

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

Impact of Market Oriented Urban Development on Neighbourhood Level Infrastructure: The Case of Nagpur, India

Amit M.Deshmukh¹, VinayakS.Adane²

Assistant Professor, Department of Architecture and planning, Visvesvaraya National Institute of Technology, Nagpur,
Maharashtra, India¹

Professor & Head, Department of Architecture and planning, Visvesvaraya National Institute of Technology, Nagpur,
Maharashtra, India²

ABSTRACT: Urbanization in Indian cities has different impacts on various aspects including quality of life. Land as a resource is becoming scarce and overburdened because of location preference for accommodation and allied business establishments. Efforts laid in planning legislation in form Development Control Rules (DCR) and amendments over course of time have given certain remedial measure without foreseeing the impacts on development. Last decade has seen several changes in building development pattern in existing urban fabric which are the results of the building legislations in the form of amendments. Differences in coordination amongst various planning organizations have failed to address most of the issues. During implementation of planning schemes most of the urban agglomeration has undergone transformation in terms of development which has certain intangible impacts on urban precincts. Market oriented development tool in the form of Transfer of Development Rights (TDR) in one of the mechanism widely used in India for development plan reservation proposals as per Maharashtra Regional and Town Planning Act 1966. This additional Floor Space Index (FSI) in the form of TDR is widely used by Municipal Corporation across India. The paper discusses the policy of TDR and other permissible development areas in Development Control Rules as Premium areas, Balcony area, and alternate terraces as a case of Nagpur city in India. TDR related policy as applicable in Nagpur along with other development areas are explained in first part. Three developed case studies in study area are discussed with their increase in proportionate areas related to TDR, FSI, super Built up, Parking areas and Volume to plot area (VPR) ratios. Discussion along with the comparison amongst various areas highlight the values which seems to be alarming as threat to the receiving areas. The results of this TDR mechanism has given certain fruitful results as far as state policy is concerned for reservations and finances, but simultaneously resulted into certain unforeseen impacts after its implementation during course of time. Implementation of development policy has seen certain intangible impact on infrastructure in specific receiving areas which are highlighted.

This paper intends to demonstrate and highlight certain unanticipated impacts pertaining to market oriented mechanism TDR which has already undertaken its shape in Nagpur, Maharashtra, India during last two decades.

KEYWORDS: Transfer of Development Rights, Floor Space Index, Premium area, Urban Development, Development Control Rules, Infrastructure, Municipal Corporation.

I. INTRODUCTION

During last decade, India has seen several results of planned Development plan process under various town planning acts by different States. Many cities are growing haphazardly irrespective of the planning legislation laid by the respective administration. Migration has resulted in major burden to cope up with urban development in terms of existing infrastructure and housing needs. Characteristic of Indian cities is the vast growth of existing cities, rather than accommodating growth in new planned cities [1]. Accommodation of additional population in urban centres where

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

already the development has occurred becomes the major task for any planning organization for framing policy. The million plus cities in India are becoming growth engines of the country and many of them matching equally with the metropolitan cities in terms of quality of urban life[1]. Already strained infrastructure, housing shortages, growing slums, traffic problems, pollution, etc. are on rise in the tier II cities as pointed out in McKinsey report [2].

During recent past high valued precincts in cities are developing abruptly for availability of spaces. Urban Characteristics of most of Indian cities reflects varied development pattern within same areas. This is because of the development potential was not explored to its maximum with certain typology of buildings and also apartment concept being accepted during last 2 decades. These might be because of flaws in implementation of planning legislation which are amended on need based basis. Indian Municipal corporations are solely responsible for planning and implementation of planning projects as statutory obligatory function and as per 74th Constitutional Amendment Act of 1992[3]. Implementation of development plan require procurement of land either by way of private negotiation plan. or through the land Acquisition Act 1894[4] and this requires huge investment which is beyond the fiscal capabilities of many Urban Local Authority (ULB). McKinsey Global Institute referring to Infrastructure deficiency in Indian cities highlighted huge gap between demand and supply of urban services like water supply, urban sanitation, electricity supply, roads in localities, waste collection and treatment, social infrastructure (education and health), open spaces and recreation [2].

