazar (Shopping Area)	(C)	80	82	-	75	76	76
18. Calcutt University (College Street)	(S)	89	76	-	64	65	52
19. Girsih Park (Shopping Area)	(C)	78	81	-	78	76	78
20. Shyambazar (Shopping Area)	(C)	82	79	75	80	78	76
21. Dunlop (Shopping Area)	(I)	84	90	78	82	81	73
22. Ultadanga (Shopping Area)	(I)	-	-	76	84	72	76
23. Salt Lake (A Block)	(R)	-	76	67	72	70	60
24. Rajabazar	(R)	-	-	-	71	77	62

roads, hand-pulled rickshaws come as the last resort to helpless commuters. If you want to move a serious patient to hospital or an expectant mother to a nursing home late in the night, it is the rickshaws which alone can be persuaded to oblige more easily than any other transport. Not only passengers, but quite a substantial proportion of freight in the city is carried by hand-pulled rickshaws.

Besides land use, various other factors which normally influence the choice of mode and modal split also played their role in giving wide diversity in the modal split of the multi-modal transportation system in the city. Urban travel demand is diverse in nature and to cater to this diversity a mix of various modes is necessary. A person needs different modes of transport for different journey purposes at different hours of a day and for the same journey different people need different modes in the same hour of the day.

The heterogeneity in the composition of commuters in terms of age, sex, income and journey make all these differences. A multi modal transportation system is, therefore, indispensable in urban or metropolitan areas.

Modal split

The analysis of modal split (Table 8) of the dominant travel modes on the main transit corridors of the city, leaving out the hand-pulled and cycle rickshaws and the private cars, it may be noticed that about 3.80 million passengers out of 11.23 million were carried on an average weekday in 1991 by electrified suburban railways, metro rail and trams. These modes do not pollute locally and hence are relatively eco-friendly. The

rest (about 7.43 million) were carried by other modes who use fossil fuel and are mainly responsible for air pollution. The hand-pulled and the cycle rickshaws were left out from the modal split for the obvious reason that they neither ply on the main transit corridors nor do they use fossil fuel. The private cars have been left out because their share in total number of trips performed in the city is not substantial nor could their contribution be considered cognisable.

Already adverse modal split, from the standpoint of air pollution, has gone from bad to worse because of the natural urge to speed. Greater damage will be done if, as is feared, trams are withdrawn. It is believed that the Government of West Bengal will close down Calcutta Tramways Corporation (CTC) because of its financial crisis and road occupancy. By all indications this apprehension is correct because CTC being a tram operator runs buses to make up the loss while Calcutta State Transport Corporation (CSTC) puerilely runs buses at a huge loss. It will be a degenerative step if the State Government winds up CTC which run the biggest eco-friendly urban transport mode. What the Government should have done is:

- gradually upgrade trams to the contemporary standard;
- extend tram services to areas like Salt Lake City and to areas which are less congested and are not yet covered by the tram system, and;
- include the expansion scheme of the tram system in projects like Calcutta megacity programme.

It may be noted that the railway project which was identified by Calcutta Metropolitan Development Authority as essential in its report on "Development need" has not been included in the Calcutta megacity programme 1994.

Observations

What emerges out of this discussion is that road congestion is the result of population density and concentration of activity on a limited space due to unplanned growth of the city. The remedy lies in taking immediate steps to stop further intensification of land use by devising suitable legislative, administrative and fiscal measures.

Table 8: Modal Split of Passenger Trip on an Average Day in CMD (1991)

SL No. & Modes of Travel	Trips in Million
1. Suburban Rail (including circular railway)	2.15
2. Metro Rail	0.10
3. Private Bus	4.87
4. Calcutta State Transport Corporation Buses	0.78
5. Tramways	0.55
6. Mini Bus	0.90
7. Chartered Bus	0.24
8. Taxi	0.69
9. Auto Rickshaw (within the city)	0.40
10. Auto Rickshaw (in and out of city)	0.04
11. Ferries	0.18
12. Suburban Buses	0.33
TOTAL	11.23

Source: Rail India Technical & Economic Services (RITES)

Given that transport demand is derived from the level of activities in a society, if further increases in the level of activity in the metro core is effectively discouraged by well orchestrated action involving all the relevant public institutions like CMC, Improvement Trust and Departments such as Transport and Urban Development, etc., significant improvement may be expected. In a sense the solution to the problem of the urban transport sector should be sought in other sectors of the urban economy.

On the other hand to reduce the pressure on the CMD, areas outside the CMD should be adequately developed so as to reduce their dependence on the CMD substantially.

Without doing that, short-term patchwork solutions which make expensive physical changes that the country's economy cannot afford will make the CMD more attractive and create an unhealthy spatial imbalance in the metropolitan region.

Turning to pollution, transport being the main source, modal choice should be turned in favour of fuel efficient and environmentally friendly modes like trams, bicycles, improved versions of the manually operated rickshaws, etc. A skilful combination of carrot and stick should be evolved to popularise pollution-free modes to serve the common interest.

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The Left Alliance and the Unintended City: Is a civilised transition possible?

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Keywords

**Poverty, Rickshaws,
Government, Society.**

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Jai Sen: The Left Alliance and the Unintended City: Is a civilised transition possible?

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Abstract

Attempts have been made to ban hand-pulled rickshaws in Calcutta in the past. Hand-pulled rickshaws are one of the last vestiges of feudalism and imperialism. The lives and livelihoods of those who pull the rickshaws are not normally considered because some politicians believe that "the poor must suffer a little for the good of the larger community".

Introduction

The recent debate in Calcutta - within the state government, the ruling Left Alliance, and the media - about the future of hand-pulled rickshaws and cycle rickshaws has been instructive and welcome. This is not a new debate but it is good to see that this time there are some prominent people (such as Buddhadeb Bhattacharya, Home Minister) who, briefly, appeared unwilling to take a simple-minded approach to traffic planning and city "modernisation". They have confronted some of the awkward realities that are contained in our social existence, of which rickshaws and rickshaw-pulling are examples. It is good to see Ministers talking quite openly about such issues; and it illustrates a new openness within the Left, where it was most unusual to discuss such issues in public.

Given that we like to believe that we are living in and building a democratic society, then this is a very important public debate - one which is of far greater significance than might appear to be the case at first sight. In collective terms, the debate implicitly involves the lives, livelihoods, and futures of a huge population, straddling urban and rural areas in Bengal, Bihar, Orissa, Uttar Pradesh, and Bangladesh who are among the poorest and most exploited sections of society. It is crucial also to recognise that the apparent standoff between Buddhadeb Bhattacharya and Subhas Chakraborty is, fundamentally, between more civilised and democratic planning and a more authoritarian ("I will clear them from the streets") approach. The agenda at hand is thus much more than just "rickshaws or no

rickshaws". Indeed, precisely because rickshaws and their pullers are a potent symbol and reminder of a feudal past (and of a continuing and prevailing present), it is vital that the issue is understood not just by itself but as a part of the wider and continuing struggle to fight feudalism. Furthermore, it is important that the debate is sustained and disseminated widely, and that a socially just and forward-looking resolution is found, and that apparently "modern" but equally authoritarian, neo-feudal, "planning" is not permitted.

