Delhi Metro Rail
Beyond Mass Transit

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A decade has gone since the first line of metro started in Delhi in 2002. Despite its expansion across the city in the past 10 years neither pollution nor congestion levels have gone down as claimed by its advocates. An analysis of the revenue generated by the Delhi Metro Rail Corporation through property development and the rise of property prices adjacent to metro routes and stations suggests that the metro is entangled with the larger process of gentrification in the city. It is restructuring urban space for capital accumulation by a series of dispossessions of the poor and by giving priority to metro routes for middle class colonies. Thus the metro may fulfil the dreams of the ruling class and their city planners of transforming Delhi into a "world class city". But so far it has failed to provide equitable mass transit to the city.

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The need for a mass transit in Delhi was first mentioned in 1969 in a traffic and travel characteristics study done by the Central Road Research Institute (CRRI). Several studies were since conducted by different government agencies to explore the possible technology for such a mass transit (Shreedharan 2002). However, the metro rail was chosen as an appropriate technology of mass transit only in the 1990s on the basis of a feasibility report prepared by the Rail India Technical and Economic Services (RITES) (1995a). In 1995, with an equity participation of the Government of India (GOI) and the Government of National Capital Territory of Delhi (GNCTD), the Delhi Metro Rail Corporation (DMRC) was established to carry out the construction of the Delhi Metro Rail (DMR). The construction of the DMR started in October 1998 and by December 2011, two phases of the DMR network were completed consisting of six lines with the length of 190 km and 142 stations (DMRC 2011).

Studying the Metro

The DMR project has attracted some academic interest in the past few years. The Transport Research and Injury Prevention Programme (TRIPP) based at the Indian Institute of Technology (IIT), Delhi, has led the discourse on the project right from its inception. One of the earlier studies done by TRIPP illustrates that the transport systems planning of India is a case of overrunning costs and under utilisation of capacity. Further, the high capacity systems do not necessarily generate high demand and that the estimation of passenger demand for transit services should consider complete journey of commuters including access time (Advani and Tiwari 2005). Another study by TRIPP argues,

> …Metro systems were the obvious choice when relatively inexpensive cars and two-wheelers were not available. With the introduction of efficient buses, computer and information technologies to manage large fleets…bus rapid transit systems with dedicated lanes seem to be the only choice for providing affordable mass transport in our cities (Mohan 2008: 41).

Alongside TRIPP's techno-planning analysis, there are also some other studies on the metro project. From an urban studies perspective it has been suggested that DMR in the city has created an all-round "positive image", which, of course, is not the true picture as the DMR also has other physical and societal implications that do not necessarily satisfy the public transportation need of the city (Siemiatycki 2006). Roy (2007) argues that "metro is part of a larger agenda driven by a group of select 'stakeholders' to transform Delhi into a 'world class city' for facilitating and encouraging inflow of global capital". Ethnography of the metro proposes that it has created three different types of spaces in the city – a "new cultural geography" in the city's landscape; spaces within the DMR (its trains and stations) and "spatial imaginaries" experienced by an individual commuter (Sadana 2010). This article contributes to such ongoing discussions on the DMR by contesting the claims made by its proponents during its inception and by situating it within the larger context of urban politics. It argues that the DMR is not essentially an energy efficient mass transit technology as claimed, rather it is an infrastructure project linked to the process of gentrification in the city, led by a neo-liberal imagination of restructuring urban space to accumulate capital that is necessarily followed by a series of dispossessions.

The article is structured in four parts. The first part examines the claims that as a mass transit technology the DMR would reduce congestion and pollution in the city by encouraging car and motorbike users to shift to public transport. It also discusses the issue of the DMR earning carbon credits for being an "energy efficient" technology. The second part shows how the DMR is intensifying gentrification in the city through its involvement in property development and speculation. The third part discusses the implications of the DMR for the marginalised sections of the city. By examining displacement by

the metro project, connectivity of metro routes in middle class localities and the fare structure, it explains the links between capital accumulation and dispossession. The final part of the article concludes that even though the DMR is projected as a means of improving connectivity in the city, it is actually fragmenting it by creating inequitable public transport.

