

Improving Informal Transport

Case studies from Asia, Africa and Latin America



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Under the aegis of the Global Energy Network for Urban Settlements (GENUS), a network established and facilitated by UN-Habitat, The Energy and Resources Institute (TERI), New Delhi is undertaking case-study research of pro-poor mobility projects from the South/South East Asia, Africa and Latin America Regions. Informal transport modes like cycle rickshaws, mini-bus taxis, shared autos, etc. meet a significant portion of mobility needs of the urban poor in developing countries. Considering informal transport as a pro-poor mobility option, TERI is currently involved in identifying and documenting case studies that highlight the solutions implemented to improve 'informal transport'. The 15 case studies documented by TERI in this booklet highlight some interesting and innovative solutions for improvement of informal transport modes.



The Energy and Resources Institute







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1

ECOCABS: World's first dial-a-cycle-rickshaw scheme*

Place: Fazilka, Punjab (India)

KEY FEATURES

- 🌱 Dial-A-Rickshaw scheme
- 🌱 Livelihood generation for urban poor
- 🌱 Node to node connectivity and affordable and comfortable services for city residents, especially for the ones belonging to lower-income classes
- 🌱 Zero-emission technology

“Ecocabs’ is the name given to the traditional Indian cycle rickshaw operations after adding to it facilities like dial-a-rickshaw.”¹ These are cycle rickshaw services made available on phone call at one’s door step through a network of call centres, similar to dial-a-cab/taxi service. Introduced in a town, Fazilka located in the state of Punjab, India, the scheme is a first of its kind in the country as well as in the world. Aimed at improving the unorganized cycle rickshaw transport system in the town and providing affordable means of mobility to the city residents, the scheme has been a success in the city and earned accolades, both nationally and internationally.



New fleet of Ecocabs being launched



Ecocabs Stand constructed by Municipal Council, Fazilka

Source: <http://ecocabs.org/gallery/>

It has been initiated by the Graduates Welfare Association (GWA), Fazilka, a NGO focusing on issues related to education, employment, environment, and energy. As a pro-poor mobility scheme, it has not only provided affordable mobility choices for the city residents, but has also generated employment for the urban poor of the city. As reported by the GWA, the scheme is a source of livelihood for about 0.3 million families.

The project was first launched in June 2008 by organizing a group of 500 rickshaw-pullers in Fazilka along with the dial-a-rickshaw service operating through 5 call centres. In the first phase of the project, the main focus

* <http://ecocabs.org/about/>

¹ http://ecocabs.org/media/resources/1319040291_8654_SUTP_Newsletter_July_2011.pdf

was on improving accessibility of the rickshaws followed by service quality improvements. The service was later extended in 2011 to 9 call centres, one call centre in each of the 9 city zones (around 1 km² each in area). Apart from the call centres, dedicated mobile phones and numbers are being distributed from time to time among the rickshaw operators at subsidized rates.

Main features of the scheme are:

- Rickshaw pullers, also known as traction men, are provided with mobile phones
- About nine call centres attend to the customer requests
- Operations are based on the hub-and-spoke model
- Services are made available at affordable prices
- Rickshaws are designed on ergonomic principles; new rickshaws, which are light-weight, low-floor and can carry extra luggage; advertisement space is also being introduced
- Rickshaw-pullers can earn extra income from advertising space

The members of the project receive several benefits, like free health check-ups, discounted medicines and tests, free education and annual scholarships to school-going children of the operators, digital identity card, accidental insurance for INR 50,000 (US\$918), better rickshaw parking facilities, free legal help cell, and access to credit financing schemes of leading banks. Provided with rickshaw licenses and work uniforms, the traction men have to follow a code of conduct.

The project is supported by an innovative financial model which allows each traction man to become a stakeholder in the project at an initial capital cost of Rs 10,000 for which a loan can be availed at a low annual rate of interest of 4% under the Reserve Bank of India's differential rate of interest scheme. With daily instalments of Rs. 20 per day (which is less than what rickshaw-pullers generally pay to rent a rickshaw) and along with additional advertisement revenues, the scheme allows the rickshaw-pullers to reach the breakeven point within 10–12 months.

Significant research, especially in terms of design and technological improvements is also being conducted to make cycle rickshaws a more comfortable mode of transport for both the passengers as well as the drivers. While GWA is responsible for all the research, operations, etc., the local government provides infrastructural help, especially in setting up 'Ecocab' stands at different locations within the city.

The "Ecocabs" scheme in Fazilka has been a success and has attracted significant attention and appreciation from all ends. If viewed from the perspective of mobility for poor and mobility as a livelihood for poor, it has contributed towards both. Additionally, the scheme has promoted the use of most environment-friendly means of transport. It has made a huge contribution towards well-being of the rickshaw pullers and the improvement of environment, in addition to providing a low-cost mobility choice for the city residents.

The project was awarded with "National Award of Excellence" in the area of Non-Motorized Transport (NMT) in 2011 by the Ministry of Urban

Development, Government of India.² The success of the scheme in Fazilka has encouraged the state government to introduce the concept in 22 other cities of the state. Beyond cities in Punjab, the state of Haryana and other cities in the country like Delhi, Chandigarh, and Jaipur are also considering implementation of similar schemes to promote sustainable and inclusive mobility choices.

References

Asija N. Replicating Fazilka initiative on Ecocab in other Punjab cities – presentation made at workshop ‘Our right of way: Walk and cycle’, organized by the Centre for Science and Environment (CSE), New Delhi, March 2012.

² <http://ecocabs.org>



2

ORGANIZING THE CYCLE RICKSHAW INDUSTRY: Case study of Sammaan Foundation's work in India

Place: India

KEY FEATURES

- 🌱 Innovative business model to organize the cycle rickshaw industry
- 🌱 Cycle rickshaws provided rent-free to the rickshaw pullers
- 🌱 Revenue earned from advertising, commissions on loans, and R&D activities

Cycle rickshaws are a predominant mode of transportation in many Indian cities. Even though cycle rickshaws are one of the most popular modes of transportation, the cycle rickshaw industry remains a highly unorganized sector; almost 95% of the cycle rickshaws in any given city are run on a daily rent basis and are not owned by the cycle rickshaw drivers. The cycle rickshaw-pullers are usually exploited by the owners, who otherwise claim to be charging a nominal rent for their cycle rickshaw.

In 2007, Mr Irfan Alam established the Sammaan Foundation with the aim to organize the cycle rickshaw industry. The foundation follows an innovative business model. The underlying idea behind this is that the cycle rickshaws being mobile have the potential to offer a higher market penetration to the corporate sector, in the cities and towns of India. Sammaan Foundation capitalized on this characteristic of the cycle rickshaw industry and successfully transformed it into a marketing instrument for corporates. The profits generated through the sale of advertising space on the cycle



A Sammaan foundation cycle rickshaw



Mr. Irfan Alam with Sammaan rickshaw pullers

Source: <http://indiamicrofinance.com>

rickshaws are partly used to cover the cost of the cycle rickshaws that are provided rent-free to the rickshaw pullers.

The cycle rickshaws while serving the mobility needs of the local population also provide services like magazines, newspapers, first-aid, and music, and also sell items like fruit juices, water bottles, etc. Passengers are even provided with facilities like payment of their utility bills and mobile phone recharge. All these facilities have led to value-addition to the cycle rickshaw industry. The foundation has also focused on improving the design of the cycle rickshaws. Improved, spacious, and lighter cycle rickshaws have been introduced.

Sammaan Foundation's revenue comes from:

- commission on vehicle financing loans for the cycle rickshaw-pullers, commission on the recovery of those loans, and on opening of new bank accounts for the rickshaw-pullers (30% of total revenue)
- revenues earned through R&D activities, which the foundation carries out for the cycle rickshaw manufacturers in India (40% of total revenue)
- revenue from selling the advertising space (30% of total revenue)

In 2010, Sammaan Foundation controlled 300,000 cycle rickshaws in the states of Bihar, Jharkhand, Uttar Pradesh, Madhya Pradesh, and National Capital Region (excluding Delhi). Initiative by the Sammaan Foundation has transformed the lives of hundreds of rickshaw-pullers by ensuring them some form of financial security and rescuing them from the exploitative daily cycle rickshaw hiring system. Through appropriate training, capacity building, and financial support, the Sammaan Foundation has transformed the cycle rickshaw industry into an organized sector and also into a business opportunity.

References

Anjaly, Bhawna, and Arun Sahay. "Sustainable Transportation: A Way Forward for Rickshaw- pullers with Sammaan Foundation". Available at <http://www2.hull.ac.uk/science/pdf/ANJALY%205b.pdf>.

Sengupta, Snigdha. *Pedalling to success*. Business World, 29 March 2010.

Entrepreneuring India – Irfan Alam and Sammaan Foundation. Available at <http://indiamicrofinance.com/entrepreneuring-india-irfan-alam-sammaan-foundation.html>.



3

ENABLING OWNERSHIP OF CYCLE RICKSHAWS BY CYCLE RICKSHAW DRIVERS: Dipbahan Rickshaw Bank Project in India

Place: Assam (India)

KEY FEATURES

- Financial scheme introduced to enable cycle rickshaw ownership by the drivers
- Scheme coupled with measures like improvement in rickshaw design, provision of insurance, uniforms, ID badges, etc.

In most small- and medium-sized cities of India, cycle rickshaws play an important role in meeting the mobility needs of the population. Cycle rickshaws serve as an appropriate mode in these cities as most of the trips here are short enough to be covered by pedalling. Typically, in Indian cities, cycle rickshaw drivers do not own the rickshaw; some studies suggest that almost 95% of them in India hire the rickshaw on a daily basis and pay a rent. In this type of financial arrangement between the cycle rickshaw owner and the driver, the driver usually pays a fixed rent to the owner and the rest of his earnings are his income. The fixed rents generally form almost one-third of the income of cycle rickshaw drivers, or sometimes even more, thus reducing their net earnings significantly. The financial arrangement is highly exploitative for the rickshaw drivers as they tend to work for 12–14 hours to make a decent living.