At the time of writing, one of the more recent developments in a fast-developing situation, is that the two Ministers in question have buried the hatchet, and that Mr. Bhattacharya has apparently come round to agree with Mr. Chakraborty that "*rickshaws must be quickly cleared from the city, for the good of the city*"; and, it has been reported, that he apparently agrees that "*the poor must suffer a little for the good of the larger community*". There may be more between the lines than was reported, but nevertheless it has to be said: how familiar and how sad it is to read this - quite aside from how patently anti-Marxist this refrain is. This position is grotesque, especially coming as it does from a government of parties who claim to be of the Left.

Though the debate largely focussed on the future of hand-pulled rickshaws in Calcutta (and only to an extent, on the future of the rickshaw pullers; there is a vital difference), we must also remind ourselves that the West Bengal State Government's proposals may be much wider. In what was perhaps the opening salvo, R. K. Prasanna, Transport Secretary, announced that the government had decided that "*the city will no longer have hand-pulled and cycle rickshaws, pull carts, school vans and other cycle-vans by the end of this year ... The decision to remove all manual modes of transport has been finalised*" (*The Telegraph*, August 8, 1996). The number of people who stand to lose their livelihoods, and importantly also the range of services lost to the rest of Calcutta, is in fact far larger than simply those involved in the

rickshaw trade alone. The hand-pulled rickshaw and the rickshaw-puller have come to symbolise this larger question - the future of what I call "the unintended city", the city of the poor. The question before us is: is a civilised and democratic transition possible; and is the Left Alliance, whose constituents have historically associated themselves with the poor, and with the struggle for democracy, willing to address this question?

A drive for the removal of hawkers was announced simultaneously - or more accurately, what Mr. Chakraborty has described as "encroachers" ("hawkers" being those who move around hawking their wares, while those commonly called "hawkers" are usually encroachers on public land such as footpaths (*Statesman*, August 18, 1996)). After much deliberation CITU came out in defence of the rights of "poor hawkers" to hawk, but not what it calls "businessmen" (*The Telegraph*, October 2, 1996). It is important to recognise this distinction, and that established hawkers (though part of the "informal sector") constitute a very different class and section from rickshaw pullers. Although in simple physical planning terms, their occupation of public space may seem to be related to road and traffic congestion, in economic and political terms this is very different. It is no accident that elaborate plans such as the commercial development of Vivekananda Park in south Calcutta (*The Telegraph*, September 27 and 28, 1996) to "rehabilitate hawkers who will be removed" materialised within a month, while plans for the rehabilitation of rickshaw-pullers remained at the level of conjecture and "meetings". It is typical of officialdom to group the two questions together - under the bureaucratic rubric of "law and order", "traffic congestion", etc. In addition, despite his otherwise useful distinction in relation to hawking, Mr. Chakraborty himself seems quite happy to lump encroachers and rickshaw pullers together. It is disappointing that no opinion on the Left in West Bengal, other than Buddhadeb Bhattacharya, has been voiced to make distinctions and to move towards clearer and more strategic thinking, planning, and action - something that has often been the hallmark of the Left.

The unintended city

Rickshaws, and rickshaw pullers, are just one fragment of what planners, social scientists, and international bureaucracy tend to call "the informal sector", but which I prefer to term "**the unintended city**: a society that has

grown within and beside the intended city and society (Sen, 1975).

The existence of this "city" is neither planned nor intended, either by ruling sections and their planners or, in any collective or deliberate sense, by its own members; nor is it intended by the richer sections that it should disappear - for it is in their interests that "*the poor should always be with us*" to provide cheap labour. Though the debate in question has taken place in and about Calcutta, this larger reality is equally true of all cities and towns everywhere; and increasingly so, as the contradictions of modern and post-modern development manifest themselves. For example, the increasing number of street children in urban areas of the South, and the increasing homelessness in cities of the North, are just two manifestations.

Citizens of the unintended city are no different from the middle classes, in that most of them come from the hinterland of the city, but the twin forces of rejection and affinity - rejection in the form of discrimination, exclusion, and exploitation by the urban centre, and the affinity of strong ancestral tradition and of familiar primordial association such as language and caste - leads these citizens to live a reality that straddles what are called "urban" and "rural" areas. This has led to a continual and gradual, mostly unintended, evolution of a "new" society, different from either the conventionally or normatively "rural" or "urban", a synthesis of the ordinary things that this mass of ordinary people is doing over generations in their myriad struggles to survive and to prosper in a relentlessly hostile environment. This hybrid society has specific and inherent value especially for the poor, since it allows them to develop within their own capacities and potentialities, to meet the demands of evolving life both in the city and in their rural homes; and as a result, new, hybrid values are slowly being evolved which offer them flexibility and security, both of which are vital in an evolving situation.

So far in history, there has been little or no genuine attempt on the part of the dominant society to accept the urban poor and disadvantaged as a part of the city, here or anywhere else: to accept them as equal and integral citizens; to develop also the city according to their needs as a society different from the "dominant urban" and where their disadvantage might be reduced; and to find ways of planning and decision-making in which they can take equal part. At best, they

are tolerated, and planning is done for them, according to what the dominant centre thinks is best for them. Usually, it is quite the opposite, where “planning” means what the dominant centre thinks is best for itself, and where such people are not only exploited for their labour but their lifestyles are also frowned upon and their livelihoods declared illegal - and then even this “illegality” is then exploited. In those rare instances where things have been different and where change has taken place, it has usually come about as a result of resistance and struggle - not out of largesse.

Rickshaws and rickshaw pulling are a classic case in point. By the early 1980s, there were some 50-60,000 hand-pulled rickshaws plying in Calcutta, but the number of licenses that were issued by the Calcutta Municipal Corporation (and the ceiling on licenses, under existing law) was only 6,000. This ceiling remains the case, even today. A certain number of licenses were also issued at that time by surrounding municipalities such as Rajpur, but this still left something like 40,000 rickshaws which were in use at that time, that were “unlicensed”. Since each vehicle provided employment to an average 2.2 pullers per day, this meant that nearly a lakh (100,000) of pullers were then being forced to work “illegally”.

The research which produced these figures, done by Unnayan, a civil organisation based in Calcutta, revealed an interesting background:

- the ceiling on licenses of 6,000 had been set as far back as 1939. This figure has not been revised upwards since then, despite the tremendous growth in the city’s population and the inevitable consequent tremendous increase in demand for services, despite official reports recommending increases and despite the evident reality of a huge number of “unlicensed” vehicles - which were nearly 90 percent of the total on the streets by the early 1980s;
- this situation was far from being one of benign neglect. The standard and mandatory rule for all “unlicensed” rickshaws and their equally unlicensed pullers, was (and remains) regular bribes to both Corporation officials and the police, adding up to a dirty grey economy running into crores (tens of millions) of rupees, each year; and
- large numbers of these unlicensed vehicles were in fact owned by members of the police force. In this situation, it is only quite likely that many of these

“unlicensed” vehicles on the streets were ones that had earlier been seized by the police, on the grounds of illegality, and were then being “recycled”. So it was a neatly tied-up economy, where the pullers were exploited by both the owners of the vehicles and by the administrators of the city.