Pollution, Congestion and Energy Efficiency

The idea of a rail-based mass transit system in Delhi was largely driven by the alarming growth of private vehicles, as also an increasing demand of public buses in the city. The government was concerned that if timely measures were not taken, the pollution and congestion levels would further deteriorate in the city. To improve both the quality and availability of mass transport service, a non-polluting rail-based mass transit system was considered the way forward (GNCTD 1996). Subsequently, the execution of rail-based mass transit plan was accelerated and its construction began in 1998. During the initial stages of the construction of the DMR, the managing director of DMRC, E Shreedharan rearticulated the government's concern behind the DMR project. He stated,

> It [the DMR] will be much more than a cheap and safer means of transport. It will reduce congestion on roads making movement easier. It will also reduce atmospheric pollution to a great level making the environment healthy…the metro will totally transform our social culture giving us a sense of discipline, cleanliness and enhance multifold development of this cosmopolitan city (Sreedharan 2002:83).

The utility of the metro as a rapid mode of mass transit technology is unquestionable because in comparison to other modes of public transport, it takes less time for long distance travel. However, claims that the metro would also contribute to reducing pollution and congestion in the city seem to be exaggerated. Evidence suggests that despite the expansion of the metro in Delhi, both the pollution and congestion levels are gradually rising, the metro expansion having not been tied up with any policy prescriptions on curbing the growth of private vehicles.

Delhi currently has more motorised vehicles on its roads than those that ply on the roads of Mumbai, Kolkata and Chennai. Government data suggests that the motorised vehicles in Delhi have increased from 35.5 lakh in 2001 to about 64.5 lakh in 2010 (GNCTD 2010). The major contributors to this growth are cars and two-wheelers. The number of cars increased from 9.7 lakh in 2001 to 20.1 lakh in 2010, while the two-wheelers increased from 22.6 lakh to 40.7 lakh over the same period.[1] One media report states that a total of 1,317 new vehicles including cars, two-wheelers and commercial vehicles are being added to Delhi's vehicular population every day. More than 60% of these new vehicles are two-wheelers (Mathur 2011). A comparison of the compound growth rate of motorised vehicles in Delhi before and after the DMR also substantiates this trend. The annual growth of motor vehicles in Delhi was 6.7% between 1991 and 2001, and 6.8% between 1998 and 2008 (GNCTD 2002 and 2009).

Regarding the issue of pollution, a study done by the Centre for Science and Environment (CSE) on pollution levels in Delhi illustrates that in 2001 the annual average level of respiratory suspended particulate matter (RSPM, or PM10) in residential areas stood at 149 microgram per cubic metre. After registering a drop in 2005, the level shot up to 209 microgram per cubic metre in 2008. The concentration is thus around three times higher than the safe levels. Eight-hourly maximum current level of carbon monoxide (CO) is touching 6,000 microgram per cubic metre – way above the safe level of 2,000 microgram per cubic metre – though the annual levels have registered a drop. Levels of nitrogen dioxide (NO_2), though lower than the standard in most areas, have also been increasing marginally (CSE 2008).

Overall, the figures above illustrate that the DMR has not contributed to bringing down pollution and congestion. And it is unlikely that it will happen so in the future, unless supplemented by disincentives on cars and motorcycles and there is an improvement in other modes of public transport. In the past few years, the government has tended to actively encourage car and motorcycle usage by widening roads and constructing flyovers.[2] Alongside, it has dismantled the public bus service by cancelling 120 bus routes adjacent to the metro lines.[3]

The connection that was made between the DMR and reduction of pollution and congestion was recast in the later years as "energy efficiency", popularised by the discourses of climate change. Under the umbrella of climate change mitigation strategies, the DMR was vastly publicised as an energy efficient Clean Development Mechanism (CDM) project catering to an important aim of saving fossil fuels. In 2011, the DMR became the first railway project in the world to get carbon credits from the United Nations (UN). It has since earned carbon credits worth about Rs 47 crore annually for the next seven years (TNN 2011). The certification, as part of the CDM under the Kyoto Protocol, says that the DMRC has helped in reduction of harmful gases into the city's atmosphere.

An unpublished report of a study by Sarai of the Centre for the Study of Developing Society in 2011 on climate change and cities, however, questions the energy efficiency claim of the DMR. It points out that while the direct use of fossil fuel based energy in a mode of transport – electricity in the case of metro rail – amounts to reduced fuel consumption, its impact in terms of making people stay farther away from their workplace may translate into a larger consumption of energy itself. Moreover, there needs to be an assessment of how the infrastructure of metro rail system itself consumes huge amounts of resources – when metals, electricity, etc, are put to use to make the metro rail system functional. It needs to be seen whether it translates into extension of accumulated energy consumption (Sharan et al 2011).

