

EXISTING TRANSPORT SCENARIO AND THE LIVE ABILITY CONCERNS

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Abstract

The purpose of this article is to investigate the potential for multi-stakeholder networks to build future scenarios for government policy and company innovation and then apply those scenarios in some way. The primary objective is to strategize and foster environmentally responsible innovation breakthroughs in the field of transportation within the framework of Kolkata, India. The future of Kolkata is uncertain due to the fact that the nation's capital is now mired in pollution and congestion caused by an ever-increasing population of private vehicles as well as an increase in the number of public transportation vehicles. The situation is becoming increasingly dire as a result of rising levels of air pollution, a crisis in traffic management, expanding metropolitan populations, and inadequate infrastructure. In order to address the issues, a number of short-term solutions were implemented, including the implementation of emission standards for automobiles, the transition to cleaner fuels, and the elimination of older vehicles. In order to successfully plan for the long term, it is necessary to initiate stakeholder networks that include the interests of all participants. In order to plan solutions that are sustainable over the long term, multi-stakeholder networks need to move beyond the confines of their existing frameworks. The problem is to integrate regulations, technologies, and enterprises in order to construct sustainable infrastructure for Kolkata that can fulfil the needs for mobility at the moment and is flexible enough to adapt for the future. This is a very difficult task. The purpose of the study is to come up with many possible future outcomes and to investigate how various kinds of technology and regulations might function in the foreseeable future. It is a purposeful Endeavour to build credible alternatives of sustainable futures for passenger transport in Kolkata from the desk study and interviews with stakeholders.

keywords: *Transport , Scenario, ability*

Introduction

The persistent process of urbanisation that occurs in emerging countries results in the creation of areas with a dense population. The inflow of people results in an increased demand for fundamental services and goods, such as water, electricity, housing, and transportation. In the setting of Kolkata, one of the rising issues is the mobility of the city's population, yet the city's transportation infrastructure is not keeping up with the demand for even the most fundamental forms of mobility. The current situation does not have the necessary infrastructure or planning in place to meet the ever-increasing demands of both the present and the future. The requirements have been disregarded as a result of deficiencies in policy, a lack of commitment, and an inability to invest in infrastructure. It seems anticipated that rising earnings, a demand for more personal mobility, and inadequate public transport will result in a considerable increase in the ownership and use of automobiles. It is anticipated that the number will rise from 3.9 million in the year 2000 to 6 million in the year 2011 in Kolkata. Growing motorization, coupled with limited road space,

inadequate separation of the working space from the living space and the space for movement, an ageing and poorly maintained vehicle stock, a sizeable stock of two stroke engines, the absence of efficient public transport, and lower quality fuels have led to traffic congestion, which has resulted in longer travel times, increased fuel consumption, growing air pollution, discomfort, and a degradation of the urban environment. Under these circumstances, the construction of an effective transportation infrastructure is a crucial requirement for satisfying the requirements for mobility in the not too distant future. The approach that was taken for this research consisted of developing various scenarios that were adaptable enough to allow for an analysis of the future alternatives and the examination of how technologies and policies may operate in conjunction with one another. The scenarios, which are distinct from one another and from the current operating environment, are developed on the basis of interviews with stakeholders and of assumptions about how to make the transportation system more sustainably. They will provide decision makers with a window on potential market needs, a tool for systematic and innovative consideration of growing needs, and a method for evaluating the long-term viability of current trajectories or technological developments. In order to define managerial practises (innovation management) and skills necessary to complete the task, the purpose of the research is to understand the mechanisms and approaches that characterise innovation and technological change (in particular socio-economic conditions). Additionally, the research aims to collect empirical evidence of cases and practises of innovation. The subsequent phase is to identify the sustainable methods and techniques, which may then lead to the creation of an action plan with the cooperation of stakeholders. The purpose of this research is to make an attempt to comprehend the dynamics of the system in terms of the perspectives of the stakeholders and the potential future directions.

Objective

1. research into the topic of Sustainable Transportation Planning.
2. study on There is a never-ending battle against concerns such as air pollution, congestion caused by human population and traffic, and the lack of open green areas.
3. study on Strong cities that are both healthy and livable are dependent on having a healthy environment, a solid economy, and adequate employment possibilities for its population.