Municipal Corporation across Maharashtra under MRTP Act 1966 Section 126 have prepared and implemented the Development plan, which provides provision to acquire land by Transferable Development Rights in Maharashtra state[5]. Municipal administrations are striving for fund generation along with implementation of development plans with new market driven mechanism TDR. Various amendments related to Development Control Regulations (DCR) have been amended for proper implementation without much hassles for benefit of society. Other such revenue generating models for ULB include premium areas, enclosed balcony, development charges. All these timely amendments in the form of TDR, Floor space Index (FSI), premium area as common areas, Balconies, Alternate terraces and parking have as tremendous impact in an urban precincts, even though these policies help in generation of funds for ULB. Author tries to highlight this timely implemented amendments with the case studies with different typologies. It must have led to an unanticipated situation related to infrastructure and subsequently impact on quality of life in neighbourhood. Probably this has resulted in urban chaos. This must have been resulted into some drastic change in quality of life in the developed areas. McKinsey Global Institute found out that growth of Indian cities is backed by investment, they fall short of delivering basic services to its citizens and ultimately affecting the quality of life [2]. This paper in form of study intends to highlight certain unexplored aspects related to development and infrastructure in an urban precinct which has undergone several transformations.

II. TRANSFER OF DEVELOPMENT RIGHTS:

"TDR is a technique of land development, which separates the development potential of a particular parcel of land from it and allows its use elsewhere within the defined zones of the city. It allows the owner to sell the development rights of a particular parcel of land to another. This entitlement is over and above the usual FSI available for receiving plot in accordance with the prevailing laws and regulations, which entitles a landowner to construct additional built up area on his existing building or vacant land"[6]. Although these guidelines have already been implemented in some of the corporation the impact needs to be studied along with other such areas as mentioned earlier. Pruetz explains TDR as a market based technique that encourages the voluntary transfer of growth from places where a community would like to see less development (called sending areas) to places where a community would like to see more development (called receiving areas). The sending areas can be environmentally sensitive properties, open space, agricultural land, wildlife habitat, historic landmarks or any other places that are important to a community. The reserve areas should be of the places that the public has agreed for appropriate development because they are close to working places, commercial areas, schools, transportation and other urban services[7]. The City Planning Commission views TDR policies as rational precisely because their benefits are tangible and quantifiable in nature, the construction of larger projects results in financial gains to Municipalities and developers, making them easy to justify[8]. In tangible implication of such type of policies needs to be accessed and highlighted as the developments have already taken

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

shape. Tavares describes property ownership as a bundle of rights, including the right to use, the right to exchange, and the right to convert[9]. One of the advantages of TDR as suggested by Taveres is less administrative costs and less monitoring to ULB than zoning[9]. ULB has conceived TDR as one of the effective tool for providing amenity spaces in existing urban fabric thereby creating more open spaces, roads, public and semi-public activities in form of spaces without compensation to affected people. It also identifies as one of the revenue generation model by taking development charges on TDR.

III. CASE STUDY: NAGPUR MAHARASHTRA, INDIA

Located as Geographic centre of India, Nagpur has population of about 23.98 lakh with an average density of 106 persons per hectare[10]. It is second capital of Maharashtra with an advantageous geographical location having centrally located [11]