The Initiative

An initiative in the form of “Dipbahan Cycle Rickshaw Bank Project” was taken up by Dr Pradip Kumar Sarmah (Founder, Centre for Rural Development, Guwahati) in Guwahati in November 2010 to enable the cycle rickshaw drivers to own a cycle rickshaw through a simple financial scheme. The aim of the project was to rescue the cycle rickshaw drivers



Mr. Pradip Kumar Sarmah at work



Cycle rickshaw puller showing his Dipbahan Identity card



Fleet of improved Dipbahan cycle rickshaws

Source: <http://www.harmonyindia.org/>

Source: <http://business.rediff.com/slide-show/2010/oct/20/slide-show-1-innovation-deep-bahan-for-rickshaw-pullers.htm>

from the exploitative daily rent system and enable asset ownership. Under this scheme, the rickshaw driver is required to pay a sum of INR 40 per day towards the cost of the cycle rickshaw, and at the end of the year or a half, he is able to own one. This innovative funding approach has been coupled with other measures to meet the capital needs. The corporate firms are given space for advertising on the cycle rickshaws in exchange for a fee, which makes up for the seed capital of the bank.

The design of the cycle rickshaws has also been improved through this scheme and new light weight, comfortable, and cost-effective cycle rickshaws have been developed in association with Indian Institute of Technology (IIT), Guwahati. The scheme also includes provision of insurance; each cycle rickshaw driver is provided with third-party insurance. All Dipbahan drivers are given a uniform, pair of slippers, a license, an insurance policy, and an identity card. Under the scheme, the rickshaw drivers are provided with additional benefits like health checkup, fuel package (LPG gas with stove), and educational exchange programme for the children of rickshaw drivers. The distinct identity is helping the rickshaw driver community gain a sense of dignity, while they continue to provide their services to meet a significant part of urban mobility needs.

The initiative has been a huge success, not just in Assam but throughout India. By year 2012, there were about 5,000 Dipbahan rickshaws operating in various cities of Assam. The initiative has been expanded to other cities like Lucknow, Varanasi, and Allahabad in the state of Uttar Pradesh, with a total of about 12,000–14,000 more Dipbahan cycle rickshaw drivers in all these cities.

New models of cycle rickshaws are also being developed by the Centre for Rural Development (CRD), Guwahati, with solar panels, lights, FM radio, and a mobile charger. This initiative is truly making a difference at the ground level. The rickshaw bank has emerged as one of the largest cycle rickshaw service provider in India, while offering low-cost innovative financial solutions to the cycle rickshaw sector. The membership of the bank has now reached more than 30,000 families.

References

Arora A, M Jarnhammar, and F Jawed. 2010. “Green and Pro-Poor? The role of Informal Public Transport in India” Presented in the Conference on the ‘The Environments of the Poor’, 24-26 November 2010, New Delhi.

Anju Mohan. *Dipbahan: Bank of Ideas*, 2012. Available at http://www.harmonyindia.org/hportal/VirtualPageView.jsp?page_id=18682&index1=2.

Pradip Kumar Sarmah. “Rickshaw Bank: Empowering the Poor through Asset Ownership”, *Journal – Innovation: Technology, Governance, Globalization*. Special edition for Tech4Society: A celebration of Ashoka-Lemelson Fellows. MIT Press, Hyderabad, 2010.

Centre for Rural Development. See website <http://www.crdev.org/cs2.html>



4

SOLECKSHAWS: Dual powered cycle rickshaws in Delhi

Place: New Delhi (India)

KEY FEATURES

- Dual drive: Manual and solar power assisted
- Removal of drudgery and hardship of the rickshaw pullers
- Zero-emission technology
- Employment options to the poor, especially old and the weak

Soleckshaw is a battery-powered and pedal-assisted dual-powered tricycle. The batteries in soleckshaws are charged using solar energy.³ Though pedalling is not required, if pedalled, the soleckshaw gains more power. Aimed at reducing the physical effort involved in pulling passengers on cycle rickshaws, soleckshaws have been designed by the Council of Scientific and Industrial Research (CSIR) and Central Mechanical Engineering Research Institute (CMERI). The technology has now been transferred to the manufacturers selected by the government.

Soleckshaws were first launched as a pilot project in 2008 in the old city area of Chandni Chowk in Delhi. Chandni Chowk is one of the oldest and busiest markets of Delhi characterized by a network of narrow and winding streets.

The Soleckshaws can carry two passengers, a payload of 200 kg excluding the driver and run at an average speed of 15 km/h, which can go up to a maximum speed of 40 km/h. Typically, a fully-charged battery can run for about 70 km. When batteries run out, the solar-powered rickshaw drivers swap the exhausted cells for fully-charged ones at solar-powered charging stations.⁴ The cost of recharging the battery is about INR 45 (less than US\$1).⁵ Battery



Chief Minister Sheila Dikshit and Union Minister for Science and Technology Kapil Sibal riding a solar-electric rickshaw after launching it in Delhi in 2008

Source: <http://www.wired.com/autopia/2008/10/solar-powered-r/>

³ <http://asiancorrespondent.com/37308/soleckshaw-%E2%80%93-solar-rickshaw-as-green-postal-delivery-vehicle/>

⁴ http://www.cecni.res.in/krc/news_clippings/solar%20rickshaw.pdf

⁵ <http://www.dancewithshadows.com/tech/solar-electric-rickshaws-launched-in-delhi-chandni-chowk/>

recharging stations have been set up by the Central Electronics Limited (CEL) at few locations in the old-city area. An alternative battery is also provided to the rickshaw-pullers for the time his battery is being recharged at the stations. For increased safety of both the driver and the passengers, all the three wheels have the braking system.⁶

DESIGN CHARACTERISTICS	
Power source	Solar and manual
Type of drive	Motor-assisted pedal driven (hybrid)
Electric motor	BLDC Hub Motor, 240W-36 V, on front wheel
Charging	From solar-powered charging station
Battery	Deep discharge Pb acid batteries
Motor Controller	Controls the speed of motor
Transmission	Chain and Sprocket drive with differential transmission
Brakes	Drum and shoe brakes on both rear wheels; brake on motor at front wheel
Total Weight	100 kg
Source http://www.skoch.org/8tw/SKOCH-%20S&T%2018032011.pdf	

Initially the soleckshaws were available at a cost of Rs 30,000 which was about 3-times higher than the cost of traditional rickshaws and were far from the reach of the rickshaw-pullers. Due to the high cost, the soleckshaws did not gain much popularity initially despite their huge environmental and health benefits. Significant research — especially in terms of design and technology improvements — has been done to make soleckshaws more economical and available to the rickshaw-pullers. To promote the vehicle and make it more affordable, the government is providing incentives like 4% concessional excise duty and also exemption from customs duty on its key parts and components. Greater volume of production are expected to further bring down the cost of the vehicle. Apart from the above, loans at lower rates and microfinancing schemes are also being made available by the government and NGOs working to promote this eco-friendly vehicle.

Designed to ease the physical labour involved in pulling the rickshaws, these dual-powered soleckshaws with widespread use are expected to promote cleaner modes of urban mobility. It is also seen as a major source of employment generation for the poor. The project is also expected to reduce the incidence of several diseases suffered by the rickshaw-pullers on account of hard work and malnutrition. With zero emissions at the end-use level, soleckshaws are seen as a new potential face of urban transport for short-distance travel.

References

http://www.dnaindia.com/india/report_budget-concessions-for-soleckshaws_1353741

<http://www.icast.org.in/news/2010/mar10/mar29EFY.pdf>

⁶ <http://www.scribd.com/doc/38994039/soleckshaw-09mba57>



5

PANGKALANGS: A cooperative organization of drivers of informal transport system in Indonesian cities⁷

Place: Indonesia

KEY FEATURES

- Cooperative organization of informal transport drivers, Pangkalang or rank, regulates the informal transport operations
- Pangkalangs can be instrumental in influencing city-level policies/planning

Informal transport plays an important role in meeting the urban mobility demand. This is especially true in case of small- and medium-sized cities where the formal public transport systems are limited in reach and capacity. The informal systems in these cities play a critical role in meeting the medium- to long- distance urban mobility needs, especially of those who cannot afford private motorized vehicles.

A variety of informal modes ply in the Indonesian cities: Angkot, Ojek, Bajaj, and Becak are some of the common informal modes. Angkot is a 10–12 seat minivan, Ojek is a motorcycle taxi to ferry single passenger, Bajaj is a motorized three-wheeled taxi service, and Becak is a non-motorized three-wheeled vehicle used as taxi service.

The informal systems in Indonesian cities not only complement the formal public transport systems, but also meet the needs of specialized traveller groups. The flexible services provided by these modes accommodate a variety of demand and uses. The informal transport modes are also a cheap mobility option, thus meeting the needs of low-income and urban-poor population in Indonesian cities.