However, this is not to suggest that it is only policemen who own fleets of rickshaws. Unnayan’s research showed that the majority of rickshaws, both licensed and particularly the unlicensed, were owned in small and medium fleets (of between 2 and 20 vehicles) by individual owners, i.e. by “small owners”; and there were only a few “large owners”, having fleets of hundreds of vehicles. Unlike the cycle rickshaw trade, where this was at least partly the case, very few hand pullers owned the vehicles they pulled, let alone fleets. In short, it was a highly exploitative and feudal trade right up to the early 1980s. Dominique Lapierre portrayed part of this feudal reality in *City of Joy*.

There is little to suggest much has changed since the early 1980s - except in the important dimension of numbers, where both the number of vehicles and pullers has gone substantially down. This reduction has taken place not “by itself” but on account of a combination of factors since then. On the one hand, there has been a fairly sustained - if also sporadic - process of seizures of unlicensed vehicles by the police, and an apparently much stricter process of issuing of licenses by the Corporation, both for vehicles and pullers. On the other hand, the steep rise in the cost of living over this period that the pullers have equally faced, as well as the constantly rising level of pay-off that has had to be made to the police (because of the dropping numbers of vehicles and inflation) has meant that rickshaw fares have risen very sharply during this time - and that their usage has accordingly dropped. It is a war of attrition, with a certain inevitability about it. The government’s move suggests that it is finding the process too slow, and therefore wants to accelerate it.

The previous round: Are there any lessons?

The currently “drive for modernisation” proposal, and the debate that has taken place, is nothing new. The last time, the same Left Alliance government introduced a ban on “unlicensed” rickshaws in the city and, simultaneously, ushered in auto-rickshaws. Much publicity was given to constables being

given special rewards for seizing unlicensed rickshaws; long lines of chained vehicles started appearing in front of the city's police stations, followed by huge stockpiles of their broken carcasses in dumps in the north and south of the city. Unlike this time round, when there has been so little opposition except for a few letters in the papers (and Bihar politicians Laloo Prasad Yadav and George Fernandes speaking out in support of Bihari pullers), the 1981 drive was opposed and strongly criticised by different sections of civil society in the city, and briefly also by the Congress party. The principal critic was Unnayan, which entirely by coincidence had just completed and published its detailed study of the hand-pulled and cycle rickshaw trades in the city. Unnayan found the plan to be outrageous, violating the most fundamental of the pullers' human rights and also making no planning sense at all. On the basis of its findings, it argued that the banning of so-called "unlicensed" rickshaws in the city would on the one hand suddenly deprive the city of a range of important services (short-distance passenger travel, freight carriage in dense inner-city areas, as well as specialty services such as emergency transport for the aged and the ill especially among the majority of the city that is low-income, and safe personalised transport for school children). On the other hand, since no employment alternatives were proposed for the pullers, the drive would throw nearly a lakh of pullers out of work, as well as a significant further number who were employed in rickshaw assembly and servicing work.

On that occasion, there was no known public opposition or debate within the Left Alliance. It is in fact one of the tragedies and contradictions of the Left being in power in Bengal that the drive was, for instance, not opposed by the Calcutta Rickshaw Pullers Union, formed by the legendary unionist Mohammed Ali. This union had been built among the highly unorganised pullers during the fifties, when workers in this highly feudal trade came to be organised for the first time, and to command some respect from the bureaucracy as well as from owners of the vehicles. But in the 1980s, when Unnayan approached it for its views on the drive being undertaken, it found the union to be paralysed on the question, seemingly on account of its links with one of the ruling parties. Finding no constructive response to its arguments from within unions and from within the Left (and indeed, from one of the state's civil liberty organisations, who

decided that the matter was "a trade union matter, not a question of human rights" - a sign of those times), Unnayan took its points to the public. Through booklets, newspaper articles, and with the help of an arresting film, "Man versus Man" (made by film-maker Shashi Anand based on its study), Unnayan was able to raise a fair debate in the city - indeed to such an extent that the Chief Minister himself came out in public and said darkly that "some people are misleading the public" on the issue.

When Unnayan's campaign came to the notice of trade unionist George Fernandes, and the question was taken up by him - in part because a substantial proportion of the city's pullers are from Muzaffarpur in Bihar, which was then his constituency - that the Calcutta Rickshaw Chalak Panchayat was formed. It was only after the matter was taken by the new union to mass meetings of rickshaw pullers in Mohammed Ali Park (in central Calcutta) among other places, leading to gheraos of police stations and the Corporation's licensing office, that the 1981 drive died down.

On its part, Unnayan went further than merely opposing the drive. It proposed that while the feudal practice and trade of rickshaw pulling should certainly be done away with, mandatory policy prerequisites had to be

- the provision of alternative employment opportunities for the pullers, and
- the replacement of the most essential services that would be lost.

To achieve this most economically, Unnayan proposed the mass introduction of what it called a "city rickshaw" along with transport and traffic planning in the city that took such transport services into account.

The city rickshaw was not simply a fanciful idea. With the help of volunteer designers and engineers, Unnayan took the initiative of designing a suitable vehicle and building and testing some prototypes, including making it available to a rickshaw drivers' co-operative in Kasba for field testing, where it proved very popular. Basically a cycle rickshaw and just as easily buildable, the city rickshaw was however a radical improvement. Smaller, and with a tighter turning circle (essential for dense inner city traffic), lower (therefore far more stable), equipped with gears and drum-brakes for easier driving, and fitted with independent suspension for a far more comfortable ride for passengers, the city rickshaw could have been a very appropriate replacement for the hand-pulled rickshaw on

both the policy counts listed above. The prototypes designed and tested could also be easily converted into an effective freight-carrying vehicle, which is an equally essential characteristic of a vehicle in our context.

However, the government of West Bengal was not interested. Though many individuals within government departments expressed much interest, including in the State Planning Board and the Small Industries Department, none of the government bodies that Unnayan approached were willing to provide the small grant that it requested for the research and development work that had to be done to make the idea a reality. To the contrary, in a previously unexpected step, but one which must have been prepared, the state government suddenly announced the introduction - and licensing - of auto-rickshaws in the city, even while the hand-pulled rickshaw drive was on. Indicating that Unnayan's campaign had at least had some effect, the Chief Minister went so far as to say in public that "the public should not be worried about the loss of services caused by the banning of hand-pulled rickshaws; the government is introducing auto-rickshaws, and they will carry your kiddies to school".

The dangerous and polluted history of auto-rickshaw service in the city over the subsequent years has shown how ironic and weak that claim was, but far more significant are the facts that the Chief Minister failed completely at that time to address the question of his government throwing the poorest of toilers out of work and thereby being directly responsible for creating only more misery and more unemployment. Instead, the situation was used by the government to invite Bajaj, the manufacturers of auto-rickshaws, to move into the city and displace the small assemblers who made hand-pulled rickshaws. Just as thousands of impoverished rickshaw pullers were put out of work, the situation was used by the government as an opportunity to give heavily subsidised employment to an entirely different section: Hundreds of "educated-unemployed youth", almost certainly a convenient vote-bank, were given auto-rickshaws worth Rs 25-30,000 each in the name of bank loans that were later written off - against the cost of a hand-pulled rickshaw of Rs 1,000. It is also not possible to avoid the fact that those who were subsidised in 1982-84 were Bengali, and those who were rendered unemployed were largely non-Bengali. This communal reality was only reflected in the response of the then state

Minister of Transport, when Unnayan approached him in 1981 about the problems being created by the drive: "*But the rickshaw pullers are only Biharis! And after all, the government is only seizing rickshaws in order to protect law and order*".