The standard solution offered to the environmental problem in capitalist economies is to shift technology in a more benign direction: more energy-efficient production (Foster 2000). DMRC can earn carbon credits by projecting the DMR as an energy efficient technology through abstract calculations but in reality the problems of pollution and congestion still persist as it is linked to the larger socio-economic processes in the city. In

the words of Foster, "it is not technology that constitutes the problem but the socio-economic system itself" (ibid).

Intensifying Gentrification

Gentrification is a state strategy whose primary objective is to convert low rent spaces into high rent spaces: to reorganise urban space by displacing older, lower value, historical, land uses for newer capital-intensive development that absorb surplus capital and fix it in physical infrastructure and land (Smith 1996).

The process of gentrification in Delhi started after the introduction of neoliberal policies in the early 1990s resulting in the clearance of land by closing/relocating industries operating in the non-conforming zones[4] and demolition of slums inhabited by the urban poor. Two controversial orders of the Supreme Court in 1996 and 2000 resulted in the closure of hundreds of industries, leaving thousands of workers unemployed (Navlakha 2000). Alongside, under the slum clearance schemes, between 1990 and 2007, around 90,000 houses were demolished (Bahn 2009). The land formerly considered as public and owned by the Delhi Development Authority (DDA) was released to private developers for different purposes. On several occasions, land-use plan assigned in Delhi's Master Plan (DMP) was interfered with, in order to provide legal cover for various commercial projects across the city (Roy 2004). This resulted in a huge spurt in the construction of business and commercial centres, hotels and restaurants, malls, amusement parks, multiplex cinema halls, etc.

On its part, the DMR has contributed significantly to the gentrification process by actively remaking urban space through creating and promoting capital-intensive real estate development and speculation. In 1996, while sanctioning Phase-I of the DMR, the union cabinet mandated that approximately 7% of the initial project cost should be generated through property development on land transferred to DMRC for the project. Most of the land was made available to DMRC on a 99-year lease at nominal rent at interdepartmental transfer rates. The DMRC set up a Property Development Wing in 1999 for the implementation of this scheme. Planning of property development work was taken up under different types of arrangements including six to 12 year licence for spaces within station buildings for commuter-related vendors, a 30 years' concession for commercial developments on vacant land pockets adjacent to metro stations, long-term lease (50-90 years) on land pockets, and in depots, etc, not immediately needed for operational structures and advertisement through agencies (DMRC 2011).

One of the first major projects undertaken by the DMRC for property development was the Information Technology (IT) Hub at Shastri Park. This project was approved by the Government of India as a sector specific special economic zone (SEZ). The total plot area was 12 hectares. One block of the 30,000 square metre floor area was completed in 2005 and another one of similar size has been completed in 2011. These are being rented out to information technology enabled services (ITES) operators. There is also a proposal to construct such kinds of additional buildings on this 12-hectare plot of land in the future and operate it as an IT-specific SEZ (DMRC 2011). There are also other examples of property development by the DMRC on the land available on both sides of the metro lines. A media report in 2006 published details of the areas in the city where the DMRC was planning to develop residential and commercial property on different routes of Phase-I of the DMR. This included residential property in six different locations on 2,12,026 sqm of land and commercial property in nine different locations on 66,464 sqm of land[5] (Sinha 2006). The information available on DMRC's website suggests that substantial development work has been completed on the same on Phase I routes. The DMRC website also indicates similar plans for the routes of Phase II (DMRC 2011).

It should be noted here that the Delhi Master Plan 2021, which was notified in 2007, but drafted in the early 2000s, specifically discusses the role of the metro in densifying the city, leading to the formation of high-density and high-rise commercial development. It thus provided different building by-laws and land use norms for all segments of land within 500 metres of any metro line, specifically increasing the Floor Area Ratio (FAR) and allowing denser and higher buildings to be constructed (DDA 2007). This demonstrates the manner in which the metro has been envisaged as a strategic infrastructure project for rebuilding Delhi into a more capital-intensive and commercially oriented city. Thus, while the land given to the DMRC for the metro was meant to be for the public good of the city's residents, it is currently being sold off or leased out to private developers for speculative purposes, and virtually none of the land acquired by the DMRC that is not occupied by the metro rail is being used for public purposes. The DDA has persistently argued that there is a shortage of land in the city to house the poor; on this basis the DDA has increasingly been displacing the urban poor to the city's peripheries. If there is no land available in the city then how is the DDA managing to provide the DMRC with such a huge land area for property development?