The complementary nature of these modes helps in filling the gap left by the formal public transport systems. The informal modes typically do not compete with the formal system but rather serve the areas unserved



Pangkalang of becak drivers

Source: <http://fizsaja.wordpress.com/2010/04/23/pangkalan-becak/>

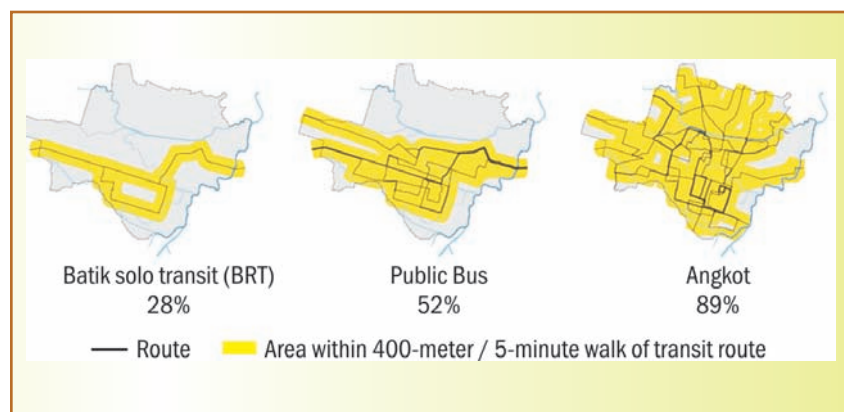
⁷ Report on “Informal Public Transportation Networks In Three Indonesian Cities”, June 2011, Cities Development Initiative For Asia

by the formal public transportation. The informal service networks usually come up in a manner and their services begin where the service of formal public transportation systems end.

The figure shows coverage of the formal public transportation system as well as the informal systems in the city of Solo, a medium-size city located in central Java. The comparison in coverage clearly brings out the extensive coverage of the informal system. These systems provide a far better coverage in the city along with providing last mile connectivity to the passengers, which the formal public transportation system is unable to provide.

In the context of Asian cities where the formal and informal transport systems coexist, it is important that both the systems complement each other. But, if instead of working as complementary transport modes, they act as competing modes, problems like oversupply in certain routes and under supply in others start occurring. Such a situation causes problems like reduced revenue for both the modes, poor safety conditions due to competition, reduced last mile connectivity, etc. To prevent such a situation, the city governments should take preventive measures and manage both the formal and informal transportation systems optimally. Additionally, the cities and service operators should also aim to improve and organize the informal services in order to make them complementary to the formal systems and ensure their optimal utilization in meeting the unfilled/niche urban mobility demand. Such an initiative to organize informal transport services ('Pangkalang') has been undertaken in Indonesian cities by the operators.

Pangkalang or rank, is a cooperative organization of informal transport drivers. Ranks could be formed through a variety of means, ranging from government recognition to sharing of uniforms among the rank members, etc. The membership in a rank permits a driver to operate in a particular territory like near a market or in a neighbourhood or to serve a station or a specific customer group. Rank members have access to uniforms, parking attendants, shared repair equipment, and sometimes even an emergency fund. Each rank could be identified through its distinct uniforms, design of vehicles, sign boards, etc. This makes the informal transport stands easy to locate. In Pangkalangs, members are accountable to the group;



Source: Report on "Informal Public Transportation Networks in Three Indonesian Cities", June 2011, Cities Development Initiative for Asia

the drivers tend to follow safety guidelines like providing passengers with helmets. Sometimes, these organizations are also supported by public and private actors like police, hotels, or other businesses. Such associations not only enhance the mobility options for the residents but also benefit the informal transport drivers by ensuring them a regular income. Formation of Pangkalang helps the member drivers gain political leverage. This helps them to negotiate with the police or the local government. Thus in this way, if powerful enough, the Pangkalang can also influence policies. This was demonstrated in case of Solo, where a rank – PPBS consisting of 400 members influenced the annual participatory budgeting process in 2008–09. Through this process, the residents can direct government investment into their neighbourhoods. The PPBS in 2008–09 participated in this public planning forum and received a grant of Rp 2 million⁸ for the purchase of becaks.

This small innovation in the form of ‘Pangkalang’ on the part of informal transport drivers is not just ensuring resource sharing, political influence, and more importantly a stable income, but steps like an emergency fund are providing some form of insurance to this informal sector. Such organizations on one hand are benefitting the drivers and on the other hand are also proving their worth for the society at large through incorporating better safety conditions. Such a step is certainly a way forward towards better urban mobility, however more needs to be done to organize the sector and gain from its ‘unique’ operational characteristics. The government should participate proactively in providing integration between the formal and the informal public transport systems. To enhance urban mobility, a proper support mechanism should be evolved for the operators of informal transport. The government can provide support to informal public transportation (IPT) providers through provision of infrastructure, like, parking space, designated stands/stops, etc. Small investments towards integration of formal and informal public transport systems can go a long way in enhancing the quality of public transportation — formal and informal — in the cities of Indonesia.

References

CDIA Report on “*Informal Public Transportation Networks in Three Indonesian Cities*”, June 2011, Cities Development Initiative for Asia (CDIA).

⁸ Rp. refers to Indonesian Rupiah



6

SHIFT SYSTEM: Solving the problem of oversupply of Angkots in Bogor, Indonesia⁹

Place: Bogor (Indonesia)

KEY FEATURES

- Shift system introduced for informal transport modes, i.e., Angkots
- Angkots can ply only in specific shifts
- The oversupply of Angkots in the city has been checked
- The problems of congestion, unsafe road conditions, etc., on account of Angkot operations have reduced

Bogor is a city of approximately 1 million people and is located about 50 km south of Jakarta, Indonesia. Angkots, 10–12 seat minivans, are a dominant public transport mode in Bogor. It plies on fixed routes with high frequency boarding and alighting passengers wherever required. High frequency ensures lower waiting time for the passenger and high route densities lead to better last mile connectivity. An informal transport system in the city, Angkots while meeting the mobility needs of the city have also lead to serious traffic problems in the city of Bogor.

There are more than 8,000 Angkot vehicles that are licensed to operate in Bogor. A large number of Angkot vehicles lead to competition amongst the drivers to increase their patronage and thus the revenue. The patronage of Angkots has been reducing over time as people prefer to travel by private vehicles, especially motorcycles, as they are faster and more convenient. Also, the Angkot vehicles with low roof and door height make it difficult for the passengers to alight and board the vehicle, thus leading to discomfort. The inappropriate design of Angkot vehicle has also contributed in reducing its popularity. As a result of the declining patronage of Angkots, the drivers have resorted to unsafe driving practices, which lead to congestion and safety problems. To increase the patronage, the Angkot drivers are either too slow to pick up passengers or they drive too fast to overtake the leading



Large number of Angkots congesting the streets of Bogor

Source: <http://lifeisgift.files.wordpress.com/2010/09/img00058-20100925-1333.jpg>

⁹ Paper on “Strategies for Bogor’s Angkot”, David Overington, Journal of the Indonesia Infrastructure Initiative: Prakarsa, April 2011

ANGKOT LICENSED TO OPERATE IN BOGOR CITY (2002–2010)				
Year	City	District	Other	Total
2002	2460	6976	1987	11423
2003	3506	4827	1987	10320
2004	3506	4827	1987	10320
2006	3506	4827	1987	10320
2007	3506	4827	1987	10320
2008	3425	4827	1987	10239
2009	3425	4827	1987	10239
2010	3413	4644	1879	9936
Source Bogor City Records				

Angkot vehicle so that it can pick up more passengers. In both the cases, they either cause congestion in the limited road space or create unsafe road conditions due to fast-driving practices.

To solve this problem, the Bogor City Angkot association and Bogor City government took a decisive step in year 2009 to introduce a shift system for its operations. Under this system shifts were introduced; the Angkot vehicle could operate only in one of the shifts, either A or B or sometimes a third shift C, depending upon the number of Angkot vehicles operational on a given route. The 'A' shift vehicles operate on certain days and 'B' shift vehicles operated on the other days. Such a system has reduced the number of Angkot vehicles operating on the roads to half and has offered multiple advantages to the operators, passengers, and the city administration. The first advantage is the reduction in congestion as the number of vehicles has reduced to half. The Angkot operators have benefitted as they are able to earn the same revenue doing half the shift. The competitive driving practices are no longer adopted by the Angkot drivers, thus addressing the safety issues. The passengers are also satisfied with safer operations of the Angkots and are unaffected by the reduction in service frequency of the Angkots as there is unnoticeable increase in their waiting time. In case of A, B, and C shift system; two of the three shifts are allowed to operate at any point of time. A three-shift system is adopted for only those routes where the demand is too high to be catered by a two-shift system.

Till 2011, the shift system had been implemented in 11 of the 23 Angkot routes in the city. This system has been immensely successful as it has reduced almost 8% of the vehicles from the city streets. The most appreciable aspect of the whole system is that there are almost zero adverse impacts. Urban traffic condition in Bogor city has improved; congestion has reduced, safety has increased, while at the same time there has been no loss of income to the Angkot drivers. The shift system has truly offered a win-win situation for all the stakeholders.

References

Overington D. 2011. "Strategies for Bogor's Angko", *Journal of the Indonesia Infrastructure Initiative: Prakarsa*



7

IMPROVING INFORMAL TRANSPORT SYSTEM THROUGH LEGAL AND REGULATORY MECHANISMS:

Regulations for improving minibus-taxi industry in Western Cape, South Africa

Place: Western Cape Province (South Africa)

KEY FEATURES

- Legalization of informal minibus-taxis
- Requirement of registration of associations and operators of minibus-taxis with the Provincial Registrar
- Route-based permit system introduced
- Mandatory replacement of old fleet
- Scrapping allowance for minibus-taxi owners in exchange for their vehicles; used as a deposit for the new Recap vehicles
- Formation of a 'Unified Taxi Council' at the provincial level
- Policy to encourage integration of informal systems with formal systems

The Western Cape Province in South Africa has a population of about 4.5 million people, with 70% of the population living and working in and around the city of Cape Town. Western Cape has a good transport infrastructure, an extensive road and rail network, providing connectivity between all the major centres of the province. The road-based transportation is provided by a large fleet of buses and minibuses. In spite of the presence of a well-established rail and road system, it has been observed that there has been a steady decline in the number of rail and bus commuters and rise in the mini-bus ridership in the province.