The situation that exists in Calcutta today, in 1996, is not very different. There are however two important exceptions. One, is that for a brief while, someone important within the government spoke up and even spoke about the contribution of the pullers to the city. For the moment, this voice seems to have been quietened. Since there were no other changes in the situation, this has happened for reasons that are not very clear - except that the government wanted to present a unified face to the public, at any cost. What this writer has tried to show is that it is of considerable importance - for a civilised society, and for the Left - that this voice be raised once again, and that it is supported loudly and clearly by civil society and by all democratically-minded political parties. (The Congress party would in fact do well to recall that one of the first points in its 1994 Election Manifesto, was "*Replace hand-pulled rickshaws ... in the First 100 Days*" (*Pioneer*, March 27, 1994). The history of this point is not known.)

The second exception, or change since the 1980s, is that following the first skirmish and then the peace treaty, and contrary to his earlier defiant stand of "NO RICKSHAWS", Mr. Chakraborty has announced that the state government has "*begun discussions with two automobile companies, Bajaj Auto and Telco, to design and manufacture a smaller and simpler version of the auto-rickshaw, which can be handed over to the rickshaw- and handcart-pullers as an alternative mode of employment*" (*The Telegraph*, September 24, 1996). Taken at face value, this should also be accepted as an advance since the 1980s. But closer examination of what Mr. Chakraborty said reveals that the government will also be holding "*a meeting with representatives of nationalised banks and state co-operative banks ... very soon*", and that "*a formula will be chalked out to make money available (sic) to rickshaw- and handcart-pullers or any other interested unemployed person, he said*" (*The Telegraph*, September 24, 1996). Aside from several other problems with this proposal, this is the crunch line: the process of supposedly giving employment alternatives to "the poor pullers" is evidently being used once again as an entry door for "other

interested persons". History is only repeating itself.

Some conclusions

It is important to realise that the anti-rickshaw drive now being given shape, has not suddenly materialised. There are clearly people, and sections, within government who are determined to remove rickshaws, whatever it takes. Recently, *The Guardian* in Britain carried an article headlined "End of the road for rickshaws: Plans to modernise Calcutta will rob 60,000 human engines of their jobs". The article quoted Ashim Burman, Commissioner of the Calcutta Municipal Corporation (who was credited as "shaking things up since taking over last year as Calcutta's city commissioner"), as saying: "Man pulled rickshaws have to be dispensed with ... They add to congestion, and they are humiliating" (*The Guardian* October 5, 1995). The article also pointed out that "Mr Burman is part of a wider effort to reinvigorate Calcutta ... The Communist politicians who control the West Bengal state government and its capital Calcutta have begun to turn their backs on Marxist orthodoxy ... Travelling widely in an effort to attract foreign investment, they have vowed that Calcutta will one day outpace Bombay." This part of the grand plan has yet to mature.

There was no mention of alternatives for the pullers in *The Guardian* article, just as it was not there in the state government's attempt in 1982-84 to ban rickshaws. That this question is now in the open, it needs to be considered as at least some advance, as does the forthright position that Mr. Bhattacharya has taken - at one point - on the contribution that rickshaw pullers make to the city. If the criticism is that men pulling other human beings is inhuman, and that the overall objective is to humanise society, then the questions to be asked are: How can this be done? Can the humanisation of society really be done by executive fiat from above, or does it not require that the pullers themselves are a part of the process? That they must be involved, and that whatever education it requires to achieve this, must necessarily be a part of this? In formal terms, the Left has historically emphasised the necessity of the emancipation of the oppressed, and the successes of many of the campaigns and struggles it has been involved with before and after independence, has come from this strength. But where does the Left Alliance government in West Bengal stand on these questions?

Secondly, it is also very important that the public does not allow itself to be hoodwinked and that in the name of providing employment alternatives to "rickshaw pullers and to other interested sections", that what happens is that vehicles are introduced again, just as in 1983, and go to strategically-placed "other sections" who would never have stooped to do something manual like pulling a rickshaw. The state government should be asked to categorically limit benefits of this scheme only to those who were previously rickshaw- or handcart-pullers, and to no one else. If the scheme is not workable with these people, then the scheme should be closed - not simply transferred to another group of people. In addition, the government should also be asked to keep in mind that if its scheme does not work, then how will the services lost be replaced, and what other alternatives is it offering to the disemployed pullers?

Thirdly, while it is good to see that the government is this time talking of technological alternatives to the hand-pulled rickshaw, and that the cost of the alternatives is one of the considerations, there is much reason to think that an engine-driven, "cheaper auto-rickshaw" is neither feasible nor the required answer to the situation; and that some variation of the idea of a human-driven "city rickshaw" proposed by Unnayan back in 1984 still deserves serious consideration. An engine-driven vehicle, especially if made by the likes of industries such as Bajaj and Telco, is unlikely to be made available at a cost that the existing hand-pulled rickshaw pullers - and not other unemployed sections - can afford to buy and repay the loan on. On top of this, in an already dangerously polluted city such as Calcutta, it is essential to keep in mind that more engine-powered vehicles on the streets will only add heavily to both noise and air pollution. A human-driven machine can, if properly organised as a scheme, overcome most of these disadvantages. And a machine such as the one proposed by Unnayan is no less dignified than an engine-driven machine.

Fourthly, any such plan has two basic and interrelated requirements. To begin, it requires that detailed re-thinking be done in terms of traffic and transport planning of the city. This re-thinking must take into account both the kind of real transport needs that the different classes and sections of the city require, in the widely-varying localities that exist (from dense central and north Calcutta, to the more suburban areas), as well as the

amount and kinds of road-space that is available, and also the local availability of human labour power. Some amount of future planning, attempting to predict requirements and availabilities in the future is required. It needs to be recognised that there is conflict between slow and fast-moving vehicles - but equally, it needs to be recognised that the resolution to this is by no means that slow-moving vehicles should be removed. In some areas, and on some roads, it is the movement of faster-moving vehicles which should be restricted. Zone separation and route segmentation (of fast- and slow-moving vehicles) are possible, and should be tried on an experimental basis in different areas until the right balance is achieved. If it can work in other cities in the world, there is no reason why it should not work in Calcutta. It is a question only of there being available the necessary political vision and will.

In addition, there is a need to think beyond the level of planning "for" people, and to move to planning "with" people. The meetings that have been taking place with the non-governmental organisations of the intelligentsia is better than no meetings at all, but the government needs to move beyond limiting its vision to only the middle-classes and to directly involve those who are bearing the brunt of the changes it is proposing: the labouring classes & the citizens of the unintended city. Recognising this so-far unintended, unrecognised world, involving its members in the planning of their own futures and more generally the city, would constitute one of the most powerful and meaningful ways to change the present situation, and is a prerequisite for a civilised transition from where we are today. Even if the sleight of hand (that seems planned and has the outward appearance of progress and modernisation) simply to legislate out the livelihoods and existence of some people, and to legislate in favour of others can be

blocked, it is no change from a backward past.