Definition of “Sustainable Transport Planning”

The practise of sustainable transport planning is a method that aims to improve the quality of life by facilitating the movement of people and products in a manner that is more rapid, more easily accessible, more secure, and more comfortable. The administration of services and facilities for the various forms of transportation in consideration of ecologically sound characteristics is what this term refers to. The construction of a pollution-free city, the structuring of that city, the promotion of socioeconomic activities through mobility, and the enrichment of the quality of life through seamless connectivity are all major reasons why sustainable transport planning is crucial.

Contemporary Transport Planning

Mobility flows have emerged as a crucial driver in the process of fast urbanisation that is taking place in Indian cities, and the infrastructure that supports urban mobility now serves as the skeleton of the urban form (Amin, 2013). In Indian cities, issues related to traffic and transportation have become much more prevalent over the previous two to three decades. It is essential to take into account the problems that are

associated with traffic and transportation and to look for improved approaches to the problems in order to solve them and make the city more sustainable in terms of transportation. The role of traffic and transport planning encompasses a very broad scope, including but not limited to the reduction of pollution caused by motorised vehicles, the enhancement of health and safety, social and economic equality to use public transit, and the promotion of mobility in general.

Sustainable Traffic and Transport Scenario

The agricultural, manufacturing, and service industries in India are all major contributors to the country's robust economic growth. Movement, in the form of traffic and other forms of transit, is essential to the development of these locations. The difficulties associated with traffic and transportation are acutely felt in virtually all of India's major cities (Raman, 2012). When compared to the rise in the number of motorised vehicles, the expansion of the infrastructure has been seen to be rather mild. It was declared in the union budget of India for the 2016-2017 fiscal year that a total of INR 55,000 Crores would be allocated for the construction of India's roadways (TNN & Agencies, 2017). The government of India announced that they would invest INR 15,000 Crore in the growth and development of cities around India. Approximately 97,000 Indian Rupees (INR) would be invested in the overall development of the infrastructure. The Government of India has made available funding for the Mass Transit System (MTS), metro railways, and other similar projects in order to facilitate the development of a sustainable traffic and transport system. However, despite inadequate execution, design guidelines, and monitoring, there has been a significant increase in the number of private automobiles.

Kolkata: is it a sustainable city?

A city is considered to be sustainable if it is able to meet the fundamental requirements of its inhabitants, including provision of public services and amenities, health and medical care, housing, education, transportation, employment, and other essentials, as well as sound political and administrative leadership. The availability of open green areas, the congestion of human population and transportation, and the pollution of the air are all concerns that are constantly a source of contention. Cities that are robust, healthy, and livable are dependent not only on a healthy environment but also on a thriving economy and abundant employment possibilities for the populace. It should be able to cater to the requirements of the public as well as all segments of society without showing favouritism. As it relates to the circumstances in Kolkata, appropriate emphasis should be placed on population control and providing housing to the impoverished sections of society. These sections of society are comprised of people who live in conditions that are below human standards in slums, generate income at wages that are lower than the minimum wage, and contribute to environmental degradation. Because there are fewer available jobs, a growing population also results in increased instances of exploitation, criminal activity, and lawlessness. For instance, migration contributes to a yearly growth of 400,000 people in the population of Kolkata, which raises concerns about the long-term viability of this city. This frightening rise in population places an intolerable strain on a variety of resources, including housing, jobs, healthcare, water, power, and transportation. Large regions that were once considered "green" are being developed into housing colonies, which leads to environmental damage. In this particular setting, the focus is on investigating people's mobility and accessibility in order to meet their requirements for travel. In 1997, Kolkata had 9.11 kilometres of road length for every one thousand vehicles and 2.15 kilometres for every one thousand inhabitants, which indicates that the city had a higher vehicular density than any other developing country criterion. The percentage of the metropolitan area that can be covered by roads appears to be limited at 20%, however Kolkata currently has 21% of its land area covered

by roads (DDA, 1990). Any increase in road capacity has a high likelihood of being swiftly overwhelmed by an increase in the demand for travel (Zegras, 1996). The combination of the metropolitan area's short mobility distances and the lack of infrastructure, such as a sub-urban rail system, presents a particularly difficult problem for urban planners and decision makers.