MODAL SHARE CITY OF CAPE TOWN

Mode	1987	1998	2000
Rail	65%	62%	62%
Bus	24%	18%	14%
Minibus	11%	20%	24%

Source Y. Ahmed, paper on "Transformation of public operations from informal to formal services: An examination of initiatives by the Western Cape Provincial Department of Transport to transform the minibus taxi industry"



Source: http://www.cmt4austin.org/African_shared_taxi.html

Despite the large government subsidies to the rail and bus services, their ridership has continued to decrease, while the informal minibus-taxi service have filled the gap created by the inefficient public transport services. The popularity of minibus-taxis has primarily grown due to the fact that it provides door-to-door service to the commuters. Being aware of the significant role played by the minibus-taxis in enhancing the economic opportunity of its people and meeting their mobility needs, the new democratic government of South Africa (in 1994) gave the minibus-taxi services and operations very high priority. Initiatives were taken by the government to improve the informal minibus-taxi operations.

National Taxi Task Team

With the spirit to understand the problems of the minibus-taxi industry, a National Taxi Task Team (NTTT) was setup in South Africa in 1995. This team consisted of representatives from the taxi industry, from all the tiers of government, and also specialist advisors. The focus area for NTTT was regulation and control, formalization and training, and economic assistance for the minibus taxi industry. In Western Cape, a Provincial Taxi Working Group was established by the provincial department of transport and public works to implement the recommendations of NTTT published in 1996. The key recommendations of the NTTT were regarding registration of the minibus taxi operators, training and empowerment of the operators, formation of taxi councils and establishment of their election procedures, and improvements in the legislation regarding minibus taxi operations and recapitalization of the old fleet.

Legislation

In 1994, after the new government came into power, the Road Transportation Act of 1977 was amended and metred taxis and buses were accepted as legal public transport vehicles, unlike previously when no provision existed for the minibus-taxis.

Registration

In 1996, Western Cape Road Transportation Act Amendment was introduced wherein legal definition of the minibus service taxi was presented. This new act also required the associations and operators to register themselves with the Provincial Taxi Registrar. The Provincial Registrar is an autonomous institution appointed by the Provincial Minister of Transport, not subject to reporting under any government department. The Provincial Registrar is responsible for registration of minibus-taxi associations, their members, and the vehicles. He also keeps a record of the routes on which the associations are given a permit to operate. Before registration, the registrar makes sure that the taxi association meets the minimum criteria as per the national and provincial legislation. In case of Western Cape provincial regulations, the association should comprise of a minimum of 10 members, each having at least one legal operating permit linked to a roadworthy bus. The association also needs to sign a constitution and a code of conduct. This ensures that the associations adopt a standard minimum constitution.

Under the standard minimum constitution, the associations are required to hold annual general meetings, prepare audited financial statements and establish a mechanism for managing grievances, and internal disciplinary procedure. The registrar is also responsible for monitoring the compliance of the constitution and the code of conduct by the associations. In case of contravention of the constitution or the code of conduct, the registrar has the powers to summon an association or its members, or fine the association or even cancel the permit of the association, in case of serious violations.

Changes in the permit system

The Provincial Minister for transport and public works formulated regulations which required all the new permits to be issued on route basis and the minibuses were marked to identify them as the legal operator and also to identify the route on which they were permitted to operate. Previously, the minibuses were issued radius permits that authorized the minibuses operators to work along any route falling within the permitted radius (generally a 30 km radius). The increase in number of minibuses led to fierce competition amongst the minibuses operators for passengers and the most profitable route. Due to the lack of enforcement by police, operators trespassed the “boundary agreements” leading to turf wars. As per the new regulations, the permit holders were required to convert their radius based permits to route based permits. By the end of 2002, 95% of the radius-based permit holders were converted to route-based permits.

Recapitalization of the minibus-taxi fleet

Due to lack of investment on replacement of the old fleet, the average age of the fleet climbed up posing a serious safety hazard; in 1997 the industry spent only 35% of the required investment on recapitalization of the minibus fleet. To encourage recapitalization of the minibus fleet, the government proposed a strategy to replace all the 16-seater minibuses. As per the National Land Transport Transition Act, 2000, all the old minibuses were to be replaced by 18- and 35-seater buses. It was also announced that the operating licenses will no longer be issued to 16-seater minibuses. The government also proposed a “scrapping allowance”, under the “Recapitalization Programme”. Scrapping allowance was to be paid to the minibus taxi owners in exchange for their current vehicles and used as a deposit for the new Recap vehicles.

Training

A government-funded training programme to enhance the standards of operations and management of minibus-taxis was also taken up. Training programmes like advanced driving techniques, fleet management, first aid, customer care, etc., are now conducted regularly to improve the functioning of the minibus-taxi operations.

Enhancing the institutional capacity: Unified Taxi Council and EISA

One of the problems that government faced in formalizing the minibus taxi operations was the fragmented nature of ownership of the minibus-taxi industry. Government found it difficult to engage with more than 150 individual associations in the Province and thus facilitated the formation of a “Unified Taxi Council”, which represented interests of all the minibus taxi operators in the province.

At national level, the requirement of a representative body was felt, which could express the views and fears of the taxi industry on key issues. The provincial department of transport and public works set up an independent body — Electoral Institute of Southern Africa (EISA) — to supervise the elections of a new provincial representative structure. In 2002, EISA ensured transparent elections at special general meetings, regional, and national level.

‘Public transport first’ policy

The Western Cape Province adopted a policy of “Public Transport First”, giving preference to the public transport over other traffic. A Public Transport branch was established under the department of transport and public works. The public transport department developed a provincial vision and also a strategic delivery programme to realize the vision over a period of five years. Under this programme, a lot of emphasis has been put on the inclusion of the minibus-taxi operations into the formal public transport system through funding, training, and institutional reforms.

In a short time, the Government of South Africa has achieved success in formalizing the highly unregulated minibus taxi industry in the province of Western Cape through its industry friendly policies and stakeholder participation. The government has taken the issue of transformation of the informal minibus taxi industry a step further by a “Public Transport First” policy where it gives emphasis on integrating the informal public transportation with the formal transport system. The case highlights the initiative on part of the government to improve informal transport system through legal and regulatory mechanisms.

References

This case study has been adapted from the paper see. Y. Ahmed, Department of Transport and Public works, Western Cape, Republic of South Africa. “Transformation of Public Transport Operations from Informal to Formal services: An examination of initiatives by the Western Cape Provincial Department of Transport to transform the minibus-taxi industry”.



8

IMPROVING INFORMAL AUTO RICKSHAW SERVICES THROUGH FLEET ORGANIZATION: G-Auto services in Rajkot city, Gujarat (India)

Place: Rajkot, Gujarat (India)

KEY FEATURES

- Entrepreneur-driven fleet organization
- Dial-A-Rickshaw service
- Affordable and comfortable services for all
- High quality service

G-Auto is the brand name given to an organized fleet of auto rickshaw service. The service is provided by a public charitable trust called Nirmal Foundation based in Rajkot city in Gujarat, India. The scheme aims at organizing the auto rickshaw drivers under a social umbrella and improving the quality of service. Currently offering services in different cities of Gujarat namely Ahmedabad, Gandhinagar, and Vadodara, G-Autos have become a brand in itself.

With a population of around 1.3 million people, Rajkot is one of the fastest-growing cities in India. Auto rickshaws play an important role in meeting the mobility needs of the people in the city. Until very recently, the auto rickshaw service in Rajkot was highly unorganized comprising a collection of informal auto-rickshaw fleets and companies, with more than 12,000 auto rickshaws providing shared services and charging the fares as per the their own discretion. Recognizing the large benefits offered by the auto rickshaws in terms of door to door service, flexibility in operations, etc., local authorities decided to organize the auto rickshaw service in the city as a step to offer a safe and reliable service to the locals. The Rajkot Municipal Corporation (RMC) in partnership with EMBARQ India selected G-Auto as a strategic partner for implementing and running its unified auto rickshaw fleet with the '**dial-a-rixa**' service. The project was launched in



Source: <http://www.mobiprize.com/2012/04/16/g-auto/>



CNG Auto rickshaws in Rajkot, Gujarat

Source: <http://insights.wri.org/>

July 2012 with a pilot fleet of around 50 autos and is expected to scale up over time.

G-Autos provide metre-based services with a government regulated fare structure, on the lines of other cities where G-Auto is currently offering services. 'Dial an auto rickshaw service' makes the auto rickshaws only a phone call away. Autos are available to the passengers at their doorstep at any time of the day with no extra charges for the same. It also helps auto rickshaws serve as a major alternative to the door to door use of private automobiles. Further, auto rickshaws also serve as a major feeder mode ensuring last mile connectivity to the other modes of transport. To achieve this, auto rickshaws are being made available at all the major public transit stations, high-demand transport hubs, such as bus stops, intercity bus terminals, railway stations, and the airport.

In Rajkot, fleet organization in the auto rickshaw sector is expected to address the key challenges related to the mode including poor public perception, informal fare structure, lack of employment benefits to drivers, operational inefficiencies, and lack of regular maintenance of the vehicles. At the same time, giving due recognition to the mode under a distinct brand image is expected to improve the quality of service offered. Apart from the above, the project also promises employment benefits to drivers, which includes accident insurance, health cover, training, and additional revenue from advertising.

While G-Auto is responsible for implementing the project and setting up operational systems for the same, the RMC is committed to providing seed funding, infrastructural support, and stakeholder management for the duration of the project. EMBARQ India offers technical advice and expertise in the scheme.

