

SOCIAL ENGINEERING APPROACH TO AIR QUALITY CHALLENGE : The Case of Kathmandu

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Toward the end of the millennium, Nepal did show a noticeable concern for environment and moved a few steps towards its improvement. Success does not come by introducing regulations and standards but on its compliance by the people. The whole process and approach may fail its purpose if government is not consistent upon its efforts and the very issue is not seriously taken up by the implementing authority or if its enforcement causes massive discomfort to the affected people. But if its merit is accepted by the people at large, it may even persuade the government to adopt and implement such a regulation.

Complete displacement of a particular type of vehicles from the Kathmandu Valley is a successful test case of social pressure for better environment where it was delayed and denied for a long time by the state authorities themselves. The air pollution control movement in Nepal did go though faced several ups and downs from the government and the practitioners. It did bring in the desired result when the social engineering aspect was duly honoured. The present paper presents the measures taken to mitigate the vehicular pollution and people's involvement therein.

Introduction

Until 1960, Kathmandu was a quiet and clean city. It was also one of the peaceful and beautiful cities of Asia. With the wake of industrialisation in the country, and establishment of a cement factory within the valley, it gradually got polluted. The increasing number of vehicles added to the pollution. The number of vehicles surged significantly in the later years.

Unregulated import of old and new vehicles including the *carnet* of the tourists, resulted in a wide mix of vehicles in the valley. The country has no limit on the life of old vehicles, while the growth rate of vehicles is one of the highest in the region. With very little negligible extension of the roadways in the valley, the traffic has been very slow. The city also introduced three-wheeler diesel vehicles (popular by Vikram, a brand) with very poor emission performance.

Government did impose a ban on registration of three-wheeler diesel vehicles. But the beginning on regulating vehicle emission began under an external pressure. Later it set standards for petrol and diesel engines. The non-compliance of standards would keep them off the Valley. Air quality has been a matter that attracted international public attention in 1994 with a feature entitled *Goodbye Sangrila* in the Newsweek that highlighted it as one of the most polluted cities.

But the government at times did get influenced by the business group. This resulted in relaxing the control. At one time, it even permitted running a few Vikrams *on trial* in the Pokhara township despite the protests of the local people.

Vehicular Pollution

The valley falls within the Bagmati Zone. According to the Zonal Transport Office vehicular population has increased from xx in 1990 to xx in 1998. The road network has remained at 341 km. Two wheelers have grown significantly in the past two years. New luxury buses are mostly registered in other zonal offices, mostly at Birgunj. As the long distance night buses have age restrictions, the old buses are later operated as day/city buses. There has been insignificant growth in the number of these public transport vehicles. The little addition over the years is mainly due to the transfer/ re-registration from other Zonal Transport Offices to the Bagmati Office.

There are 4,200 three-wheeler tempos, out of which 1200 are the diesel ones. On an average tempos travel 125 to 150 km a day. The diesel tempos ply on 42 routes, reaching the city interiors (1). The smaller vehicles are practically competing with the larger ones in nearly all routes.

The First Emission Standards

The government came up seriously to control vehicular pollution through a project sponsored by the UNDP in 1992. Tests were conducted on a number of vehicles with regard to their emission and improvement through repair and maintenance and other corrective

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measures. Based on the tests, a technical committee made recommendations for the vehicular emission standards made in 1994. The Environmental Protection Council, which is chaired by the Prime Minister, made an ambitious change over the limits of emissions. It accepted three percent Carbon Monoxide by volume for petrol engines, but prescribed stricter limit of 65 Hartridge Smoke Unit (HSU) for diesel engines in place of 75 HSU as suggested by the committee. The standards, that were applicable for all vehicles plying in the Kathmandu Valley, came into effect through a gazette notification on xx.

The project did not go long. But the notification was definitely a positive step towards curbing the vehicular pollution. The government decision to set stricter emission standards than those recommended by the technical personnel may be a reflection of its seriousness. The government did not want Nepal to be a dumping ground for the older vehicles. Nepalese standards were kept in par with that of India. The government had even banned the import of second-hand and "re-conditioned" vehicles older than five years.