Finally, Calcutta has a very special responsibility in this field. It is most likely the very last city in the world and hopefully in history, to have hand-pulled rickshaws. Despite the inhumanity of man pulling man, and despite the feudality of the trade, the jin rikisha ("man-pulled vehicle" in Japanese - it was arguably first introduced there about 1869) has played a memorable role in the history and culture of humankind. The struggle of rickshaw pullers, perhaps precisely because of the mesmerising reminder that it offers of the real nature of human relations in society, has figured widely in the literature of possibly all Asian cultures, certainly in all parts of India. The rickshaw, indeed, has only operated in Asia - in colonial Asia. It was introduced, it proliferated, and it operated as a reflection of a time and of societies where humans became cheaper to use as beasts of burden than animals. We are now, thankfully, moving past those times. In almost all other contexts, including within India, the rickshaw - and the rickshaw-puller - was simply driven out, crushed out of existence - which, as I argue above, is just as authoritarian as the societies from which they emerged. In this situation, Calcutta needs to do two things: one, and beyond doubt first of all, it needs to phase out its own part in this past in as meaningful and graceful fashion as possible - and equally, it needs to phase in the future in a civilised and democratic way. Two, and especially given its penchant for the unusual, Calcutta should seriously consider establishing - and taking some liberty with the original language - a "Museum of the Rikisha Jin and the Jin Rikisha", as a testament to the struggle of the rickshaw-pullers of Asia, both in the past and the future.

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Unco-ordinated public transport: Calcutta style

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Keywords

Public Transport

Abstract

Calcutta's public transport has developed in a very haphazard manner, with a mixture of public and private providers. The private operators are beyond any regulation. It is totally unco-ordinated and insufficient for the needs of the city. Levels of investment are low, the infrastructure is in poor condition and it is in urgent need of integration.

Introduction

CALCUTTA, the gateway to eastern India, is situated on the eastern side of the River Hooghly about 200 km north of the Bay of Bengal. On the opposite side of the river stands the industrial town of Howrah, often referred as the twin city. The city grew in an unplanned manner during the British period when it was the capital of India. Since the turn of the century and the laying of railway tracks on either side of the Hooghly, growth of the city concentrated in particular along the attractive river corridor. The condition of the city deteriorated due to the influx of a huge number of refugees from East Pakistan (now Bangladesh) in 1947 when India achieved political independence, and subsequent in migration. At present Calcutta is the capital of the state of West Bengal.

History reveals that leftist ideology is popular among Bengalis. Care is taken to harmonise policies with this sentiment, though often blind adherence to certain ideologies has led to the total collapse of many systems, regardless of whether it is the transport or education sector. It is important to note that Calcutta experienced terrible civil disturbances during the 1970s at the hands of ultra leftists and a kind of fear psychosis has gripped its citizens since then. Subsequently, it was thought politically that the destruction of civic facilities and civil indiscipline are protests against the establishment. Incidentally, the left has been

in power in West Bengal for the last 22 years with an absolute majority in the assembly where the opposition is virtually nonexistent. Therefore, the local cultures which prevail over traditional values are believed to be the product of an unusually stable government for an unusually long period. Calcutta is inhabited by far more poor people compared to other metropolises in India.

Public transport in the early days

Calcutta and Howrah have had electric tramways since 1902. In fact, the municipal area of Calcutta was defined as the area served by the Calcutta Tramways Company (CTC). The network was, and still is, so intricate particularly in north and central Calcutta that any place could be reached by trams coupled with 10-12 minutes walking. The two cities, including their tramways, were connected by the famous cantilever Howrah bridge which still serves as the main linkage between the two cities. Bus service of significance came into existence in 1948 when the Calcutta State Transport Corporation (CSTC) was formed primarily for creating jobs for East Bengal immigrants and that gradually replaced private buses operating in the city. After independence due to expansion of the city and stalled growth of CTC by the British owners a situation came about in 1960 where CSTC and CTC shared 60% and 40% of commuters respectively.

Calcutta is well connected by broad gauge electrical multiple unit coaches in addition to long distance trains. The two railway stations Howrah and Sealdah cater for millions of commuters who travel as much as 100 km to work each day in the city.

Present public transport system

Inefficiency and corruption in state owned organisations have compelled private bus operators, once banned from city roads, to

cater for the growing needs of commuters. This does not mean CSTC was dismantled, rather four more state transport corporations were invited to compete in city roads. They are North Bengal STC, South Bengal STC, West Bengal Surface TC and newly built, highly controversial, CTC buses. The tram service was effectively stopped when the state government planned to phase out trams and replace the service by diesel buses. The tramway fleet was reduced from 384 (1990) to 318 (1995) and procurement of 300 CTC buses was done in an unbelievably speedy manner in spite of worldwide criticism. Now, the combined strength of all the state owned transport fleets are woefully inadequate for the city's needs; an estimate puts the figure at 15% low proportion of outshedding - sometimes as low as 50%, a high rate of breakdowns, irregularity of timings, replacement of magnificent double decker buses by mini/midi buses, issue of multiple tickets per passenger etc., make it impossible to quantify the efficiency of state transport.

It is evident, therefore, that the responsibility of mass transport lies on private bus operators. They are now sufficiently strong and organised and have the ability to collapse the city by withdrawing their service if necessary. They formulate rules according to their maximum benefits and the city authority has no power to tackle the nuisance caused by their operations. The government as a model employer has failed to protect the interest of transport workers. The bus owners make profit by deceiving the passengers of their legal dues on one hand and exploiting their workers on the other; for example, a crew works 16 hours at a stretch in high summer for 15 days and then has his job terminated. These situations often tinted in political colour make the matter worse. There are other cities in India, e.g. Bombay, Hyderabad, Trivandrum, Bangalore, etc., where city transport is fully nationalised and fairly efficient.

As mentioned earlier commuter trains provide an important linkage between Calcutta with its surroundings though the trains become extremely crowded during peak hours. Train services in the Howrah division are comparatively better while the Sealdah division, which serves the eastern part of the city, is badly affected by large scale fare dodging. There is no doubt that the work efficiency of commuters is considerably reduced due to their tiresome train journeys.

Calcutta has had a plan for a circular railway for at least half a century and finally has its truncated form - a non-electrified single line with infrequent service which terminates abruptly at a nonresidential area thus preventing its proper use. However, compared to the run down conditions of the surface railways, Calcutta has its world class metro railway spanning across the city in a single corridor. It is nicely connected with Sealdah main line to the north, but commuters from south of Sealdah have no scope to use this facility. Essentially the lack of a feeder network, infrequent service and lack of combined ticketing systems have kept the metro much underutilised.

Calcutta has over 20,000 taxis, infamous for passenger refusal, charging exorbitantly at the slightest pretext, tampered meters, illegal ferrying passengers from point to point, and above all the most polluting vehicles ever seen in any city in the world. Recent additions are 10,000 auto-rickshaws whose operations are truly above and beyond all regulation. From the date of introduction they refused to use meters or carry passengers on shuttle service. It is their unions associated with different political parties who distribute quotas of different routes and set passenger fares. Though built for three people, frequently they carry as many 6 or 8 passengers within city limits. Accidents related to auto-rickshaws are common, yet people continue to use them partly due to the belief that auto-rickshaws are fast and partly due to lack of proper transport facilities. In addition, taxis and auto-rickshaws are quite expensive in Calcutta.