The project has brought significant attention and appreciation from the central as well as state government as an initiative to improve the quality of services for passengers as well as quality of life for the drivers. Reforms related to auto rickshaws do not directly fall under the regulatory purview of the city municipal corporation, but the city government in coordination with other stakeholders including traffic police, regional transport office (RTO), service providers, and driver unions has made significant efforts in the implementation of the fleet auto rickshaw service. With slight changes based on its context and applicability, this model is definitely worth adopting in other cities as a way to improve and promote the informal manner of service provision by modes like auto rickshaws, mini-buses, etc.

References

<http://www.embarq.org/en/node/5081>

<http://www.business-standard.com/india/news/rmc-to-launch-autocall-service/471803/>

<http://www.embarq.org/en/news/12/02/10/rickshaw-rising-auto-rickshaw-entrepreneurship-summit>

<http://cleanairinitiative.org/portal/node/8390>



9

REDUCING ENVIRONMENTAL IMPACTS OF INFORMAL MODES: Conversion of shared auto rickshaws in Ahmedabad to CNG

Place: Ahmedabad, Gujarat (India)

KEY FEATURES

- Shift from petrol to CNG-run shared auto rickshaws
- Reduction in pollution levels at the city level

Ahmedabad, also known as Amdavad, is the fifth-largest city and seventh-largest metropolitan area of India with a city population of more than 5.5 million and an extended population of 6.3 million (Census, 2011).

Ahmedabad has been consecutively ranked over the last few years as one of the best cities to live in. But that has not been the case always. In 2001, Ahmedabad was listed as the 4th most polluted city among 85 cities in India monitored by the Central Pollution Control Board (CPCB) under the National Ambient Monitoring Programme. As per CPCB's monitoring results, the city showed alarming levels of air pollution in 2001 and required immediate attention. High pollution levels in the city were primarily attributed to the unprecedented growth in vehicles in the city. Vehicular pollution was estimated to contribute to about 50–70% of the air pollution (CPCB, 2001).

Vehicle population in Ahmedabad comprises buses, auto rickshaws, private vehicles, etc. Among the various modes, auto rickshaws have been a vital mode of transport providing low-cost mobility options to the locals. The popularity of the mode among other modes of transport can be attributed to a number of reasons. Auto rickshaws provide affordable and comfortable door to door services to all sections of society. Auto services also operate on a shared basis within the city (the informal operations).



CNG auto offering shared service in Ahmedabad, Gujarat

Source: <http://razmatazz.mgis.in/tag/auto-rickshaws/>



Auto rickshaw transporting school children

Source: <http://www.rediff.com/news/slide-show/slide-show-1-in-photos-incredible-india-part-1/>

Old city area of Ahmedabad is a major hub of employment for the low-income population in the city, many of whom have to come to the old city from the peripheral areas. The shared auto rickshaw services help in meeting the mobility needs of these poorer sections living on the fringes at relatively lower fares as compared to formal transport systems. Apart from this, shared services are also a preferred mode for travel to other nearby towns like Gandhinagar or the industrial areas due to their availability at all times and faster service in comparison to the public transportation buses operating on these routes.

Also, these modes are considered to be safe; evidential data shows that auto rickshaws are safer than other modes of transport. Specifically, due to the auto rickshaw's lower speed of travel, smaller size, and easy manoeuvrability, it is the motorized way of transport with the lowest commuter fatality rates.¹⁰ Auto rickshaws are also a major source of livelihood among the lower income groups.

Despite their popularity and critical role in meeting the mobility needs of the residents, auto rickshaws have significantly contributed to air pollution. The Supreme Court of India in 2001 had directed various states¹¹ including Gujarat to prepare 'urgent' action plans to lower the pollutants in their cities showing high pollution levels as per the CPCB report in 2001. In response to the ruling, the Government of Gujarat prepared Air Action Plans for its various cities namely, Ahmedabad, Vadodara, Bharuch, Surat, Rajkot, Jamnagar, Vapi and Gandhinagar in 2002. In these plans, the Gujarat Pollution Control Board had identified auto rickshaws as one of the major contributors to the high pollution levels in the transportation sector and recommended conversion of all the auto rickshaws to CNG.

Gujarat is favourably placed with regard to both the availability of natural gas and the natural gas pipeline infrastructure. Also the compression requirement is considerably reduced in Gujarat as the gas is already received in a compressed state to a level of nearly 50kg/cm². CNG in its ready state is compressed to a level of 250 kg/cm². The government saw it as a great opportunity and therefore proposed switch over of motor vehicles — public buses, autos, and taxis — to CNG owing to its high environmental benefits.

The implementation of the proposal to shift to CNG faced significant resistance from transport operators as well as suppliers. Shift to CNG included technological changes at both ends, i.e., supply side as well as consumer side. The main concern areas for the switch over included lack of infrastructure for refilling (stations or outlets, pipeline network, etc.), existing incompatible vehicles, availability of conversion kits, etc. The State of Gujarat hence, focused at ensuring adequate CNG supply, adequate supply stations and outlets to avoid long queues and also adequate availability of conversion kits in order to plan for smooth and easy delivery

¹⁰ The Auto Rickshaw Restructuring Project (2011), OneWorld Foundation India.

¹¹ Notice for preparation of action plans to the States of Maharashtra, Andhra Pradesh, Gujarat, Uttar Pradesh, Karnataka, and Tamil Nadu. Cities indicating high pollution levels: Ahmedabad, Kanpur, Sholapur, Lucknow, Bangalore, Chennai, Hyderabad, Mumbai, and Kolkata. For details see http://www.cpcb.nic.in/divisionsofheadoffice/pci3/08_Interim_report_on_cities.pdf

of CNG to the customers. Forty-five CNG stations were set up in the city on a PPP mode.

Apart from the reduced emission levels, it was estimated that the conversion to CNG would lead to an average saving of Rs. 100 per day per vehicle. But, this saving came along with an initial investment of Rs. 20,000 per auto as auto rickshaws required installation of CNG conversion kits. After installation, the vehicles were able to ply on both CNG as well as petrol as per the requirement and convenience of the owner. CNG use involves low operating and maintenance costs and therefore, also helped in recovering the initial conversion costs within a year. The rickshaw owners welcomed the idea of shifting to CNG but their major concern was the one-time conversion cost which seemed too high and most of them found it difficult to meet it. The Gujarat Pollution Control Board, therefore, gave the auto rickshaw drivers an incentive of Rs. 10,000 per auto for conversion. State, district, and local administration helped in the procurement of loans. Banks offered soft loans to the first 1,000 auto rickshaw owners who approached them for installation of kits. Also, all auto rickshaws registered before 1991 were phased out and a new fleet was introduced on roads to reduce the emission levels. At the same time, significant attention was given to provide proper training and awareness to all the stakeholders.

Ahmedabad had 72,937 CNG-operated auto rickshaws in 2011. The implementation of the plan has significantly helped in bringing down the air pollution levels and improving its ranking among the most polluted cities from 4th in 2001 to 13th in 2005, 43rd in 2006, and 66th in 2009.

References

Gujarat State Petroleum Corporation Ltd. *A Report on Implementation of CNG projects in Gujarat.* Gujarat State Petroleum Corporation Ltd., 2003.

Shivanand Swamy, HM. *Ahmedabad, India: Emerging Sustainable City in South Asia*, Presentation at CEPT University, Ahmedabad.

<http://www.business-standard.com/india/news/cng-conversion-to-help-autorickshaw-owners/184257/>



REDUCING THE ENVIRONMENTAL IMPACTS OF INFORMAL MODES: Conversion of diesel-run Jeepneys in Manila to clean fuels like LPG and electricity

Place: Manila (Philippines)

KEY FEATURES

- Shift from diesel-run Jeepneys to clean fuels like LPG and electricity
- Incentives to informal transport operators to shift to clean/alternative fuel vehicles

Jeepneys are the most popular travel mode throughout Philippines and have been often referred to as the 'Undisputed King of the Road'. Crafted out of the remnants of American jeeps used in the Second World War, these informally designed vehicles can be seen in many colours and offer a cheap alternative transportation mode to the people. Often associated with flamboyant decorations and overcrowded seating, Jeepneys are looked upon as the symbol of Philippines culture and creativity.

Apart from the informality in the design of the Jeepneys, informal ways of operation also characterize this mode of public transportation. It is the main choice of mode for medium travel distances ranging from 5–20 kms and can accommodate up to 20–25 passengers on an average. Jeepneys generally operate along fixed routes nowadays, which are clearly indicated on the exterior. They are mainly owned by the private owners who customize and decorate them as per their own choice. They are also available on fixed rent on a day to day basis.

Since its origin, the government has made numerous regulations to organize and improve this basic mode of transportation in Philippines. Today, the drivers require special licenses, charge fixed fares, and operate on fixed routes unlike earlier when the drivers could pick up passengers from anywhere along the way and follow any route. The route followed along with the origin and destination is boldly demarcated along the sides of the Jeepneys on the exterior. Also proper areas have been identified for loading/



Old traditional jeepney (left) vs new LPG jeepney (right)

Source: <http://business.inquirer.net/81636/finally-a-cleaner-jeepney>



LPG jeepney under examination

Source: <http://d0ctrine.com/2012/09/14/comparative-study-of-jeepneys-lpg-jeepney/>

unloading of passengers in order to ensure uninterrupted and smooth flow of traffic. However, despite the efforts, Jeepneys have long been negatively associated with congestion and high pollution levels. Considering the significant contribution of the diesel-run Jeepneys towards environmental pollution levels and its adverse health impacts on the population, the government has now started to encourage the operators to shift from diesel to cleaner fuel options like electricity and liquefied petroleum gas (LPG), especially for the new fleet. In March 2012, a study¹³ has been taken up to ascertain the “economic viability, environmental soundness, health impacts, and social acceptability” of LPG-run Jeepneys.