The government, though legally should not have allowed running the sub-standard vehicles to ply on road, was not serious on implementing the legal provisions. In stead of the valley the movement of polluting vehicles was prohibited only in the confines of Singh Durbar, the central secretariat of His Majesty's Government.

There was a wide protest of the "impractical" standards. Smelling the lack of seriousness of the implementing agency, fewer vehicles turned up for emission tests. In the first two years, only 12,000 and 6,500 vehicles reported for the test. This was much below the vehicle population of the valley.

A New Beginning

A full-fledged Ministry of Population and Environment was formed in 1995. Environment Protection Act came two years later. But there are no limits prescribed to the polluting activities. Prevalent emission limits for vehicles were prescribed under a clause of the Transport Management Act, 1990.

The Ministry took up the vehicular pollution minimisation as its priority programme. It started with implementing the existing rules and regulations organised. It appealed people to help fight air pollution, by keeping the vehicles in fit conditions. It launched a vehicle-testing programme from June 5, 1996, coinciding with the World Environment Day. It invited people to voluntary appear for the test within a schedule for different categories of vehicles such as buses/minibuses, taxis, private

and tourist vehicles and the three-wheelers. The vehicles failing the tests were asked to repair their vehicles and re-appear for the test. It alerted the people in advance that the non-compliance to the standards might result in restrictive actions. It deliberately put the Vikrams in the last of the test schedule.

It made a novel beginning. The testing program was inaugurated with the emission testing of the Prime Minister's vehicles. The whole process was transparent, where press and people could watch the entire testing procedure including the readings of the test equipment. The transparent approach was widely accepted by the people. A record number of vehicles were tested. In a six-month period October 1996-March 1997, more than 16,000 vehicles came up for the test. The overall failure rate was 33 percent.

Meeting the emission standards and getting the "Green Sticker" of fitness became a matter of social prestige, specially for the richer section of the Nepalese society - the private vehicles owners. Almost all the Vikrams failed the emission test. It gave a great pleasure to the public who had been pointing at them as the polluting vehicles and were proved as the culprits. But a few of them managed to get the green stickers. The public pooh-poohed the Traffic Police for their hand in gloves in awarding the green stickers. It only proved that the Vikrams were owned directly or indirectly by the police personnel. At the pressure of the public cry against the greening of the Vikrams, these vehicles were re-tested and the green stickers were removed.

The Traffic Police also asked the Sajha Yatayat to come for the test. And when the organisation, boasting of being a semi-government organisation and close to the Ministry of Works and Transport, defied, the police detained it for the non-compliance.

Restriction Imposed

After six months of its introduction of the testing programme, it announced certain areas out of bounds for the vehicles not meeting the emission standards. At a later phase, other important areas were also covered.

The First Notice

The area restriction was imposed from Oct 1996, nearly four months after the emission test started. Ram Shah Path and Tribhuvan International Airport (TIA) Complex beyond the Ring Road was open for only "green sticker vehicles". The restriction notice was issued by the Department of Transport under the Ministry of Works and Transport.

Though the Ramshah Path stretch was a short stretch (of about 700m), it had a wide "basin". The "dirty" vehicles would not ply on the Bag Bazaar section, Dill Bazaar section and the Kamaladi section that wanted to use the Ram Shah Path. The restriction at the TIA was more for a welcome gesture to the international tourists.

The immediate effect of the restriction was that Vikram tempos could not move over these areas as all of them failed to meet the emission standards. A significant proportion of the petrol three-wheeler (the Bajaj tempos) too failed the tests.

The Second Ineffective Notice

Six months later, Durbar Marg and the New Road were declared the restricted areas. But a week earlier to its implementation, the restriction was suspended for carrying out "further studies".

The Third Notice

The third notice was brought out on the World Environment Day, 1998. It became effective from the first day of Ashadh, 2055 BS (June 16, 1998). It included the areas declared by the second notice that was later suspended. It restricted movement on major city roads, the New Road, the Durbar Marg, the Tri Devi Marg (opposite the SAARC secretariat), and the densely populated Indrachowk-Thamel section of the city, besides the three Durbar Squares in the three cities of the Kathmandu Valley.