The accounts of the DMRC given in its annual reports suggest that the generation of revenue through property development has been growing steadily. The major sources of its income are from traffic operation, consultancy, real estate and others. The figures show that between 2002 and 2005 there was no significant growth in the income of DMRC under various heads but one can witness a sudden shift in the figures of income generation between 2006 and 2009. The income from traffic operations increased from Rs 2.4 crore in 2003 to Rs 113.2 crore in 2006 and to Rs 392.8 crore in 2009, while the income under real estate has increased from Rs 1.7 crore in 2003 to Rs 296.2 crore in 2006 and Rs 244.1 crore in 2009. It has to be noted that real estate comprises 65.9% of the total income generated by DMRC in 2005-06 (DMRC 2003 to 2009).

Alongside the process of property development, the DMR is also contributing to the rise of real estate prices in the city. A study done by the Centre for Environment, Planning and Technology (CEPT) in Ahmedabad highlights that a metro station in the locality pushes up

prices by at least 22%. The impact of the DMR on real estate can be seen in three phases including the pre-construction phase (1990-96), the under-construction phase (1996-2000) and the post-construction phase (2001-06). It is found that property rates jumped significantly after the DMR began operations, although there was only a slight increase in the value in the two previous phases. The study further suggests that the property prices around stations that are at the peripheries of the city have considerably closed the gap with those at the city centres. Prices along the Dwarka and Rithala routes have risen significantly and the prices are highest within 500 m of the DMR routes. As one moves farther, the impact on prices begins to decrease. Proximity to the metro has also proved beneficial for commercial properties. In commercial areas, the land value within 500 m increased by 18.1%. In residential areas, land value within 500 m of the DMR line increased by 11.3% averagely. The threshold value for residential properties is approximately up to 500 m from the metro line, whereas the limit increases to approximately 800 m for commercial properties (Swamy 2009).

In addition to sale prices, the rental values for office spaces and residential flats in Delhi have also increased. For instance, the houses that were available on rent in the range of Rs 3,500-5,000 per month along the blue and red lines, such as residential colonies of Dwarka, Janak Puri, Kirti Nagar, Karol Bagh, Rajender Nagar, Shastri Park, Kanhaiya Nagar, Keshav Puram, Kohat Enclave, Pitam Pura, Rohini, etc, shot up to Rs 5,000-Rs 8,000 a month for two-bedroom accommodation immediately after the arrival of the DMR (RP Forum 2005).

Thus, it can be argued that the DMRC is playing a significant role in the process of capital accumulation through developing property. It is generating revenue as a landowning agency – a surrogate landlord under the guise of a public body operating for the common good – and a part of the surplus generated by land development is being further employed to acquire land to earn yet more surplus, much of which benefits the private sector at the expense of diminishing public land.

Accumulation by Dispossession

David Harvey argues that capitalist accumulation is always in concurrence with dispossession, termed as "accumulation by dispossession", a concept that draws upon the notion of "primitive accumulation" explicated by Marx. The concept of accumulation by dispossession reveals a wide range of processes including commodification and privatisation of land and forceful expulsion of local and squatter; conversion of various forms of property rights-commons into exclusive private property rights, dismissal of rights to the commons, and so on. Further, the state, with its monopoly of the means of violence and the power to define legality, plays a crucial role in both backing and promoting these processes (Harvey 2004). The DMR has accelerated the processes of dispossession in the city through: (1) displacement of slums for its construction; (2) designing metro routes in favour of middle classes; and (3) keeping high fares.

According to the Environment Impact Assessment (EIA) of Phase-I of the DMR, 2,502 slum clusters were supposed to be displaced due to its project (RITES 1995b). The construction of Phase I was completed in 2005, but no credible and verifiable data is available on how many people were displaced during that time. As per the data acquired through the Right to Information Act in 2005 from the Municipal Corporation of Delhi (MCD), 699 slum squatter families (approximately 3,500 people) inhabiting the land-owned by the MCD were displaced (GNCTD 2005). There is also no data available in public domain regarding the displacement of people from the land owned by the DDA, railways or any other agencies. Since the EIA report of 1995 was applicable to only some of the sections of the Phase I of the project, and there have been adhoc extensions into other areas, there is a possibility that many more families would have been displaced. Furthermore, the EIA does not mention anything aboutthe demolition and displacement that unfolded in the process of property development along the DMR corridors.

The DMR has undermined the rights of the poor by giving priority in designing routes for middle class localities. The DMR project has been modified several times since it was first proposed. The first modification took place in 1995 when RITES prepared the EIA for Phase I of the DMR. In this, Phase I was divided into eight operational sections including Vishwavidyalaya – ISBT, ISBT – Connaught Place, Connaught Place – Central Secretariat, Shahdara – ISBT, ISBT – Shakur Basti, Shakur Basti – Nangloi, Subzi Mandi – Siraspur, and Siraspur – Holambikalan (RITES 1995b).