Recent open market policy and various incentives to automobile lobbies made it possible to sell 30,000 cars per year in Calcutta alone. Since in India old cars are seldom condemned, an extrapolated figure indicates that by 2001 Calcutta will have a private car population of 800,000 vehicles. As expected they are the major source of congestion, air and noise pollution, road accidents and various illegal activities. It appears that poorer countries of the world in general have accepted private car ownership as an index of their progress while the western world has rejected this notion following their own experience over decades.

Among the non-motorised modes of transport, the ferry services across the River Hooghly at different points, though

particularly at Howrah railway station, are very popular. Hand-drawn rickshaws are still used in Calcutta city proper. A government decision to replace them by auto-rickshaws has been resisted by the citizens. The manual rickshaws provide tremendous benefits to the city (see table 1). The logic that 'a human



Figure 1: Another example of the excellence that can be achieved by Calcutta Tramways. The area behind the car was formerly a tram shed. It was demolished to accommodate buses at Belgatchia depot. Photo: D Bhattacharyya.

acting as a beast' negates the city image does not seem to be correct because people in other professions also use such manual labour, though often out of sight. Furthermore, the poverty prevalent in the city could not be erased simply by removing the rickshaws. Pedal rickshaws are not allowed to ply in the city because of accidents arising from their close interaction with pedestrians in narrower streets.

Table 1: Advantages of Manual Rickshaws

- available around the clock
- never refuse passengers
- transport goods - safely and securely
- ideal for patients and school going children
- are pollution and crime free
- use lanes and bylanes
- avoid congestion
- avoid creating congestion
- locally made
- provide employment to poor illiterate people
- are the only mode which can operate in water logged streets of the city

Why Calcutta lacks an advanced public transport system

It is curious to note that in spite of gigantic volumes of people depending on public transport, Calcutta never had a well coordinated system. Major reasons for the deficiency are:

- By the time the need for a coordinated system was strongly felt, say for the last 25 years, the left was in power. Their strength was rural based out of commendable land reform policies and they systematically neglected urban developments;
- The managements of state owned transport operators never thought about betterment of their services because accountability of their work was never asked for. Many of them are completely unaware of what is going on in other parts of the world. Loyalty to political parties is often their way to success;
- Transport policy makers never use public transport rather private vehicles are invariably provided by their office;
- All transport operators whether private or public enjoy some kind of political patronage which protects them against many misdeeds, even criminal activities;
- Actual transport users including physically weaker passengers have no right to voice their grievances and suggestions;
- The Calcutta Traffic Police, an untrained and demoralised assortment, is totally incapable of handling any traffic offences; and
- Interchange of vehicles, one ticketing system, use of non-petroleum modes of transport etc., are unknown to the citizens.

What prevents the creation of an integrated transport body

As outlined, Calcutta's public transport is shared in small pieces by a large number of private and public operators who do not cooperate with each other. Though the state owned organisations survive largely on subsidies, the private bus operators largely depend on unethical activities. A dangerous trend visible for the past few years is where

large vehicles (e.g. double decker buses, trams, etc.) are either discontinued or the service is shrunk and they are replaced by a large number of small vehicles (e.g. auto-rickshaws, taxis, minibuses, etc.). Though it satisfies the automobile lobbies and apparently creates employment, the

which they do not want. In fact, there are as many as 15 different fare tables followed in Calcutta buses which are also different from trams, metro and commuter trains. Unless uniformity in fares is first created, proper co-ordination among them cannot be achieved.

Conclusion

A huge wastage is associated with the unplanned nature of operation of public transport in Calcutta. In many cases it is simply competition between different modes of transport (e.g. metro and buses, trams and auto-rickshaws, etc.) or bus routes, e.g. some 50 bus routes operate along Chowringhee corridor where everybody is losing money. This is happening at a time when Calcutta has approximately one third of the public vehicles it requires. There is no restriction on the entry of buses to the city centre where metro and trams have good access. There is no unit ticketing or transfer system in Calcutta which compels people to travel by a single journey by paying once. This causes overcrowding on some routes while buses and trams which could be used by breaking journeys remain empty. These are not at all difficult to solve. Moreover in Calcutta there is an overemphasis on private motorised transport and, as a result, the city has been converted to a gas chamber. Walking, cycling, metro, trams and commuter trains are used at far below their capacities and potential.



Figure 2: Tramways are the only viable mode of public transport which could satisfy growing needs of the city with a clean environment. Built indigenously, Coach No 683 was photographed after full renovation at Calcutta Tramways Nonapukur central workshop. Photo: Foreman, Belgatchia Depot

advantages are negated when air pollution, road accidents, congestion, noise and the huge deficit in imported oil are considered. Moreover the potency of job creation by nonconventional modes of transport is always ignored.

The fare structures of public transport in Calcutta are not only strange but highly arbitrary. The CSTC pioneered the raising of bus fares by a back door policy - they raise fares promising better facilities, but within a short time the improvements disappear and the increased fare remains. Some of the bus fares are quite prohibitive and these services are neither profitable nor serviceable. These compel poorer passengers to either hang on the outside and travel for free, bribe the conductors or pay more for such reasons

Politics is nasty everywhere, Calcutta is not an exception. Yet the leftist government *per se* should not be blamed for the chaotic situation of the city. It is strictly the government officials who surrendered themselves for short sighted benefits related to their office. Equally culpable are the worker unions who neither take care of their industry nor of the workers. Unless citizens become conscious of their liabilities of better living there is hardly any scope for improvement.

The underground railway system in Calcutta

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Keywords

Investment, Metro, Integrated transport

Abstract

Calcutta's underground railway has tremendous unexploited potential as part of an integrated transport system. However it is just one of many competing providers, is grossly underutilised and makes an operational loss. A variety of solutions are required to improve its fortunes.

Background

Calcutta, Job Charnock's 'chance directed and chance erected' city is over three hundred years old. From an amalgamation of three tiny villages, Kalikata; Sutanuti and Gobindopur, consisting of few hundreds of people, Calcutta has grown enormously to become one of the top ten megacities of the world. Hailed as the city that refuses nobody, its strategic location, coupled with political chaos in its hinterland, and its status as the commercial capital of all of eastern and north eastern India has contributed to its growth. Sadly this 'growth' has restricted itself only in terms of population size and expansion of boundaries, and that too as Kipling put it most aptly, in a 'chance directed and chance erected' manner, and not necessarily in terms of infrastructure development. This has put the city under severe strain in all aspects of basic civic requirements and 'transport' figures prominently in the list.