The Administrative Inaction

At times, it has been questionable if at all the administrative machinery was serious on implementing the government decision.

The EV operators were asking for a route. They were denied for several months. They were not allowed to operate on the route, Vikrams were running. The Vikrams were, however, running competitively running on the same routes offered to buses and mini-buses. Being smaller vehicles, they would often pick up passengers from the larger vehicles. They were not assigned stands on the approved routes. The operators of EVs often complained that the traffic police did not allow them stand facilities and at times, the Vikram owners routed them out. But things gradually improved. In the newly developed stands by the Royal Nepal Airlines Corporation, where only the Vikrams and tourist buses were assigned stands, a section was later offered to the EVs.

The police delayed its implementation on the excuse that the sections needed sign posts. The demand was partly true. But as the people were well informed, the traffic police could have stopped their movements. At the worst case, the resistance would have been for a week

and gradually the vehicle owners would have learnt the restricted zone. While there were insufficient number of No Entry traffic signs during the first notification, restriction had been successfully regulated by the Traffic Police.

The Anti-Vikram Momentum

The notice to the effect came from the Ministry of Works & Transport. The entire homework was done and recommended by a committee co-ordinated by the Ministry Population and Environment. The committee had representations from the Department of Transport, Traffic Police, Federation of Nepal Chamber of Commerce and Industries, Nepal Chamber of Commerce, Federation of Nepal Transport Entrepreneurs, Nepal Oil Corporation etc. At important meetings, it sought representations from the Ministry of Tourism, Royal Nepal Academy of Science and Technology etc as well.

The Ministry of Population and Environment expressed its determination to expand its restrictive approach denying the acceptance of dirtier vehicles into the government premises and later at the non-government organisations. It was matching with the spirit of testing the government vehicles first. Government organisations such as the Ministry of Works and Transport at Babar Mahal, Ministry of Foreign Affairs at Maharajgunj, Ministry of Finance at Tripreshwor, Ministry of General Administration at Harihar Bhavan, Ministry of Education at Tri Devi Marg supported the Ministry of Population and Environment and extended the No Entry Zone beyond the Singh Durbar Complex, certain government agencies. Later, at the appeal of the Ministry of Population and Environment, other semi-government and constitutional bodies such as the Royal Nepal Airlines Corporation, Nepal Rastra Bank, Nepal Beema Sansthan, the Supreme Court, Department of Industries etc. denied entry to the polluting vehicles within their premises. The people fully co-operated the ministry.

Different non-governmental organisations (NGOs) in collaboration with several business organisations as well as the Ministry of Population and Environment conducted training programmes on vehicle testing techniques and regular maintenance practice and general talks and seminars. At such seminars, the audience frequently questioned the fairness in awarding the green stickers by the Traffic Police, which was solely assigned the task of carrying out the tests. The ministry personnel frankly admitted its limitations and appealed public co-operation against malpractice, if any, on the part of the testing authorities. The Traffic Police spokesmen also said the same when so charged.

In December 1998, while the government had announced going for the general election, it relaxed the restriction on three wheelers by inviting 500 new petrol three-wheelers. The invitation was made to fulfil the vacuum resulting from the phasing out of the Vikrams. The call was made before the government brought out any time specific plan of phasing out the very Vikrams. The Kathmandu Metropolitan City has been requesting the Department of Transport Management for such a plan. Though agreed for February/ March 1998, the government turned volte-face and decided to withhold any action until the general elections. Obviously, the government did not want to displease their voters: the transport operators and the commuters.

The notice to the effect appeared on His Majesty's Birthday Special issue of the government-owned paper for only one day against the normal practice of three insertions. By putting his application through English Weekly "A Citizen" demanded the Prime Minister to cancel the decision within three weeks. He passed the letter to the media. There was a big hue and cry against the "quiet" notice that had appeared without intergovernmental and public consultation. Similar protests appeared in nearly all the newspapers. The Prime Minister suspended the decision afterwards.