TRANSPORTATION AS PART OF A PACKAGE OF SOLUTIONS

The previous sections have focused on ADA mandates in a variety of local transportation modes and the potential of these transportation modes to provide mobility for travellers with disabilities that is more frequent or better than that which is required by the ADA. This section will focus on the potential of these transportation modes to provide mobility for travellers with disabilities. This section focuses on the critical nexus of direct transportation provision and a variety of other delivery systems for people with disabilities. It emphasises the importance of viewing transportation services as inextricably linked to decisions made about a large number of interrelated services and facilities, ranging from the manner in which, where, and when medical services are provided to the strategies adopted by job training agencies.

People in every other substantive field, from education to employment or from recreation to health care, have a tendency to assume that inadequate transportation is the cause of all or the majority of the underutilization of public and private services that are considered essential to the well-being of those with disabilities. This is perhaps the most intractable issue in the current debates (see, for example, the work of Kenyon et al. [2003] and Lucas [2004]). Considerable research suggests, in point of fact, that the vast majority of people who are disabled are confronted with multiple obstacles that impede not only their mobility but also their capacity to obtain an education or a job, as well as their access to a variety of public and private services ranging from grocery stores to medical facilities. Policy experts need to comprehend and handle these difficulties in sophisticated ways that transcend beyond public transit networks and, indeed, beyond transportation systems alone. Both the causes of these problems and the possible remedies to them are complicated.

Problems with transportation are, without a doubt, a significant impediment to the mobility and access enjoyed by people who have impairments. According to the National Council on Disability's observation, there are some people who are ready and able to work but are unable to do so due to insufficient transportation options. Others are unable to go shopping, engage in social events, participate in recreational or spiritual pursuits, or even leave their houses. In addition, some people with disabilities who are in need of medical care are forced to reside in institutions because there is not enough safe and dependable transportation to get them to the medical services they require (NCD, 2005, p. 13).

However, it is highly improbable that access to transportation is the sole challenge or obstacle faced by the majority of people who have impairments. For instance, a lack of accessible transportation may create barriers to employment; however, the inability to obtain a meaningful job may also be the result of insufficient education and training, a lack of experience, discrimination in the job market, or inadequate knowledge on the part of employers regarding the kinds of reasonable accommodations that potential workers with disabilities require. As a result, transportation services should only be considered and supplied within the context of an integrated set of policies and other supported services.

In a similar vein, people with disabilities who lack access to transportation may be unable to get medical care in a timely manner if there are no accessible transportation options available. The "underutilization" of

numerous types of medical and social services, on the other hand, has been shown by extensive research to be the result of a complex web of causal factors that are interconnected. A study conducted in 1996 using data from the 1987 Medical Expenditure Survey found that health status and having Medicaid benefits or private insurance were the most significant predictors of home health care utilisation. Income and having health insurance (or Medicaid) are also significant factors in service utilisation. According to the findings of a study conducted in 1997 that made use of data from three national data sets on ageing, it was found that whether or not older people used the services of physicians and hospitals was consistently related to both their current state of health and whether or not they had health insurance.

One of the most consistent findings of research is that the rates at which people use medical services are significantly different depending on race and ethnicity, and that these differences are frequently unrelated to either income or the availability of health insurance. attempted to explain the racial differences in the stage of cancer that people had when they were first diagnosed with the disease; the researchers discovered that neither insurance coverage nor socioeconomic position could explain these racial differences.

found that older African Americans were less likely to use emergency medical services than older white individuals with similar medical conditions, and that these differences could not be explained by either income or health status. found that older African Americans were less likely to use emergency medical services than older white individuals with similar medical conditions. Also discovered significant racial variations in the rates of medical service consumption among people with impairments, which could not be explained by socioeconomic factors. [Citation needed] "persistent impacts of race/ethnicity [in medical service utilisation] could be the product of culture, class, and/or prejudice," the researchers noted. This shows that the expense of medical services as well as the way in which they are both given and perceived by the intended users are just as important factors in the failure to use medical services as the absence of transportation resources.

According to the findings of other studies, older people are less likely to make use of a variety of services that are designed specifically for them for a variety of reasons. These reasons range from the belief that the services cannot really help to a concern about the costs of the services, even when those costs are substantially subsidised. Even while there is evidence that many people avoid using special paratransit services out of fear of being stigmatised or because they do not believe that the services can or do meet their needs, there is evidence that many people do not use these services.