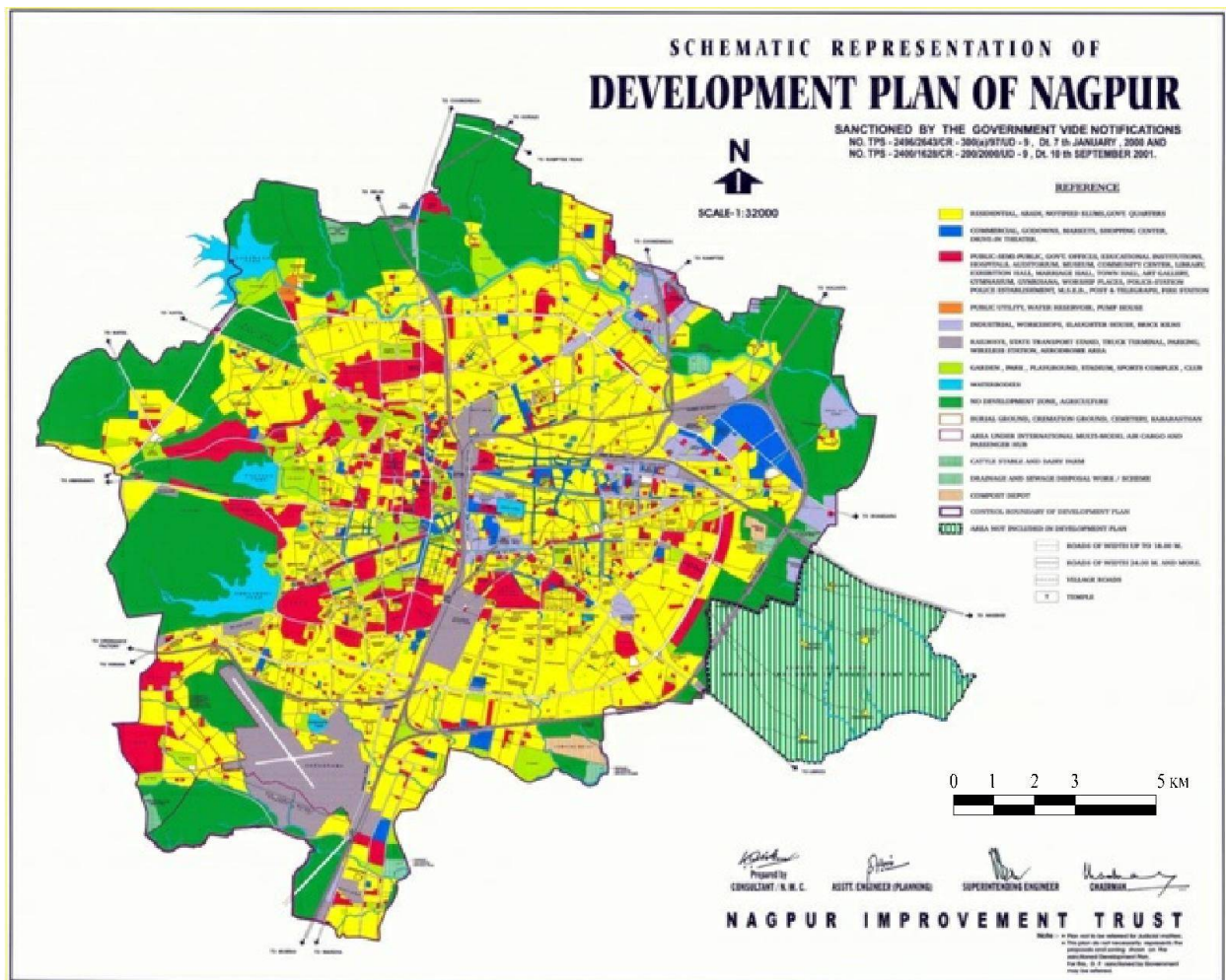


Figure 1 Development Plan of Nagpur[12]

As per the provisions in the MRTP Act, the development plan was prepared during 1984. The development plan preparation took five years and the plan was published in 1989. Subsequently, the plan was submitted to Government of Maharashtra (GoM) for approval. Based on the scrutiny of the plan, it was revised and submitted again. Finally, after

International Journal of Innovative Research in Science, Engineering and Technology

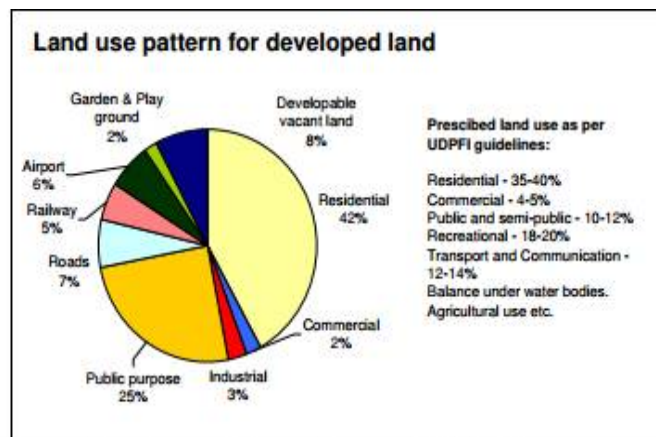
(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

multiple revisions, the development plan came into effect in 2001, which was prepared for a horizon time till 2011. Nagpur Improvement Trust was the sole authority looking after all the functions of land and urban planning in the city till 2000. But since 2001, planning and developmental activities are administered by two authorities in Nagpur. Out of the total planning area of 22,508 ha, 15,300 ha is under NMC's Town Planning department and the rest, summing up to 7,208 ha, is under the purview of Nagpur Improvement Trust [11].