The factors contributing to a steadily deteriorating transport scenario are too many though amazingly low road space (about 4%) and continuously increasing traffic are considered the pick of them. Though the problem assumes great significance on the onset of the 21st century, the strain started to show far earlier. The father of the modern West Bengal, Chief Minister Dr. Bidhan Chandra Roy, the great visionary that he was, could sense it as early as 1949. He understood that one of the potential solutions to the problem was to create more road space, and as that was not all that easy

on the surface in view of the city's socioeconomic fabric and unplanned structuring, he proposed to go below it. Just two years after independence, under his initiative, a team of French experts visited the city to assess the feasibility of building an underground railway system. According to Mr. A. K. Bandopadhyay, (Chief Traffic and Transport planner, Government of West Bengal) the French team 'found construction of an underground railway in Calcutta feasible and they recommended two lines, one from Kalighat to Paikpara and the other between Howrah and Sealdah Station'. But Dr. Roy's effort did not bear any fruit and Calcutta had to wait almost another two decades for relaunching of the concept. When CMPO prepared the traffic and transportation plan for Calcutta in 1966, both a circular railway and an underground railway were recommended. A detailed techno-economical feasibility study of the underground railway was carried out in the early 1970s by an organisation named 'Metropolitan Transport Project (Railways)' which was set up by the Government of India. Based on the substance of this report, an underground Metro Rail between Dum Dum junction and Tollygunge for a length of 16.45 km was cleared in 1973. In 1979 the organisation was renamed 'Metro Railway'. The planning of the route of Metro Railway had been done on the basis of traffic survey figures provided by CMPO. Its 1971 figures showed that on an average week day, about 21.5 lakhs (2.15 million) people moved in a north-south direction while 10.1 lakhs (1.01 million) people travelled in an east-west direction.

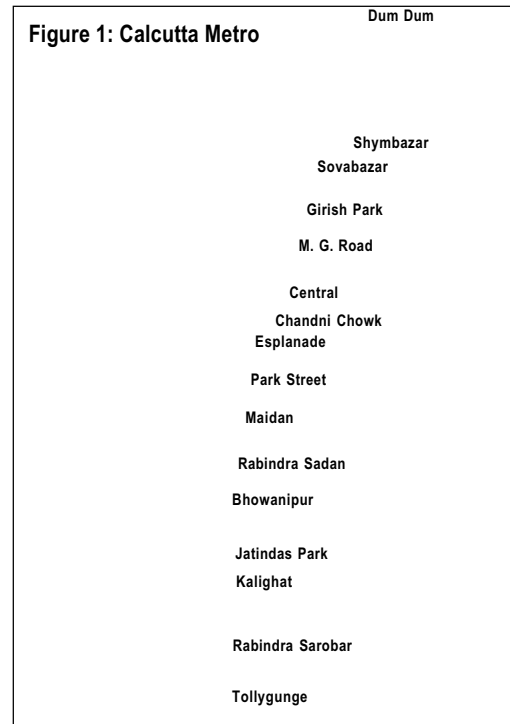
Operation

Though the project implementation started in 1973-74, it didn't gather momentum until 1977-78. The partial service between Esplanade and Bhowanipore, a stretch of 3.40 km and 5 stations, was initiated on 24 October 1984. Within another couple of years the service mainly to the southern sector,

covering 9.79 km and 11 stations, was opened. However, it took a long time to initiate the service in the northern sector. Ultimately on 27 September, 1995, as per the advertisement 'Calcutta has her wings', services were opened along the entire stretch of 16.45 km between Dum Dum and Tollygunge, roughly two decades after construction had started (see Table 1). This unusual delay not only magnified the complications and problems associated with constructing such a system in an unplanned city like Calcutta, but also escalated the cost phenomenally from an initial estimate of 140 crores (Rs 1,400 million / £ 25.5 million) to more than 1,610 crores (Rs 16,100 million / £293 million).

Contribution and socioeconomic impact

Historically, Calcutta always has had a mixed feeling about the Metro Railway. The project, aimed to solve Calcutta's acute transport problem, had ironically thrown the city's traffic system into absolute chaos for more than two decades due to its 'far behind the schedule completion' and 'cut and cover' method employed for construction. One of the main arterial connections of the city stretching from Tollygunge in South Calcutta to Shyambazar in North Calcutta via the commercial hub of the city; i.e. Esplanade, B.B.D. Bag and Central area; was hugely disturbed. Not only did general commuters face problems, but businesses along the construction corridor were adversely affected during the period. Thus, the initial reaction was of irritation. Then when the underground railway became a reality and people started to taste the comfortable; clean and fast journey across the city which was until then unthinkable in Calcutta, the mood changed into elation.



The fact that people can travel from Tollygunge to the city-centre within 15 minutes and Dum Dum in just over half an hour, is a far cry from the experiences Calcuttans had on the surface. In the peak office hours, surface transport crawls at about 6 to 8 km per hour which is 4 to 5 times slower than the Metro. The situation becomes far worse during the monsoon due to Calcutta's famous waterlogging. However, recently at the joint initiative of State Transport Minister, Mr. Subhash Chakraborty; Municipal Commissioner, Mr. Ashim Burman and efficient City Police Commissioner, Mr. Dinesh Bajpayee, illegal encroachments on the roads and footpaths have been cleared and surface transport modes have started to move faster. The advantage of comparative comfort in Metro is a bonus. According to many regular Metro commuters, the underground journey not only has ensured their timely arrival at work, but also significantly contributed to their job output. Previously the 'war through Calcutta roads' took a high toll on them and they had little energy left for their office work. Thus, Metro in a way has increased productivity and also helped in the better time utilisation.

Table 1: Salient features of the Calcutta Metro as provided by the Metro Authority

Total Route Length	16.45 km
Stations	17 (15 underground, 1 on surface and 1 elevated)
Coaches per train	8 coaches
Maximum permissible speed	55 km/hour
Average speed	30 km/hour
Voltage	750 Volts D.C.
Method of current collection	Third rail
Travel time: Dum Dum-Tollygunge ...	33 minutes
Coach capacity	278 standing, 48 sitting
Train capacity	2558 Passengers (approximately)
Project cost	1,610 crores (approximately)
Environmental Control	Forced ventilation with washed and cooled air.

Another big plus point of Metro Railway is its lack of local air pollution. It assumes more significance in a highly polluted city like Calcutta. Ironically, the chief source of air pollution in Calcutta is 'surface transport generated pollution'. A recent status report by the Central Pollution Control Board noted

that Calcutta yields 188.24 tonnes of Carbon monoxide; 43.88 tonnes of Hydrocarbons and 3.25 tonnes of SPM (suspended particulate matter) daily, and the major responsibility for this falls on surface transport.

The gradual evolution of Metro Railway as a mass transport and its impact on the socioeconomic fabric of the society is tremendous. Initially when it was operational as far as Esplanade, only a particular fragment of society, mainly middle class officegoers, used to avail of it. It seemed that the world above and below in Calcutta were altogether different. But with the opening up of the entire stretch, part integration with Suburban Railway and the realisation among common people about the value of time have changed all that. Now, Metro Railway traffic represents the actual Calcutta as people from all sections of society avail of this modern day transport. Adding escalators has made it more accessible for elderly and widow/orphan.

Moreover Metro Railway has significantly influenced settlement patterns and land pricing in Calcutta. These have shot up abruptly along the route of the Metro. Land prices in areas such as Tollygunge, which was significantly less before the initiation of Metro Rail, has increased by 200 - 400 % over the last few years. Not only Tollygunge, even land prices in areas further south such as Garia, Narendrapur and Rajpur have increased significantly due to respective Metro proximity. It is believed that the same will increase further if the Metro extension

up to Garia becomes a reality. Incidentally, the areas along the Metro route have become the most densely inhabited zones in Calcutta and there has been rapid expansion in commercial activity in these regions.