Even when people claim that difficulties with transportation prohibit them from obtaining medical or other services, these findings continue to hold true. It was established that older adults who claimed having trouble with transportation were genuinely reporting having functional impairments and were not reporting any barriers to using medical services. it was suggested that older people who reported transportation barriers as the reason for the underutilization of medical services were using that reason to represent a bundle of problems, including an unwillingness to leave home, frustration with declining motor and other skills, an inability to pay for services, and dissatisfaction with the actual services offered, in addition to difficulty in accessing or obtaining transportation. the research also suggested that older people who reported transportation barriers as the reason for the underutilization of medical services were using that reason to represent a bundle of

These observations are supported by early studies conducted for the United States Department of Transportation; when communities provided new medical and other transport services targeted at older

people, almost all of the ridership was comprised of individuals who were already making medical trips, presumably utilising a mode of travel that presented more challenges. That is to say, the majority of people who started using new transportation services simply switched from whatever mode of transportation they had been utilising in the past to the new system, whereas very few of the individuals who were thought to be underutilizing services started doing so when they were given new transportation options.

It's possible that these findings are related to studies showing that social and human service agencies need to provide their customers with more than simply transportation in order to convince them to leave their homes or use agency services. For instance, in the city of Detroit, Michigan, there is a specialised transport service that was formed in response to the presumption that low-income pregnant women did not seek prenatal care because they lacked transportation. This service illustrates how it works. However, in order to actually get the people who were supposed to use the service, the female driver had to provide incentives for the women to keep their medical appointments, keep records on the women's pregnancies, and provide prenatal and spousal abuse counselling on the bus. This was all in an effort to get the people who were supposed to use the service.

It is evident that mobility issues for travellers who have disabilities are made worse by the fact that they must contend with additional challenges, including those related to transportation, which may be a significant component of these problems. However, unless we understand the relationship between these challenges and personal, community, and service delivery constraints, it is unlikely that we will be able to address the mobility issues that these travellers face. The inability or unwillingness of a person to leave their home in order to seek employment, further their education, receive medical care, or socialise with others is impacted by a variety of personal and cultural hurdles, including a lack of sufficient and accessible transportation.

Kolkata’s Transport situation

In the context of a rising need for mobility, rising concerns about the safety of travel, and rising levels of pollution and congestion, Kolkata is in the midst of a number of trials and is enticingly close to finding quick remedies. The situation in Kolkata has reached the point where things need to move swiftly for the moment while while being properly planned for the foreseeable future. In the year 1989, seventy percent of the world's total air pollution was caused by motorised transportation, which includes things like cars, buses, scooters, motorbikes, and others (CPCB, 2000). This provides an indication of how severe the transportation scenario currently prevailing in Kolkata is. At the same time, the use of private transport has increased nine-fold in the last three decades (Tiwari, 2002), where public transport has overloaded from time to time and has hardly kept the pace in serving the mobility needs of all categories of travellers. Table 1 shows that a large proportion of the travel demand in Kolkata was catered by buses that were getting on in years; however, the use of private transport has increased nine-fold in the last three decades. The insufficient number, reach, and regularity of public transportation contributed to this situation, among other factors.

Table 1: Modal split of daily trips in Kolkata, 1994(ORG survey)