The total area out of total area of 22,508 ha within the Municipal Corporation's limit as per development plan only 83.40 sq. km. (38%) is developed. About 38% of the land is under agriculture and forest cover and 4% is under water streams and water bodies. The balance 20% cannot be developed. The distribution of the developed area is as shown in figure 2.



Source: Development Plan of Nagpur, 1986-2011

Figure 2 Land Distribution of Nagpur City[12]

As per Urban Development Plans Formulation and Implementation (UDPFI) guidelines, the land use distribution of developed land (as proposed in Development Plan) conforms to the guidelines in the case of residential usage. Though only 2% of the land is under parks and gardens (recreational spaces), this is adequately supplemented by the large forest cover in the city. But, land under commercial usage needs to be increased further, while the proportion of land earmarked for public and semi-public use may be decreased. A large percentage of land within the municipal limits outskirts remains unutilized or under-utilized in terms of permissible floor space of Index (FSI). The FSI norms under the current development control rules varies from 1 for residential and maximum 2.5 for commercial land use developments. With the growth in demand, and various infrastructure up-gradation schemes are underway presently, the norms are revised presently in select areas, allowing high density development.

1. CHRONOLOGY OF DEVELOPMENT IN DCR NAGPUR

Floor Space Index is the quotient obtained by dividing the total covered area (plinth area) on all floors, excluding exempted areas as given in regulation by the area of the plot[13]. Permissible floor Space Index across Nagpur for different land uses ranges from 1 for residential and up to 2.5 for commercial and industrial land uses depending on the adjacent road width as per DCR. Residential Plots admeasuring more than 100 Sqm are given additional FSI up to 1.25. Apart from FSI additional 15% of built areas as balcony areas are permissible under balcony areas which needs to be kept unenclosed.

During 2003 due to sudden increase in development of residential category in prime areas in the form of apartment was observed in Nagpur. A major amendment in the form of premium areas was added in DCR. A need was suggested to exclude common areas such as staircase, passages, common lobbies from and lifts from base FSI. These facility areas in apartments were excluded from FSI under premium areas which is permitted up to 30% of floor areas. Builder

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

or developer has to pay premium charges to exclude these areas. Nagpur Municipal Corporation is generating revenues out from this policy with the premium charges. This has further indirectly increased the FSI by 30% which is in form of premium areas over and above the base FSI.

Furthermore with acquisition of land for reservation under development plans has further increase FSI in the form of TDR loading policy which was already in DCR 2000. The development potential of a plot are separated from the land itself and are made available to the owner of the land whose land is under reservation in the form transferable development rights by issuing Development rights certificate[13]. Nagpur Municipal Corporation has issued Development Rights Certificates other land owners in lieu of the land which is surrendered in their jurisdiction. Land owners can sell part of his right to develop his own or other land. He can also sell the share to developers at a market price.

As per the DCR 2000 developer or purchaser is entitled load or receive TDR up to 80% of the receiving plot area which is over and above the permissible FSI [13]. This policy is applicable to all the receiving plots where TDR is to be loaded irrespective of road width within the zones specified but excluding certain congested areas and areas which are regularized under State Gunthewari Act[14].

However for residential development the maximum density of 250 Tenements per hectare is kept constant throughout the municipal limit even after loading of TDR. This amount to minimum 40.00 Sqm per tenement as built up area considering FSI 1.00. This tenement density is applicable to net plot areas. This means that any development which is undertaken in NMC limit cannot exceed the tenement density even after loading TDR and taking the advantage of premium areas. Maximum density allowed is on net plot area available irrespective of FSI and other exempted premium areas. Further loading limit of TDR is uniform irrespective of road widths and needs to be satisfied with other prevailing building byelaws related to buildings. This uniform density does not serve the purpose for which it is intended in earlier byelaws.

2 TDR STRUCTURE IN NAGPUR:

In Nagpur, 216409.29 sq. m (0.086 percent of total city area) area of TDR is generated in the form of Development Right Certificates (DRC) for different reservation heads in development plan during 2005-15 as shown in Table1.