LPG as a fuel leads to significant reduction in the emission levels of particulate matter and other gases like carbon dioxide, carbon monoxide, hydrocarbons, etc. Also, the noise levels of engines running on LPG are less. Though, the diesel-run Jeepneys involve a high cost of conversion to LPG (in comparison to taxi conversion), the overall benefits are much more. The conversion of diesel-run Jeepneys is estimated at around Philippine pesos 300,000 as it requires changing the whole engine. Almost all Jeepneys have second-hand or even third-hand engines which add to the cost of conversion.

The government is also promoting the use of electricity-run Jeepneys. Electric Jeepneys or e-Jeepneys were first launched in 2008 by Green Renewable Independent Power Producers, Inc. or GRIPP in partnership with Mr Robert Puckett, President of Solar Electric Company in the Philippines. Since then, they are gaining popularity; the new set of e-Jeepneys is believed to be less costly than diesel-run vehicles and they are also more environment-friendly with zero tail-pipe emissions. Reduction in the age limit of the Jeepneys is also being looked at as a solution to reduce their environmental impact.

In 2012, the Philippines government has passed a Bill¹⁴ to promote the use of alternative fuel vehicles (AFVs) as a measure to reduce the country’s dependence on oil and reduce emission levels. As per the Bill, the government will provide tax incentives to the manufacturers, assemblers, etc., including exemption from excise taxes and duties for nine years and exemption from VAT for purchase and import of raw materials, spare parts, components, and capital equipment for nine years. Alternative-fuelled Jeepneys — e-Jeepneys and LPG-run Jeepneys — are expected to benefit from the provisions of this new Bill.

As the Philippines government promotes and introduces fleet using more environmentally friendly fuels, Jeepneys are expected to further grow as a low cost and environment-friendly mode meeting the demands of the locals especially the lower-income groups.

¹² The said study is being conducted by Global Ambient Hi-Technology Systems, Inc. (GATES); Philippine Automotive Depot Inc (PAD, Inc.); the Environmental Studies Institute of Miriam College in Quezon City; Citizens Organization Concerned with Advocating Philippine Environmental Sustainability (COCAP); Partnership for Clean Air (PCA); and Clean Air Initiatives Asia (CAI-Asia)

¹³ Bill titled “An act granting incentives for the manufacture, assembly or importation if electric, hybrid or alternative vehicles”. For details see <http://www.philstar.com/Article.aspx?articleId=788988&publicationSubCategoryId=63>

References

<http://www.philippines.hvu.nl/transport2.htm>

<http://www.mb.com.ph/articles/357738/operators-urged-to-reinvent-jeepneys>

<http://mb.com.ph/node/357770/dotc-to-launch-new-breed-of-jeepney>

<http://www.greatoffers4u.com/library/4308.unique-jeepney-experience.html>

<http://mb.com.ph/node/349176/govt-exploring-way>

<http://www.gmanews.tv/story/212976/jeepney-may-shift-to-new-lpg-engine-says-group>

<http://www.philstar.com/Article.aspx?articleId=788988&publicationSubCategoryId=63>



11

LEGISLATIVE REFORMS TO ORGANIZE INFORMAL TRANSPORT MODES: Case of non-Transmilenio buses in Bogota, Colombia

Place: Bogota (Colombia)

KEY FEATURES

- Legislative reforms introduced to address the problem of oversupply of non-Transmilenio buses and enhance their quality of service and productivity
- Mandatory electronic tags for non-Transmilenio buses
- Farebox collection and its distribution; responsibility of the bus company
- Encouragement to buy new fleet and scrap old fleet

Bogota has two types of public transportation systems — Transmilenio and non-Transmilenio. While the Transmilenio can be categorized as a formal public transportation system provided by the city government through a bus company known as Transmilenio Co., the non-Transmilenio public transportation system can be described as an informal system because of its operational characteristics.

Transmilenio is a world-class Bus Rapid Transport System (BRTS), which is operated under a trunk and a feeder system. The non-Transmilenio bus services on the other hand are the traditional bus services operating under three broad categories of buses (fitted on truck-chassis): buses, buseta, and minibuses. The Colombian law authorizes only bus companies to run a public transportation service, hence traditionally, the bus companies in Bogota used to acquire the route permits and then rented the routes to the bus owners. Even though the law made it mandatory for the bus companies to own at least 10% of their fleet, the law was grossly disregarded.

There is a high dependence of population on public transportation system in Bogota, with almost 70% of the motorized trips being made by public transport — formal and informal. Despite owning a world-class BRT system, Transmilenio, a large proportion of public transportation demand is met through poor quality non-Transmilenio buses.

The non-Transmilenio services are typically characterized by their poor quality of service, leading to longer travel times, and sometimes even



Source: <http://www.carros.com.cose-vende-buseta-daihatsu-delta-modelo-96-45000000-en-medellin-antioquia>



Source: <http://www.whotalking.com>

unsafe travelling conditions. An oversupply of the non-Transmilenio buses over the years has led to congestion, air pollution, and at times even penny wars. These vehicles are typically inadequately maintained by the operators in order to reduce the cost of operations and increase the revenues. The oversupply of buses has also reduced the ridership per bus; to keep up the profitability, the operators resort to cost cutting through practices, like lowering investments on the maintenance of their vehicles, etc. The quality of bus services also deteriorates as the bus companies delink themselves from service provision. Once the bus companies acquire route license (permit to operate bus service on a particular route), they rent out routes to as many bus owners as possible to increase their profit, instead of running the bus service through their own bus fleet.

In order to solve the problem of oversupply of non-Transmilenio buses and also enhance their quality of service and productivity, the Secretariat of Traffic and Transport (STT), Bogota, in the year 2003, restructured the non-Transmilenio system through a series of legislative reforms. Decree 112 to 116 were introduced to reform the non-Transmilenio bus operations. Decree 112 provided better control and sanctions to the operators.

- Decree 113 made it mandatory for all vehicles to carry an electronic tag. This law helped in reducing the number of ghost vehicles, better known as pirates in Bogota.
- Decree 114 ordered the bus companies to rent the buses from the bus owners. This was done to ensure that the bus companies participate in the operation and maintenance of the buses, as against the existing practices, wherein the bus owners were no longer responsible for service provision and were expected to become investors to earn profit from their asset. The bus company was entrusted with the responsibility of Farebox collection and its distribution to the bus owners as rent for the buses. This was opposite to the prevailing practice, wherein the bus driver was required to collect the Farebox revenue and return it to the bus owner, who further shared a part of revenue with the bus company.
- Decree 115 called for a reduction of 29% (5700 bus equivalents) in the number of buses affiliated to the bus companies. It also asked the bus companies to collect a part of Farebox revenue for the purchase of new fleet and scrapping the old fleet.
- Decree 116 ordered the bus companies to deposit the funds collected in a fiduciary fund. But later, the law was amended and the bus companies were allowed to manage their funds themselves.

The legislative reforms undertaken in Bogota in 2003 highlight some interesting and innovative measures to manage a highly unorganized sector like the non-Transmilenio bus operations.

References

Schalekamp, H., D Mfinanga, P Wilkinson, and R Behrens. "An International Review of Paratransit Regulation and Integration Experiences: Lessons for Public Transport System Rationalization and Improvement in African Cities", Paper presented at the 28th South African Transport Conference, July 2009, Pretoria, South Africa.

Ardila, Arturo, "Study of Urban Public Transport Conditions in Bogota, Colombia", 2005. Available at http://www.ppiaf.org/sites/ppiaf.org/files/documents/toolkits/UrbanBusToolkit/assets/CaseStudies/summy/sum_bogota.html

Hidalgo D, "Bogota Experience in Sustainable Transportation". Available at www.ati2000.it.



INTEGRATION OF INFORMAL TRANSPORT SYSTEM WITH THE FORMAL SYSTEMS: Attempts to integrate daladalas and BRT system in Dar-es-Salaam, Tanzania

Place: Dar-es-Salaam (Tanzania)

KEY FEATURES

- Owners of informal public transport modes, daladalas, being given an opportunity to become part of the formal BRT system proposed for the city
- Consortia with existing daladala operators being given preference for operating contracts
- Existing daladalas to serve areas not served by the BRT system and gradually to be phased out as the BRT system expands

Dar-es-Salaam, the capital city of Tanzania, has a population close to about 4 million people. The city is dependent on public transport services for meeting a significant portion of the mobility needs of its population. The public transport services in the city are largely provided by the informal transport modes, daladalas.

Daladalas are privately owned minibuses. The daladala service is highly demand-responsive, affordable, and plays an important role in meeting the mobility needs of the people in Dar-es-Salaam. Even though daladalas are meeting most of the public transport needs of the city, the service provided by these modes is generally of poor quality, and the daladala drivers often resort to unsafe and highly aggressive driving practices, sometimes even leading to violence among the operators. Daladalas are considered to be a key cause of traffic congestion in Dar-es-Salaam.

Given the nature and problems associated with daladala services, the government has proposed a formal Bus Rapid Transit System for the city called 'DART' (Dar Rapid Transit). The DART will operate services on trunk and feeder routes. The high density areas would be served by the trunk service and the low-density areas would be served by feeder service.

The city is attempting to integrate the existing informal public transport system with the proposed DART system. However, the city government is facing several challenges in involving the daladala operators in the integration



Daladala in Dar-es-Salaam



Daladala picking up passengers from the roadside.