Mode	2014	2015	2016	2017
Cycle	36%	28%	17%	7%
Bus	22%	40%	60%	62%

Car	10%	16%	6%	7%
Motor cycle	1%	8%	11%	18%
Others	31%	8%	7%	7%

The percentage of trips made by bicycle was falling, while the total number of bicycle trips was rising at a steady rate (planning dept, 2000). The majority of bicycle riders are commuters because several arterial routes in Kolkata have more than 30 percent of their traffic made up by bicycles during peak hours (CPCB, 1993). This highlights the fact that the majority of bicycle riders are commuters. As a result of the deteriorating air quality and the lack of infrastructure, there is a significant risk to the health and safety of motorcyclists, walkers, and cyclists. The effects of breathing more heavily while exercising in close proximity to a source of exhaust pollution are felt most strongly by cyclists. Bicycles and rickshaws typically ride in the leftmost lane of the road, which allows for free left turns. As a result, buses have fewer opportunities to stop in the designated bus stops, which, if they do so, can be an obstruction to the flow of slow-moving traffic. Rickshaws also use the leftmost lane. They do this by stopping in the centre of the road, which causes the vehicles travelling in all lanes to be disrupted. This highlights the need of nonmotorized transportation receiving the priority for infrastructure in terms of policy and implementation, which it has never had before. The existence of 'cities inside cities' is a result of significant socioeconomic and racial discrepancies that have contributed to the phenomenon (Tiwari, 2002). There is a distinct pattern of land use and application of technology in each district of the city; some of these districts deteriorate into slums due to a lack of access to even the most fundamental services. The development of property by a variety of entities without regard to land use or the effects it has on the environment is another issue that has recently come to light. Cars and buses, as well as locally designed vehicles like three-wheeled scooter taxis, scooters and motor cycles, bicycles, rickshaws, and animal and human-drawn carts, have all used the same road space. The curbside parking of personal vehicles and the waiting of auto rickshaws for clients at bus stations cause the three-lane roadways to become congested to the point where there is only room for two lanes of traffic. Unfortunately, the rail assets are not currently being fully exploited, and this is due to the fact that their proportion of commuter traffic in Kolkata is only a meagre 2%. It is anticipated that the newly inaugurated public transportation facility, the DMRC3 (Kolkata Metro Rail co) network in a gradual way, will accommodate a sizable portion of the available mobility. Approximately 62% of the total 4 million passenger trips are being provided by the road-based public transportation system, making this an extremely important component. These buses, in conjunction with auto rickshaws and cycle rickshaws, are working together to provide the most flexible and cost-effective transportation system possible. The public transportation in Kolkata operates according to a convoluted system. The bus services are provided by a combination of public and private entities, and the system is plagued by problems such as lengthy zigzag and overlapping destination routes, improper distribution of buses, disorganised private sector operation with little or no control, an inadequate number of buses, poor spatial coverage, and a lack of priority given to public transportation. Inadequate attention has been paid to public-based transportation, despite the fact that it uses less road space, is more affordable, has a lower carbon footprint, and is more energy efficient than private, individually owned modes of transportation (TERI, 1996). Taking all of these factors into account, the country's most recent five-year plan, which is in its eighth iteration, identifies the promotion of energy-efficient modes of transportation and the enhancement of the public transportation system as the two primary transport strategies (GOI, 1992). The current state of transportation underlines the need for solutions that will minimise the consumption of resources without necessarily diminishing the services it

provides and improves. This means that a better level of efficiency is required throughout the whole system cycle.

Emerging patterns and characteristics

Vehicle Ownership

In March of 1999, the city of Kolkata had 3.21 million vehicles for a population that was estimated to be around 13.4 million. The ratio of vehicles to people increased by 24% between 1991 and 1999, going from 192 to 239 for every 1000 people (Planning Dept, 2000). In 1999, the average number of automobiles owned by a single household was 1.19. Even though a downward trend in that proportion of the market has been noted, almost two-thirds of the motor vehicles are two-wheelers. On the other hand, due to the emergence of low-cost small automobiles, there is an indication that the market is shifting away from two-wheelers and toward cars. It is estimated that there are more than 300,000 rickshaws operating on the roads of Kolkata, many of which do not have any authorization from the Municipal Corporation of Kolkata (MCD). The maximum number of rickshaws that can operate in Kolkata has been set by the MCD at 99,000. However, the number of rickshaws operating in Kolkata is currently estimated to be higher than that.