At times, like the first gazette notice on standards, which set an ambitious target with slack enforcement mechanism the implementing agencies, did show slackness at times. But they were always countered by the people. A *Watawaran Prati Sachet Samuha* (Group of the Environment Conscious) wrote to the Department of Transport and the Valley Traffic Police and pointed out the violation of the prohibited zone at a section of the Ram Shah Path (under the first notice) by allowing the Vikrams which did not bear the green sticker of fitness. When the concerned agencies did not react to the reminder of the violation, a group of about seventy persons (ranging from young children under 14 to the older citizens over 75) marched on the prohibited road on the National Democracy Day 1999 with a banners reminding that the road is a prohibited section. The roadside shopkeepers supported the move by agreeing to display the same information at their window panels.

The Vikram owners tried to convince that the EVs were more polluting than the Vikrams. The exaggerated the harms of lead in the lead-acid battery was a very dangerous substance.

A case was filed at the Supreme Court against the Department of Transport Management, Ministry of Works and Transport, Valley Traffic Police and the Ministry of Population and Environment. It

claimed that the concerned agencies had neglected the prevalent rules and regulations. The Vikrams are basically commercial vehicles, which are required to meet certain standards as prescribed under the regulations. One of the regulations required it qualify the laid standards every six months. How could the vehicles get the fitness certificate to permit it run beyond six months if they do not the norms?

Several newspapers, including *The Rising Nepal* published by a state-owned corporation, strongly pointed out the neglect on the part of Department of Transport Management and the Valley Traffic Police on enforcing the government decision.

At several interaction programmes organised by the Nepal Forum for Environment Journalists, Reporters Club, Martin Chautari etc, the concerned officials were cornered for the neglect.

The Explore Nepal conducted a series of interaction programme with the teachers and students of schools and colleges and people at different wards of the metropolitan city. The people were gradually aroused against the Vikrams. A group of the cinema artists also called for boycotting the Vikrams. The local residents of Chabahil, Maitidevi etc tried to stop the movement of the Vikrams. The Vikram owners even sought government protection for their movement. Sensing the aggressive people, the Department only said, the section of the road was not a prohibited one. In other words, they were helpless if the people ousted them off the road.

Specially due to the matters going to the Supreme Court, the government could hardly provide any logic for the violations of the existing regulations on meeting the government regulations. It was high time when government could announce a ban on the movement of the Vikrams.

The Fourth Notice

The fourth Notice came in July 1999 that announced a complete ban on the movement of three-wheeler diesel tempos within the Kathmandu Valley and later a complete ban on the import of two stroke two wheelers.

It may be the culmination of the vehicular pollution control movement started in the year 1996. During the period, the government had all the popular support for discouraging the movement of dirty vehicles. And naturally, the dirtiest should go out first. Encouraged by its success, the Ministry of Population and Environment is planning to remove the others too.

Revised Emission Standards

Six years later the Ministry of Population & Environment was asked by the Ministry of Works & Transport for review and revision of the standards. The technical Committee (headed by the author), the committee presented a recommendation within a week, as mandated. It suggested a short and long-term strategy.

Under the long-term strategy, it suggested the announcement of the revised standards for 2000 AD a year in advance. This would benefit the dealers and buyers of the new vehicles. A committee in the mean time should carry out at home study for the same. For the short term measure, the emission standards for diesel vehicles manufactured on or before 1994 would be 75 HSU (in place of 65 HSU) while for the petrol vehicles manufactured on 1980 or earlier, it was 4.5 percent CO. The relaxed limit for petrol engines also applied to the three-wheelers manufactures till 1991. Two wheelers were also required to meet the 4.5 percent emission standard. The committee also suggested introducing the standards to the Bagmati Zone rather than the valley and a phase-wise introduction of the restriction of movement of polluting vehicles.

The government accepted the recommendation for relaxed standards for older vehicles effective from Jan 15, 1998, but did not speak out the long term strategy neither did it start any work in this regard.