TDR GENERATED FROM 2001		
LANDUSE	AREA IN SQM	Percent %
Playground	55367	28.3
Parking	8145.05	4.2
D P Road	73260.3	37.5
Open space	9700	5.0
Institution	17105	8.8
Public and semi public	18005.53	9.2
Commercial	13722.99	7.0
TDR Area (with FSI)	216409.29	
Area of land under ownership	195305.87	100

Table 1 Reserved land Purposes[15]

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

Most of reservations sites were acquired were under different heads in Development plan. Figure 3 shows land reserved by the NMC (Nagpur Municipal Corporation) in percentage for various purposes and for which TDR is loaded during the year 2005-2015

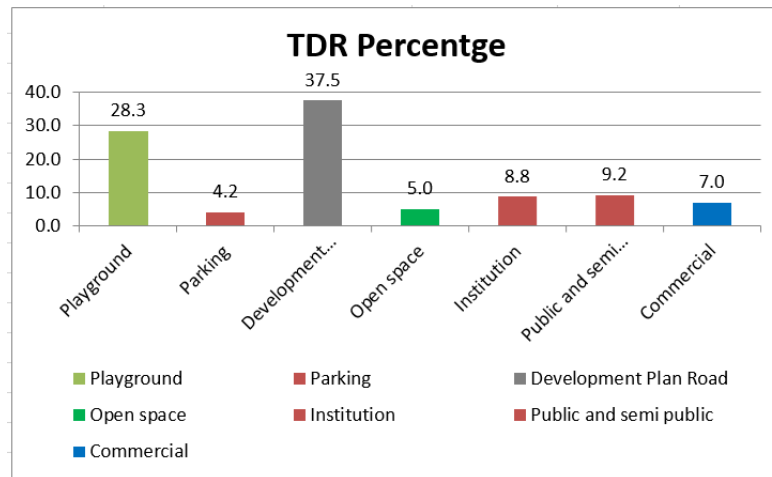


Figure 3 TDR Area for various purposes[15]

All the TDR generated in city was divided into three zones namely Central Area Zone A, Zone B up to inner ring road and Peripheral Zone C. TDR generation of sending and loading or receiving are same with the zones as its boundaries .The main objective of permitting TDRs should not to improve land use efficiency but to finance roads, housing or community facilities that the city did not have the means to finance from its own resources[16]. Approximately 80% of the TDR generated has already been loaded in Nagpur as per NMC records till 2016[15]. TDR generated from zone A can loaded in zone A as well as can be loaded in zone B & zone C. TDR generated from zone B can be loaded in zone B and zone C but cannot be loaded in zone A. TDR Generated in zone C can only be loaded in zone C but cannot be loaded in zone A & zone B.[13]. The zones for TDR loading and generation in Nagpur are shown in figure 4

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

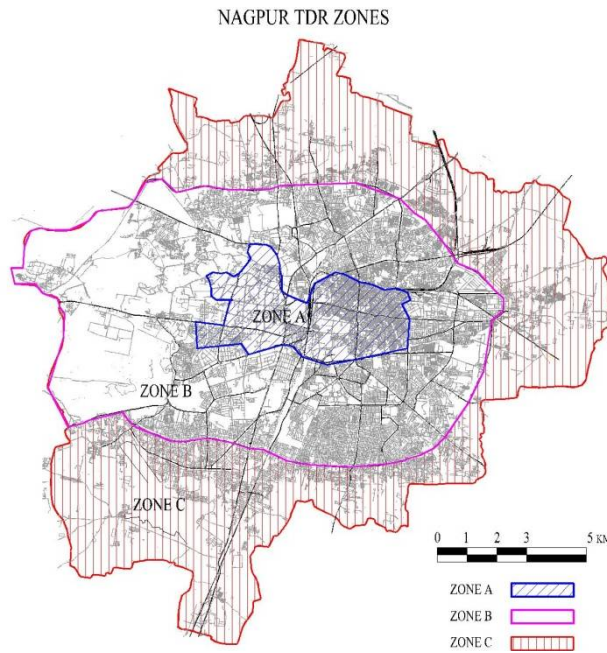


Figure 4 Nagpur Administrative TDR Zones[13]