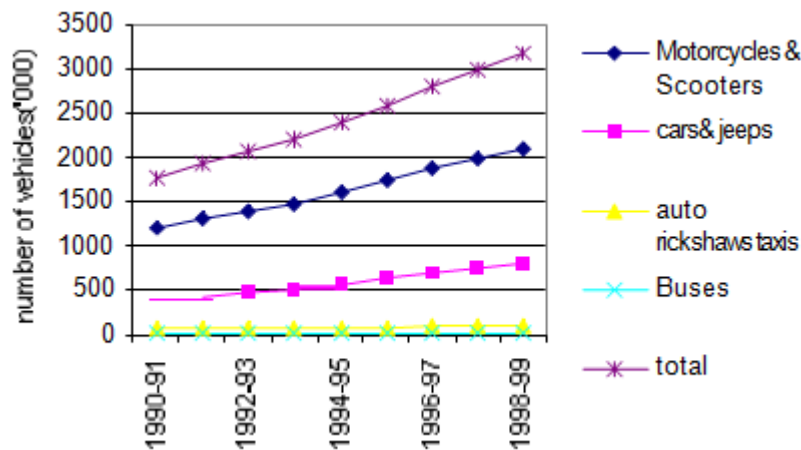


Fig 1: Number of motorized vehicles in Kolkata

Vehicular Density

Since 1971, the number of vehicles on the road has increased by more than nine times, but the length of the roads has only increased by 2.6 times. This disparity has led to an increase in the density of vehicles on the road, which is in turn responsible for longer travel times, an increase in the number of accidents, and an increase in the amount of fuel that is consumed. The worrying situation may become even more dangerous in the not-too-distant future due to the upward tendency in the number of vehicles. The larger density of vehicles results in a greater number of instances of idling, which wastes both time and money and contributes to the congestion. It has also been estimated that more than 321,000 litres of gasoline and 101,000 litres of diesel are wasted every day in the capital due to the idling of vehicles at 466 signalised intersections, which results in a loss of approximately \$0.18 million per day when adjusted for inflation from 1996 prices.

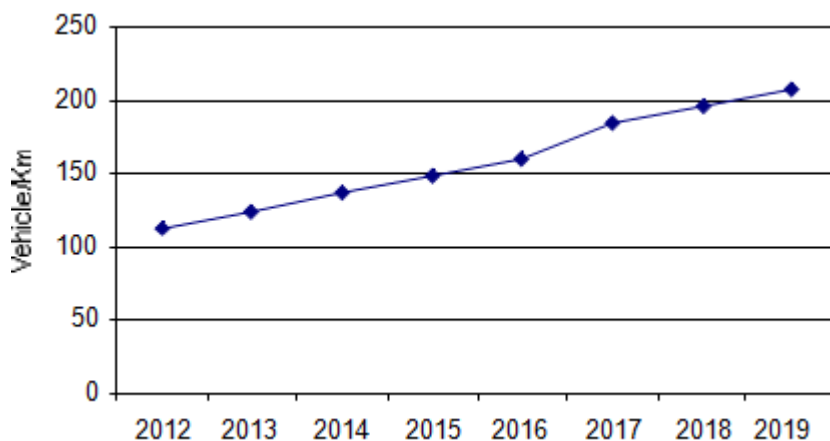


Fig 2: the increasing Road Vehicular density (Number of vehicles per km of road)

Travel demand

The demand for travel is expected to increase from 4 million trips per day (in 1994) to 20 million journeys per day (DES, 2000) by 2011. In order to meet this demand, road-based transportation will need to fulfil 12 million trips—a 403% increase. It is anticipated that the recently inaugurated Kolkata Metro Rail system will carry 1.81 million passengers by the year 2005. However, there would still be demand that could not be met by the available road transit networks. The fact that the City was planned in a circular fashion and residential satellite towns were planned as suburbs is one of the primary reasons for this situation. As a result of this land use planning, there were always a greater number of trips (of 10 kilometres on average), which presented greater challenges to planners. The anticipated level of vacation travel is detailed in table 2, which is available here.

Table 2: Projected travel demand (million trips per day)(DES, 2000) (With modified phase I of Metro Rail)

Mode	2002	2005	2011	2025
Bus	2.48	9.42	12.48	15.02
Rail	0.02	1.66	1.94	2.52
Metro Rail	0	1.81	2.34	2.86
Other modes*	1.50	2.83	3.68	4.47
Total	4.00	15.72	20.44	24.86

Governance (Role of Govt. as a stakeholder)

A number of laws, policies, and regulation programmes have been created by the local government with the help of the central government in order to combat the traffic problems and protect the environment. The Governing body has been receiving strategic guidance from the Kolkata development authority⁵, which has been playing the role to prepare the master plans (DDA, 1990) for the city of Kolkata. The "Ministry of Environment and Forest," "Ministry of Urban affairs and Employment," and "Ministry of Surface Transport" are the names of the three ministerial agencies that are involved in the transportation industry. In addition to emission restrictions for industries, the government has implemented a number of other

initiatives, which can be summarised as follows, in order to reduce emissions and difficulties caused by traffic:

1. The emission standards (Euro I and Euro II) and fuel quality guidelines for the national capital region were established in 1996. (CPCB).
2. The Bureau of Indian Standards (BIS) has suggested fuel quality requirements for the period 2000-2005 and beyond 2005 for both gasoline and diesel fuel. The judiciary has recently issued a directive that orders the Minister of Petroleum and Natural Gas to begin supplying diesel with 0.05% m/m sulphur to the entire National Capital Region beginning in July 2001. (CPCB, 2000).
3. Beginning in February of the year 2000, lead was removed from gasoline as part of a phase-out process.
4. Beginning in April 2001, the amount of benzene in the air in the National capital region is going to be cut down to 1%.
5. Additional measures include a prohibition on the use of commercial vehicles older than 15 years, a prohibition on the registration of new auto-rickshaws equipped with front engines, and the replacement of all automobiles and taxis manufactured before 1990 with new vehicles powered by clean fuels such as compressed natural gas (CNG).
6. By August of 2004, all of the buses must have made the changeover from diesel to CNG, often known as compressed natural gas. 18% of the public transportation, including auto rickshaws and taxis, were running on CNG as of July 2001. (CPCB & MOEF 2001). In an effort to promote the use of cleaner fuels, the government of Kolkata has eliminated the sales tax on compressed natural gas (CNG) vehicles and has pledged to continue offering a tax benefit and to take further steps in this direction (TOI, 2002).
7. At the moment, construction of flyovers and underpasses is taking place at twenty various locations across the city of Kolkata, while another twenty-five flyovers are now in the planning stages.
8. A appropriate bypass is now being conceptualised for the periphery expressway (DDA, 1990) in order to avoid the intermixing of local and regional traffic, which is a major problem that works as a deterrent for the smooth flow of the traffic.
9. The mass rapid transit system, also known as MRTS, is an ambitious project with the goal of delivering an effective transportation system that is based on rail.

Some of the challenges, such as those involving non-motorized vehicles, problems with parking, and the convenience of commuting, were never considered an issue during implementation or observed in policies. In recent years, the judicial system has played an increasingly important role in the protection of the environment. A number of recent court decisions concerning strict vehicle emission standards, fuel quality, the introduction of cleaner fuels, and the phasing out of older vehicles have given a significant amount of momentum to the ongoing efforts to improve air quality. According to the findings of a number of studies on transportation planning, the majority of the efforts that have been made in terms of merely improving infrastructure may provide some relief, primarily to the privately owned motorised vehicles that have low occupancy rates, but over the course of time, they may not have much of an effect on the overall traffic situation or the amount of pollution in the environment. Multi-agency planning and implementation, inter-agency interests and conflicts, lack of commitment, lack of land use-transport integration, and the absence of a culture of public transportation are the fundamental causes of the challenges. There is a need for a long-term strategic plan with the various stakeholder networks in order to fulfil all of these factors in order to

deliver a safe, secure, economical, equitable, comfortable, and efficient movement of passengers. This movement of passengers must be efficient.

Future directions

The first step of the field research was to determine who the various parties were that were involved in Kolkata's transportation system. Participants in the project include representatives from the government (1), nongovernmental organisations (2), commuters (3), businesses (4), research organisations (5), semigovernmental organisations (6), and autonomous institutes (7). (7). The vast majority of the stakeholders who were chosen were the ones that were accountable for the development of cutting-edge policies and strategic plans. It was planned to conduct interviews with them to delve deeper into their grasp of the situation and possibly desirable paths the system could take. The emphasis was placed on the matter in order to go in the proper path, which would allow for the current issues to be resolved and allow for the planning of preventative measures for the future. The development of an Urban Transport System (UTS) that is socially equitable, economically effective, and environmentally sustainable is the goal of this project. The parties involved in this situation have the responsibility of ensuring the existence of the aforementioned three aspects. To put together a policy, institutional frameworks, and investment and action programme is, according to the stakeholders' fundamental understanding, the first step in the process. Our conceptual foundation for an environmentally friendly urban transportation system is depicted in figure 3.