There was further remodification after the actual construction started, such that the necessary eight operational sections originally proposed were reduced to three: Shahdara-Tri Nagar-Rithala, Vishwavidyalaya-Central Secretariat, Indraprastha-Barakhamba Road-Dwarka sub city (DMRC 2011), thus comprising only the first four sections of the modified Phase I, along with additional lines to Rithala and Dwarka. The other four sections were simply cancelled during the actual implementation of the plan. It should be noted that the sections that were cancelled were mainly connected to the areas largely inhabited by the poor population of the city. The new sections added in the Phase I and sections of the Phase II, which are now fully operational, clearly indicate the utility of the DMR for the middle class population of the city.[6]

A careful reading of the localities covered in these two phases illustrates that these routes were systematically designed to integrate middle class colonies with business and shopping centres both within the National Capital Territory (NCT) and National Capital Region (NCR). This view could be contested by highlighting that that the metro lines are also connected to the poor localities such as Sahadra, Jahangirpuri, Nangloi, etc. But then, one may also question: why are there only a few such names of colonies in the present and proposed routes of metro, whereas it is estimated that approximately 50% of Delhi's population lives in such localities across the city?

The fare slabs of the DMR are also a case of concern. At present, in comparison to the public bus fare of a minimum of Rs 5 and a maximum of Rs 15, the DMR has a fare structure with a minimum ticket price of Rs 8 and a maximum of Rs 30

(DMRC 2011). This means that the DMR is out of reach of those who are earning low wages. Unlike the DTC, which offers concession to students, daily commuters, senior citizens, etc, the metro does not provide any concession to any category of commuters. All it offers in the name of concession is a 10% bonus travel on "smart cards", which require a minimum purchase of Rs 100 and can be used for multiple trips (DMRC 2011).

To sum up, as a public infrastructure project, the DMR has had severe impacts on the poor section of the public. In the name of land acquisition for "public interest", the houses of the poor have been demolished to pave way for the construction of the DMR and property development, while the DMR has not found any need to demolish the houses in the elite localities, by way of underground construction. To establish this mass transit system, a huge amount of public money has been invested, but it has largely benefited the middle classes, owing to their important role in the changing production and consumption relationship in the city (Fernandes 2001).

Conclusions

This article argues that the DMR that was brought into the city as a mass transit technology to overcome the crisis of public transport is strongly implicated within the changing urban politics in Delhi. It challenges the claims made by its advocates that the DMR would reduce pollution and congestion by demonstrating that despite the expansion of metro routes across the city, the pollution and congestion levels have not gone down as the DMR has failed to attract cars and motorbike users. The paper further suggests that the claims of the DMR as an energy-efficient technology need to be understood through an evaluation of the overall energy consumed by the DMR during its construction and operation. Technological interventions cannot overcome the crisis of pollution and congestion unless they are linked with other socio-economic factors in the city. It illustrates how the DMR is accelerating the process of gentrification by highlighting the growth of revenues generated by the DMRC through property development and noting the rising prices of property adjacent to the metro stations and routes. Finally, the article argues that the DMR has also contributed to the processes of dispossession by not only demolishing houses of the poor for its construction, but also by creating a fragmented and polarised public transport system.

NOTES

1 According to the *Statistical Abstract 2010* of GNCTD, the percentage distribution of categories of motor vehicles in Delhi shows that there has been a rapid increase in the number of cars and two wheelers during the decade, while there has been a decline in the other categories of vehicles. The data shows that in 2010 about 62.8% of motor vehicles were two-wheelers and 31.2% were cars. In comparison, buses that comprised 1.2% of the vehicle population of the city in 2001 were reduced to 0.89% in 2010.

2 It is estimated that till 2011 approximately 80 flyovers were constructed in Delhi.

3 See report titled "The City and the Metro" on a national level round table organised by Parisar, Pune, 2010.

4 The area earmarked in Delhi Master Plan for the planned development of industries in the city.

5 The localities for residential purpose include Khyber Pass, Rithala, Vishwavidyalaya, Dwarka, Netaji Subash Nagar and Najafgarh. The localities for commercial purpose include Shahdara, Inderlok, Inderlok Annexe, Pratap Nagar, Tis Hazari, Seelampur, Welcome, Kashmiri Gate.

6 Some of the popular middle class localities in Phase I and Phase II of the DMR are Rohini, Dilshad Garden, Dwarka, Model Town, Vaishali, Noida, Gurgaon.

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