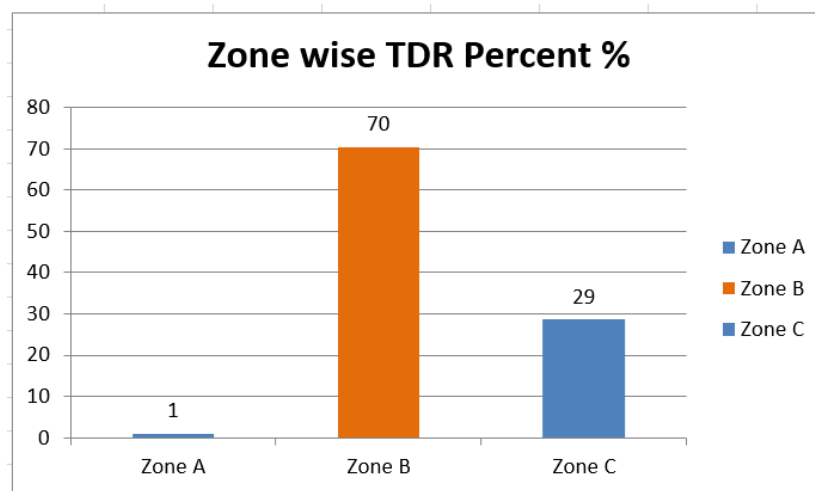


Figure 5 Zone wise TDR Generation Percentage (Town Planning Department NMC Nagpur, 2015)

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

Figure 5 clearly shown that more than 70% of total TDR is available in B type zone of the city which seems to be good for the Infrastructure & public facilities in the zone. This zone has larger boundaries with varying plot rates within zones itself. Larger variation of land rates are observed in zone B. Average market rates of land in Nagpur are shown in figure 6 along with the zones.

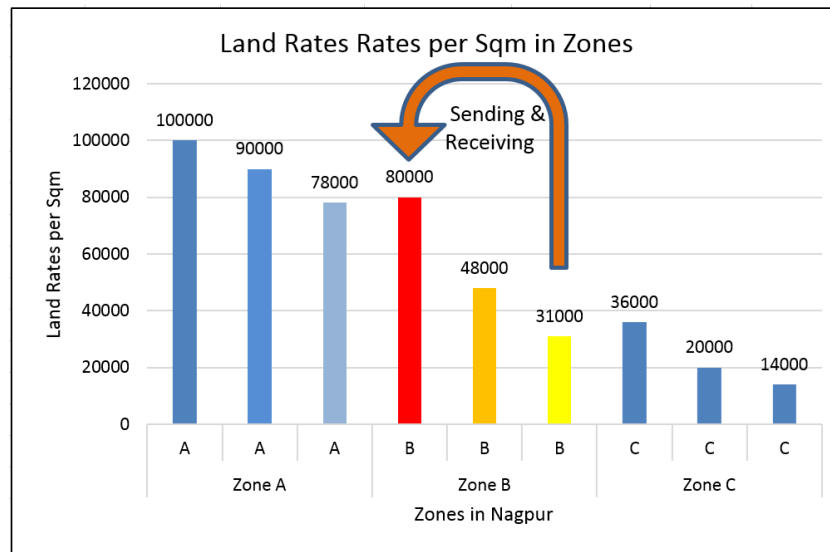


Figure 6 Land Rates in Zones

It is observed from Figure 6 that variations in land rates are more in Zone B which varies from 80000 Per Sqm to 31000 per Sqm towards inner Ring road. However the variation are also observed in zone A and zone B.

3 DATA COLLECTION OF CASE STUDY: NAGPUR RAMDASPETH

Development pattern in Nagpur has changed due to various amendments in DCR 2000 specifically related to building typology in last two decades in certain prime areas. Author tries to explain the chronology of developments in DCR with the help of three live case studies and its probable impact since almost 80% of TDR generated has already been loaded till 2015. Apart from these various policies in form of amendment has already been implemented from time to time such as TDR, premium areas, alternate terraces balconies. Ramdaspeth and Dhantoli areas, which are centrally located in prime areas of Nagpur, have seen substantial developments during last two decades. These prime areas have high land value as compared to other areas specifically within zone B. Available plot sizes in these areas are bigger as compared to other areas of Nagpur with big roads. The area is just starting of Zone B as per TDR zone plans of Nagpur.

Study area is from 11 storied building to University library in Ramdaspeth, which has 18 meter wide road. Three residential building typology are identified considering their year of sanction and construction based on changes in DCR 2000.