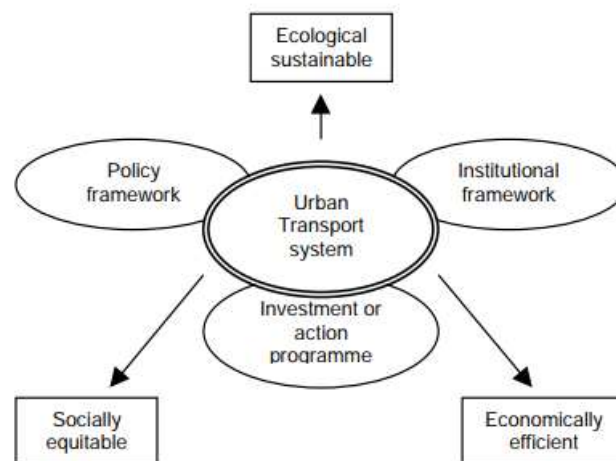


Fig 3: Conceptual basis for Urban Transport System (UTS)

Following are excerpts of the stakeholder interviews.

- Integrated land-use transport planning. (1)7 o Low cost system management measures. (1, 6)
- Dodge bicycles and cycle rickshaws from main arterial route. (1) o Need of understanding 'mobility' by different stakeholders. (2)
- Government need to work with different NGO's for big picture solutions. (2)
- Promotion of non-motorized vehicles. (2) o Create local non-motorized transport network services to connect to the Public transport and Metro Rail. (2)
- Improve the public transport. (3, 6)
- Technology advancements in motor vehicles by introducing technologically better quality transit systems. (3) o Avoid Inter-agency interests and conflicts. (4)

- Focus more on better mobility system than on air quality (aim at curing the disease instead of merely attacking the symptoms). (5)
- Understanding the synergy between safety, security and sustainability. (5)
- Accord priority to buses or keep some roads open only for buses at peak hours. (5)
- Availability of public transport information to all potential users. (5)
- Collect and maintain reliable up to date statistics for traffic management and planning for future. (5)
 - o Measures to discourage the personal motor vehicles. (5)
- Promote equitable use of road space. (6)
- Segregation of traffic according to motorized, non-motorized and goods. (6)
- Adequate road infrastructure. (3, 6)
- Movement on foot, by bicycle and transit need to be cultivated by providing safe infrastructure. (7)
- Set performance objectives for services (availability of service for every commuter within 10 minutes on a busy corridor at peak hours) (7)

The conversations with many stakeholders illuminate the gravity of the scenario that now exists in Kolkata. In a nutshell, the consensus is that there is a pressing need for interventions on both the demand and supply sides to be significantly improved. In addition to the policy concerns, the opinions were considered in order to establish an institutional framework and business/implementation programme. It was also emphasised to come up with solutions that had integrity and to follow the approach that the system took. In the not-too-distant future, it is predicted that the participation of stakeholders will be required in order to analyse the various potential future orientations and develop a plan of action.

Conclusion

In light of the interviews with various stakeholders, it has become clear how important it is for any public policy to take into account the perspectives of all relevant actors. The participation of stakeholders in the scenario analysis that comes next is one of the measures that must be taken. It is predicted that the policy makers would participate in the action plan to a greater extent in the future so that it can become more feasible. This is a launching point that will provide insights and prompt the stakeholders to think in the proper directions. The future of transport in Kolkata should include a regulatory approach to transport policy, with strong elements of public provision of transport and subsidisation, coupled with a strong enforcement to prioritise public transport over private transport, and adequate infrastructure facilities for cyclists and pedestrians. This is the best way to ensure that public transport is given priority over private transport. A delay in taking such action would be costly for Kolkata, and the cost of recovering from inaction is increasing every day, therefore the city needs to choose the appropriate strategies as quickly as possible. Degradation of the environment is a problem that cannot be wished away and must be dealt with. In the event that the current trends continue, it can only get worse in the future, and the transportation sector will be the primary contributor to this. Simply insisting on one's entitlement to breathe clean air, enacting ever more strict regulations that have no chance of being put into practice, and pointing out the disastrous effects that this situation will have on future generations will not make the situation any better. Working with an educated judgement, taking action that is supported by proper reflection, and maintaining a healthy scepticism of easy solutions and quick cures are all necessary.

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