Source: <http://members.virtualtourist.com/m/p/m/1ddab4/>

process as the daladala industry is highly fragmented, with majority of owners owning one or two daladala/s. Even the management structure is highly inconsistent across the daladala industry. Some operators are also the drivers of the daladalas, while others keep drivers to run their buses.

To successfully integrate the daladalas with the DART, the government is involving the Dar-es-Salaam Commuter Bus Owners Association in the planning and implementation of the DART project. The first phase of the project which is 20.9 km long is being planned to be operated through two companies, wherein each would be responsible for the operation of trunk and feeder lines. It has been proposed that in the bidding process, the companies should give preference to those consortia, which include former daladala owners and operators. The daladala owners are also required to organize/include themselves into consortia and bid for the operating contracts or alternatively, form a company in association with an international bidder. The international bidders are required to partner with the existing operators while bidding.

In order to prevent competition between the DART and the daladalas, the government has stopped issuing licenses to the daladalas for the Central Business District (CBD) area since 2007. The daladalas which were operational in the CBD area have been relocated to peri-urban routes, which would be uncovered by the first phase of DART. This has reduced the number of daladalas from 6,000 to only 2,000 in the CBD. It has been planned that daladalas would serve all those parts of the city which would not be served by the DART and gradually as the DART service would expand, the daladala service would be phased out. The government is also encouraging the registration of new buses, which conform to the technical specifications of feeder buses.

It can be observed from the case study that the city government is making efforts to involve the already existing daladala industry in the planning process of the formal DART system. The consortia including the daladala operators are being preferred for operational contracts for formal service provision. The government has prepared a well thought-out plan, which focuses on a gradual phasing-out of the daladalas as DART becomes operational; the daladala operators would be given an opportunity to become part of the formal services proposed for the city.

References

This case study has been adapted from the paper, Schalekamp H, D Mfinanga, P Wilkinson, and R Behrens, "An International Review of Paratransit Regulation and Integration Experiences: Lessons for Public Transport System Rationalization and Improvement in African Cities", African Center of Excellence for Studies in Public and Non-motorized Transport (ACET), Paper presented at the 28th South African Transport Conference, July 2009, Pretoria, South Africa.

"End to Dar City Traffic Congestion on the Horizon". Available at <http://www.ippmedia.com/frontend/index.php?l=46118>



ALTERNATIVES TO INFORMAL TRANSPORT FOR PROVIDING CONNECTIVITY TO THE URBAN POOR AREAS: Cable-car connectivity to favelas in Rio de Janeiro

Place: Rio de Janeiro, Brazil (South America)

KEY FEATURES

- 🌿 Cable car connectivity in hilly regions
- 🌿 Connecting favelas (slums) with the main city
- 🌿 Affordable and comfortable
- 🌿 Reducing the travel time by nearly half an hour

With a population of around 6.3 million people, Rio de Janeiro (commonly referred to as Rio), is the second-largest city and the third-largest metropolitan area of Brazil, and an agglomeration in South America. The city of Rio is served by a comprehensive public transit system which includes metro, suburban trains as well as buses. Despite that, the transportation services are often unable to serve the informal settlements or the favelas.

The slums of Rio de Janeiro or favelas pile onto and up and over the city's iconic steep hillsides. Improper and unorganized development and a hilly terrain have not supported any kind of public transport system in these favelas, thereby making it quite difficult for these favelas to be connected to the rest of the city. As 20% of Rio's population lives in favelas, a large part of the population has to do without any public transportation. Gondola or cable car is one feasible option that Rio de Janeiro has adopted to connect these favelas with the rest of the city.

Gondolas are systems equipped with cabins moving along on a unidirectional loop. The gondola cabins are small, with each commonly able to accommodate between 4 and 40 people. Systems of this kind generally have a declutching mechanism, which allows one car to be slowed or stopped in a station without any impact on the overall flow of cabins on the loop. One of the advantages of these systems is that they operate within their own dedicated space, and are therefore independent



Overhead Gondolas connecting favelas in Rio.

Source: <http://favelissues.com/2011/11/03/resistance-to-rios-celebrated-gondolas-fetishizing-the-teleferico/>



A cable suspended cabin

Source: http://www.huffingtonpost.com/2011/09/01/rio-de-janeiro-urban-gondolatransit_n_944786.html

of constraints to which other modes of transport operating on the road network may be subjected.¹⁴

SERVICE CHARACTERISTICS OF THE GONDOLA SYSTEM IN COMPLEXO DO ALEMAO TELEFÉRICO (largest slum area in Rio)	
Line Length (m)	3,400
Line Speed (km/h)	21.6
Peak Period Headway (min)	12
Cabin Capacity (persons)	10
Transport Capacity (persons/h)	3,000
Number of Cabins	152
Source: http://www.civil.engineering.utoronto.ca/Assets/Civil+Engineering+Digital+Assets/Makkah+Project+Report+-+Part+I.pdf	

The \$74 million project is part of a larger investment in public works initiatives by the Brazil government, ahead of Rio’s hosting of the 2016 Olympics.¹⁵ According to the government, 152 gondolas carry about 30,000 people a day along a 2.1 mile route over the neighbourhood, transforming the hour-and-a-half trudge to a nearby commuter rail station into a 16-minute sky ride.¹⁶

Gondola system in Rio not only falls under the recent smart transport innovation concepts but also promotes and fosters equity in mobility choices provided to the population, especially the urban poor. The system ensures an easier and faster way to job and educational opportunities, saving the slum residents from the tiring hours of journey per day through the steep and narrow roads. As the gondola system connects to the conventional mass transit systems (suburban train), it has significantly helped in improving the overall accessibility of the city, way more than before. Flying over the uneven hilly terrain, the gondolas also offer livelihood options for the deprived communities. This smart, cost-effective, and sustainable transit solution for the hill side communities in Rio has also been a success story in Medellin, Colombia.

References

Garthwaite, Josie. “Green Moves: Medellin Cable Cars, San Francisco Parking Reform”, *National Geographic Daily News*. Available at <http://news.nationalgeographic.com/news/energy/2012/12/120125-sustainable-transport-awards-2012/> (accessed on 25 June 2012).

Gomide, Alexandre. *Mobility and the Urban Poor: Urban Age*, 2008. Available at http://v0.urbanage.net/0_downloads/archive/_SA/14_News_Paper_Essay_Gomide.pdf (accessed on 25 June 2012).

Sustainable Cities website: <http://sustainablecities.dk/> (accessed on 25 June 2012).

¹⁴ http://www.certu.fr/fr/_Syst%C3%A8mes_de_transports26/IMG/pdf/cableways_MEDDLT_december2011-r2.pdf

¹⁵ <http://www2.macleans.ca/tag/rio-de-janeiro/>

¹⁶ Sustainable cities website <http://sustainablecities.dk/>



REDUCING THE ENVIRONMENTAL IMPACTS OF INFORMAL MODES: Tricycle conversion programme in San Fernando City

Place: San Fernando city, Philippines

KEY FEATURES

- Awareness generation and communication with stakeholders
- Voluntary implementation
- Loan-assistance programmes

Around the world, outdoor air pollution kills 800,000 people a year and sickens many more. Throughout Asia, vehicles with two-stroke engines produce vast amounts of pollution including dangerous hydrocarbons, carbon monoxide, and smoke.¹⁷ Two-stroke petrol-powered three-wheelers (*tuk-tuks* and tricycles) cough up roughly 13 times more lung-damaging particulates than other engine types.¹⁸ In most cities in the Philippines, tricycles are the vehicle of choice because of their schedule flexibility, simple construction, high power-to-weight ratio, and their relatively low cost. Unfortunately, tricycles currently in use are predominantly carburetted two-stroke engines which emit high levels of unburned hydrocarbons, carbon monoxide, particulate emissions, and carbon dioxide.

San Fernando City is the capital for Region I in Philippines, also known as the Ilocos Region. San Fernando City has been a major centre of trade and commerce in the area. It hosts a small airport and a commercial sea port, along with numerous business establishments to rival those found in any regional centre. San Fernando belongs to the first generation of City Development Strategy (CDS) implementers. The strategy focuses on the city's liveability, competitiveness, bankability, and good governance, and



4 stroke tricycles in San Fernando

Source: <http://www.hobotraveler.com/>



Tricycle with painted side car and body number

Source: http://azraelsmerryland.blogspot.in/2011_09_11_archive.html

¹⁷ <http://discovermagazine.com/2008/may/21-two-strokes-and-youre-out>

¹⁸ <http://chimalaya.org/2012/04/11/different-strokes-new-lower-pollution-auto-rickshaw-curb-climate-change/>

serves as a knowledge resource for other cities for best practices in local governance and in enhancing business opportunities in urban areas.¹⁹

The Mayor Mary Jane Ortega (1998–2001), after learning that the two-stroke tricycles were a major source of air pollution in the city because of the type of oil they burnt, initiated the phasing out of over 1,200 two-stroke tricycles in the city. Her early initiatives for tricycle management included traffic rerouting, tricycle colour coding, and capping the franchise at 1,600 tricycle units.²⁰ For implementing the phasing out of two-stroke vehicles and replacing them with the cleaner four-stroke vehicles, an inventory of tricycles in the city was conducted in 2000 by the City Permits and Licensing section on the model and age of tricycles. Consultations and discussions were held in 2001 with the tricycle sector educating them about the ill effects of pollution on health and environment and by 2002, the operators were offered individual interest free loans of \$200 to make down payments for buying new four-stroke vehicles. This programme was implemented under the aegis of the Philippine Clean Air Act which was notified in November 2000. With increased awareness and the need to formulate strategies to reduce vehicle emissions, this initiative evolved into a transportation and environment management programme and the tricycle conversion programme became the key focus area of the city's Clean Air Program.