In this context it will be relevant to add that a Metro culture has developed in Calcutta over the last few years. Traffic, being highly unruly on the surface, becomes disciplined once it goes down to the Metro zone. Perhaps the clean and pleasant atmosphere, with bright advertisements / drawings (providing revenue to Metro Rail) being systematically displayed and an overall air of efficiency rubs off on general commuters.

Problems and Suggestions

The major problem with Metro Railway in Calcutta so far, is its gross underutilisation. According to the data provided by the Metro authority, on average about 2 lakhs (200,000) people travel on Metro Railway on working days which is roughly 2 - 3 % of the entire traffic load of the city. The figure does not attach credibility to any transport system and far less so for a system, which cost 160 crores and whose running cost is more than 65 crores (Rs 650 million / £ 11.8 million) per annum. As a matter of fact, per day earning of Metro Railway is about 5.5 lakhs (Rs 550,000 / £ 10,000) and its operational loss is about 240%. Incidentally, operational loss is far less in other railways despite the fact that the menace of 'without ticket journeys' is far greater in those sectors. Thus, it seems that the so called success of Metro Railway is only phenotypic and the scars are widening below the surface. Now what factor(s) may be responsible for this? To answer in a one-liner: *total lack of integration among various modes of transport*. The contention can be aptly established with the help of the breakup of the passenger figures with respect to each stations. According to data provided, the greatest passenger load is at Dum Dum, being more than 36,000 per day. Esplanade, Tollygunge, Shyambazar, Central, Chandnichak, Rabindra Sadan and Kalighat also draw over 10,000 passengers a day; while the passenger load in Bhowanipore, Maidan and Belgachia are far less than that; being least in Bhowanipore, at about 4,500 per day (See Table 2). Interestingly, many of the higher passenger drawing stations are close to major east - west connections and excepting the regular traffic plying on that

Table 2: Stationwise passenger breakup, 5 June 1997

Stations	No. of Passengers booked
Dum Dum	36,744
Park Street	9,296
Belgachia	6,345
Maidan	6,828
Shyambazar	12,895
Rabindra Sadan	13,199
Sovabazar	9,512
Bhowanipore	4,581
Girish Park	7,799
Jatin Das Park	8,118
Mahatma Gandhi Road	8,736
Kalighat	12,424
Central	12,222
Rabindra Sarobar	9,325
Chandni Chak	13,510
Tollygunge	18,260
Esplanade	21,873
Total Passengers	211,667

line feeding the Metro, even unplanned connecting transport modes like share taxi and autos have generated extra passengers in all those Metro stations thus creating new job opportunities.

The observation really emphasises the importance of integrating surface transport modes along with Metro, especially those running perpendicular to Metro line. The semblances of planned integration only exists at Dum Dum where Metro; Suburban and Circular Railways are running side by side, thus making it easier for the traffic coming from city outskirts to shift from one mode of transport to another for their comfortable and quick passage up to the city core. Still, it is widely believed that passenger load and earning would be further increased if certain Metro connecting Suburban trains start from Dum Dum station itself, because now on peak office hours it becomes highly difficult for Metro alighting people to catch hold of already filled up trains.

Incidentally, the feeding and general integration of Metro and other surface modes of transport will be further successful if an integration in the ticketing system can be developed as happens in many other comparable cities. Single ticket systems will automatically relax the passenger and also increase the overall revenue as the without ticket syndrome of Suburban Railway will be automatically diluted. Things will also improve if Metro is extended to south Garia because the population density is very high in that area. A feasibility study is already underway.

Other basic problems of Metro Railway are the management and maintenance, rather the lack of them, and noise pollution. The underground Railway had proposed to run in every 2.5 minutes in its original brochure, but it now runs in every 12 minutes in peak office hours and about 15 - 20 minutes at other times. Out of a total 148 coaches, only 112 ply (56 pairs of train per working day) regularly with an outshading of about 78%. This is quite low with respect to the short distance which Calcutta Metro has to ply. As for the maintenance part, the system which was previously believed to be highly efficient and rarely skipped a minute from the scheduled time, has lost a lot of its credibility of late. Such things as technical snags, behind schedule running, incomplete

journeys and sudden train cancellation are quite common now, especially since the entire route was opened. A major fire broke out on 9th October 1995, while problems of a smaller nature are quite frequent. Total staff strength of Calcutta Metro is 3,370 which is 30 staff per train. The statistic does not speak highly off the maintenance and management part of Metro Railway.

As for noise pollution, Calcutta Metro is one of the noisiest in the world. An independent survey finding of the author (supported by the West Bengal Pollution Control Board authorities) indicate that the average noise level in Calcutta Metro is around 90 - 100 decibels which is far above 75 decibels, the highest permissible limit of noise pollution set by the West Bengal Pollution Control Board. The Supreme Court and Green Bench of Calcutta High Court have taken notice of this and remedial efforts are underway. But, lack of proper noise pollution prevention equipment in the design coupled with openable windows make it highly difficult to control the problem. According to noted ear, nose and throat specialist and ex-sheriff of Calcutta, Dr. Abirlal Mukherjee, prolonged exposure to this kind of noise pollution may cause irreparable damage to regular Metro travellers.

In this respect, another study is worth mentioning. During the construction phase of Metro, it was reported that higher Carbon monoxide levels inside the tunnel made the labourers addicted to 'sweetening poison.' Hopefully, the Metro authority has taken note of it.

Future Plans

Future proposals for Metro Railway mainly includes its extension. As already mentioned, a feasibility study about the extension of the system up to Garia is underway. It is worth noting that during the original planning of Calcutta Metro, a stretch of 97.5 km of underground Railway was suggested. Excepting the Dum Dum - Tollygunge (extension up to Garia) line, two other proposed Metro lines were (i) Salt Lake - Ramrajatala and (ii) Dakshineshwar - Joka, Behala. Even the crossings for east - west direction (Salt Lake - Ramrajatala) were done close to Shyambazar and Central station by Senbo Engineering. Though building another

Metro line seems to be a difficult proposition at present, thinking in that direction may have to be undertaken in the not too distant future in view of the continual expansion of the city's eastern fringes.

Recently, the State Transport Minister Mr. Subhas Chakraborty floated a proposal about building shopping complexes and car parking areas on the upper tier above Metro box, in between the box and the surface. The preliminary study by Senbo Engineering proposed to house about 4,000 - 5,000 shops and 10,000 car parking spaces within the stretch from Tollygunge to Shyambazar. However, the project is still in an embryonic state.

All said and done, Metro Railway is definitely an important and obligatory addition to the flagging Calcutta transport scenario though it has yet to realise its full potential. Lewis Carol, in a poem once ridiculed the lack of success of Railways by referring to Railway's share of traffic:

*They sort it out with Thimbles;
they sort it out with care
they pursued it with forks and hope;
they threatened its life with a Railway share
they charmed it with smiles and soap.*

It is certain that if Calcutta Metro does not change its track, nobody will be interested to buy its share.

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