Government Seriousness

Attempt to curb vehicular emission has several political complications. Those at the seat of governance take decisions that may go for public welfare. The decision may sometimes be a part of indirect pressure from the international organisations. But it would risk go for certain welfare moves but branded as "unpopular" decisions that may displeasing its vote banks that may root them out. The assessment of the choice of the vote banks is itself a complicated question. At times it may be just a powerful lobby that has been utilised for acquiring the much-desired popular support.

It may not be purely incidental that the restrictions mentioned above were imposed when the country had a majority government. At one point in time, when there was a minority government in the country and a district level elections were close by, the government suspended its decision on expanding the restricted area a day before it had to be effective.

Autos are lifetime assets for an average owner. In absence of the regulation it can't be phased out. There are all kinds of vehicles on roads. Government, through a ministerial decision, had put a ban on the registration of three-wheeler petrol/diesel vehicles in the Kathmandu Valley effective from 1991. The transport administration is very much influenced by the private operators. These have syndicated in the number of vehicles operating on all routes, whether city services or the long distance ones. At times, they have pressurised the government for yielding to their demands by creating public inconvenience through resorting to *chakka jam* (suspension of all vehicles movements) or *Nepal Bundh* (closure of all business activities in the kingdom). Their stronghold in influencing the government decision could be very well understood when they unilaterally hiked the passenger fare up by 20 percent for just 10 percent rise in the price of diesel in 1997.

But by this time the people were fully aroused on environmental matters. They would not tolerate any concessions given to the polluting vehicles.

The Promotion Measures

Back in 1991, the government had decided to stop registration of any three-wheelers in the valley. But the restriction was relaxed for the three-wheeler Electric Vehicles (EVs) and later for three-wheelers running on Liquefied Petroleum Gas (LPG). The EVs are zero emission vehicles, for the LPG vehicles, though accepted as low emission vehicles, there should have been some emission standards prescribed. Custom duty and other taxes on the import of such vehicles or their component for local manufactures were significantly reduced. Rules restricting any change in the registered vehicles were relaxed for those changing to EVs.

A number of international agencies have come up with programmes that have directly or indirectly supported the activities aimed at promoting better air quality in the kingdom. The USAID sponsored Global Resources Institute (GRI) for three-wheeler electric vehicle program.

The Danish Agency for International Development (DANIDA) came up with a small fund for converting the diesel three-wheeler into EVs and some battery-charging stations. It also sponsored a monitoring program, which periodically tested air pollution as selected sites and informed the public about the level of pollution. Danish government provided a grant which could be used as revolving fund to facilitate conversion of Vikrams into EVs with a support of as much as 90 percent of the conversion cost at a nominal interest rate. The estimated cost of

converting a TW into EV is US\$ 4,290 (Rs 290,000) that includes two sets of battery.

People were willing to pay more for cleaner means of transport. According to a survey, more than 80 percent commuters prefer EVs if available and about 52 percent are willing to pay more for the service (2).

The Swiss Development and Co-operation (SDC) also provided a small grant to Pollution Control for Environment and Research (PCER), a local NGO consisting of graduate engineers, for carrying out studies on bringing down the emission level of such three-wheeler diesel vehicles. It concluded that the present Vikrams couldn't meet even the relaxed limit of 75 HSU.

A Japanese organisation came indirectly by supporting the Leaders Nepal. It conducted seminars and displayed simple devices that could show the level of air pollution. Leaders Nepal conducted periodic air quality tests on selected sections of the roads in Kathmandu. It also undertook awareness program in schools where, with simple kits provided from Japan, they could get a comparative picture of the amount of Total Suspended Particulate (TSP) and NO_x and SO_x content in air and rain water.

Asian Development Bank (ADB) offered a technical assistance on air quality as a component of the institutional strengthening programme to the Ministry of Population and Environment.

Nepal Electric Vehicles Industry (NEVI) and a number of business companies came up in the local assembly of EVs. These companies have already marketed more than 200 EVs.

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