Draft resolutions were brought out in 2001 banning models from the 1970s and 1980s by 2003 and 2004,²¹ respectively. However, this was not finalized and implemented. The city claims that even without these resolutions, they were able to convince operators to convert their tricycles to four-stroke engines through education as a result of which the tricycle operators volunteered to convert to four-stroke vehicles. The city government offered loans for the upgrade in 2003. By Nov 2005, 102 operators had availed this facility and around 662 vehicles converted to four-stroke.²² The loan had to be repaid in one year through equal monthly instalments; the operators could chose to defer monthly instalments for the first two months and then pay back in 10 months.

The project was implemented in phases:

- 30-year-old tricycles replaced by 2002
- 25-year-old tricycles replaced by 2003
- 20-year-old tricycles replaced by 2004
- 15-year-old tricycles replaced by 2007

The scheme received a positive response and even the drivers, who were not required to change their tricycles, opted to have new ones.

¹⁹ Clean Air Program Case Studies, Part 3

²⁰ <http://ncts.upd.edu.ph/old/estnow/docs/EST%20Casebook/EST%20Casebook%20San%20Fernando.pdf>

²¹ <http://ncts.upd.edu.ph/old/estnow/docs/EST%20Casebook/EST%20Casebook%20San%20Fernando.pdf>

²² City of San Fernando, Air track best practice, Presentation by City Mayor Mary Jane C. Ortega

Alongwith the financial assistance provided to operators to convert to four-stroke tricycles, programmes like conducting workshops on maintenance and emission reduction were conducted for selected drivers and operators with the help of the United States Agency for International Development–US–Asia Environment Partnership (USAID–US–AEP) and the Motorcycle Development Programme Participants Association (MDPPA). Additionally, there were provisions for granting interest-free loans to tricycle co-operatives and allowing co-operatives to sub lend the amount to members at 3% per annum interest. Other initiatives included physical inspection of tricycles every year, issuance of stickers, painting the side car white, requirement of body number, and regulating passenger loads.

By 2008, two-stroke tricycles were completely phased out without even enacting an ordinance. The city was also successful in phasing out tricycles, which were more than 15-year-old. Feedback from drivers indicates that four-stroke engines were more capable in uphill drives, took longer to heat up, had lesser emissions and although these engines consumed slightly more fuel than two-stroke engines, they were still able to save more due to lesser maintenance costs.²³ This programme was successful mainly due to stakeholder involvement, capacity building, education, and advocacy. The drivers appreciated the care and initiatives taken up by the city government in providing awareness, medical check-ups, and preventive maintenance and interest-free loans.

References

<http://discovermagazine.com/2008/may/21-two-strokes-and-youre-out>

<http://chimalaya.org/2012/04/11/different-strokes-new-lower-pollution-auto-rickshaw-curb-climate-change/>

Clean Development Mechanism Project design document form (CDM–SSC–PDD) Version 03 <http://cdm.unfccc.int/filestorage/H/K/9/HK9V413TN8I76UQYDJO2BML0PCG5WZ/SSC%20New%20Methodology%20PDD.pdf?t=SIF8bWF3amM4fDBBVhGJYYWRBQ7VMe5OIdId>

San Fernando. La Union: Tricycle Sector Management. Available at <http://ncts.upd.edu.ph/old/estnow/docs/EST%20Casebook/EST%20Casebook%20San%20Fernando.pdf>

²³ <http://ncts.upd.edu.ph/old/estnow/docs/EST%20Casebook/EST%20Casebook%20San%20Fernando.pdf>



REDUCING THE ENVIRONMENTAL IMPACTS OF INFORMAL MODES: Case of Puerto Princesa city in Philippines

Place: Puerto Princesa (Philippines)

KEY FEATURES

- 50/50 scheme: Aim to reduce the volume of tricycles plying in the city by 50%
- City Ordinance to institutionalize 50/50 scheme
- Ordinances to establish the city's Clean Air Program

The city of Puerto Princesa is the capital city of Palawan, Philippines. It is the largest city in the Philippines with a land area of about 2,539 km². According to the 2000 census, the city had a population of about 0.2 million in 2000.

The city has been facing the problem of deteriorating air quality due to the increasing number of tricycles, which account for about 60% of the city's vehicles and constitute the principal means of transport.

To address the problem of increasing air pollution, the Clean Air Program was initiated by Mayor Hagedorn in November 2003. In February 2004, the city developed a strategy to reduce the harmful emissions from tricycles with the technical assistance from the United States–Asia Environmental Partnership (US–AEP). The strategy was officially launched in April 2004; reduction in hydrocarbon and carbon monoxide emissions from tricycles was given priority in the programme for cleaning the air. The five key areas identified for improvements included:

- Improved traffic management and infrastructure development
- Inspection and maintenance



Tricycles in Puerto Princesa

Source: <http://rfeatin.wordpress.com/2006/04/28/reducing-tricycle-noise-in-the-philippines-puerto-princesa-city/>



Source: <http://xplorerboyz.blogspot.in/>



Tricycle with driver during a rest hour

Source: <http://eye-in-the-blue-sky.blogspot.in/>

- A financing scheme for cleaner tricycle engines (e.g., buy-back scheme for old tricycles, shift to four-stroke engines)
- Public awareness programme
- Promotion of alternative livelihood for tricycle drivers

The main initiative under the programme and the first to be implemented was the “50/50” scheme aimed at reducing the volume of tricycles plying in the city by 50%. Under the 50/50 scheme, tricycles with a number “1” sticker are allowed to operate only on Monday, Wednesday, Friday, and Sunday. Those with number “2” are allowed to operate on Tuesday, Thursday, Saturday, and Sunday. The proposal was initially opposed by the tricycle operators, as a result of which a two-week trial period was first observed. Within one day, drivers/operators observed that the scheme had doubled their day’s income from an average of P400 to P800²⁴ and the drivers actually maintained their weekly income despite operating only for four days. The commuters’ complaints were primarily regarding the longer commuting time. The city government raised the franchise cap to 4,000 to address this issue. A consensus was, thus, achieved and the city council on November 2004 passed City Ordinance No. 271 formally adopting the 50/50 scheme.

Initiatives like public-awareness campaigns, roadside inspections, and the promotion of proper vehicular maintenance among drivers were introduced to complement the 50/50 scheme. Capacity-building initiatives were also undertaken to ensure enforcement and monitoring; trainings on the installation, operation and maintenance of ambient air samplers and gas analysers were conducted and actual roadside monitoring was initiated.²⁵ Tricycle organizations’ member drivers underwent a four-month training on proper maintenance. About 12% of the total tricycle drivers were trained in these preventive maintenance workshops through lectures and hands-on lessons. Tools and manuals were also distributed as part of this initiative. It was observed during stakeholder consultations that the proposal to ban two-stroke engines in order to make way for cleaner four-stroke engines was controversial. It was, therefore, decided to “encourage” the shift to four-stroke engines “or other more efficient technology” over a period of four years.

Public-awareness programmes were launched to make people/tricycle operators and drivers aware of the economic benefits of traffic volume reduction, generation of alternative livelihood opportunities, health impacts of pollution, etc. Livelihood development training workshops were held for the tricycle drivers and their spouses after assessing their skills and need for alternative livelihoods. Financial assistance was also extended for the required capital to start alternative livelihoods.

The local government has created a “Trike Fund” to support local drivers to switch to cleaner technologies like LPG, or direct injection technologies through discounted rates and flexible repayment schemes.

²⁴ Philippine Pesos.

²⁵ Presentation on The Puerto Princesa Experience, 13th Poverty and Environment Partnership Meeting, ADB.

Congestion is no longer a problem in the city and the environment officials claim that the scheme may have had an impact in terms of reducing emissions of hydrocarbon and carbon monoxide by at least 50%. The maintenance workshops have also helped in improving driving and maintenance practices.

Tricycle drivers have maintained their average weekly income even though they now operate for only three to four days. The three-day break enables them to have more time for maintenance activities as well as quality time for their families. Surveys show that drivers claimed improvement in health conditions because of the three-day rest and less exposure to air pollution and enough time to spend with their families. The programme is a success primarily as a result of the extensive stakeholder consultations carried out to reach consensus for programme implementation. Political will and skill of the city's political leadership was also very important in the success of this programme; the Mayor went ahead with the implementation of the 50/50 scheme despite upcoming elections. Also, close coordination with civil society groups and local government institutions enhanced the credibility of the Clean Air Program among the general public.

References

Clean Development Mechanism Project design document form (CDM-SSC-PDD) Version 03 – 2006, <http://cdm.unfccc.int/filestorage/H/K/9/HK9V413TN8I76UQYDJO2BML0PCG5WZ/SSC%20New%20Methodology%20PDD.pdf?t=SIF8bWF3amM4fDBBVhGJYYWRBQ7VMe50IdId>

<http://cdm.unfccc.int/filestorage/H/K/9/HK9V413TN8I76UQYDJO2BML0PCG5WZ/SSC%20New%20Methodology%20PDD.pdf?t=SIF8bWF3amM4fDBBVhGJYYWRBQ7VMe50IdId>

Presentation on The Puerto Princesa Experience, 13th Poverty and Environment Partnership Meeting, ADB. See <http://www.google.co.in/url?sa=t&rct=j&q=peurto%20princesa%20clean%20air%20program&source=web&cd=8&cad=rja&ved=0CEsQFjAH&url=http%3A%2F%2Fwww.povertyenvironment.net%2Ffiles%2FPEP13-PuertoPrincesa-Hagedorn.ppt&ei=Kt5iUN2SCITprQeYt4CQDA&usg=AFQjCNG3rreVx4kwWRvn7qMpn-zxDGAAMQ>