- Typology A (Development before 2000)
- Typology B (Development from 2000 to 2005)
- Typology C (Development from 2005 till 2016)

All the examples selected are residential developments with almost same size of plot and are on same 18m wide road. Typology A is assumed hypothetically for demonstration. Typology B and Typology C, are constructed examples selected from same road in zone B that has seen various developments after implementation of these policies in Nagpur. Since all plots are above 1000 Sqm the permissible Floor Space Index is 1.25. The uniformity of plot sizes of approximately 1338 Sqm is kept constant to identify various affected parameters.

The study is broadly based on four identified area parameters as included in DCR 2000[13]

- Base Areas which includes Plot area and permissible Floor space index, Transfer of Developments Right and Premium areas
- Facility areas which includes balcony and Alternate terraces

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

- c) Average super built up areas per apartment which includes FSI, TDR, premium and Facilities areas
- d) Tenement density and parking areas
- e) Volume to Plot Area ratios

3.1 Typology A- Before DCR 2000

Assuming a plot, which admeasures 1337.8 Sqm in the study zone and creating area statement for built up areas of construction before 2000. Maximum Development potential to which construction can be carried out as per these byelaws is shown in table 2.

BUILDING TYPOLOGY A BEFORE 2000					
SN	Particulars	Area Sqm	Provision of Principal DCR 2000	Area(Sqm)	% of Plot
BASE AREAS FSI PREMIUM TDR					
	Plot Area	1337.8	FSI 1 for plot below 1000 sqm	1337.8	100
a	Floor Space Index(FSI)	1.25	Since Plot exveeds 1000 Sqm Fsi is 1.25	1672.25	125
b	Transfer of Dev. Right(TDR) Max 80%		Not loaded	0	0
c	Premium max 30% (FSI)		Premium 30% taken	0	0
	Net Base Areas		Net Base Areas	1672.25	125
FACILITY AREAS BALCONY ALTERNATE TERRACES					
d	Balcony		Maximum upto 15% of Built Up (a& b)	250.8375	18.75
e	Alternate terrace		Not taken	0	0
	NET AREA		NET PERM. SUPERBUILT UP AREA (a+b+c+d+e)	1923.088	143.75
TENEMENT					
f	No of Tenements (Kitchen) Permissible		Max 250 Tenements per 10000 Sqm (40 Sqm pet tenement)	33.445	33
	Average Super Builtup area per tenement			58.28	
	Land Share with Maximum density			40.54	3
MINIMUM PARKING AREAS FOR 40SQM APPARTMENT					
	Minimum Parking for 40 sqm				
	1 Car for 4 appts x 12.5sqm			134.0625	
	Scooter & Motor cycle 1 perAppt			128.7	
	Cycle 1 Per appt			60.06	
	Covered Parking area			322.8225	24.13
	TOTAL CONSTRUCTED AREA			2245.91	167.881
	Volume of Building to Plot Area ratio (VPR)				5.29

Table 2 Area Statement Typology A

- a) Base Areas It is observed that maximum area, which can be developed, comes out to be 125% of net plot area since plot exceeds 1000 Sqm and FSI is restricted to 1.25
- b) Additional permissible facilities in form of 15% balcony areas on total FSI comes to be 18.75% of net plot. Total permissible super built area, which includes FSI and Balcony areas comes out to be 143.75% of net plot area.
- c) Average super built up areas per apartment is 58 Sqm per apartment
- d) Considering the plot to be developed as per maximum density of 250 tenements per hectare, the net plot share per tenement comes out to be 40 Sqm. This type of maximum density development is for lower socio economic group. The present maximum density comes to be 33 tenements for the Typology A. Even though the parking was not much insisted before 2000 DCR we calculated parking spaces required as per present byelaws. 1 Car Space of 5.0m x 2.5m, 4 Scooter parking space of 2mx1.5m each, 4 Cycle parking space for 0.7mx2.0m each is required for every 4 no of tenements with carpet area below 40 Sqm[13]. (Carpet area is area after deducting areas for walls for every tenement). Accordingly net covered parking areas with additional manoeuvring space of 25% comes out to be 24.13% of plot area. Thus total constructed area comes to be 2245 Sqm which amounts to 168 % of Net plot area
- e) Volume of building measure in cubic meters to plot area measured in square meters (VPR) comes to 5.29 for this typology A of building.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

These type of multi-storeyed developments with maximum potential was hardly seen before 2000 since ample land was available outskirts and the study area was prime areas with individual holdings with residence.

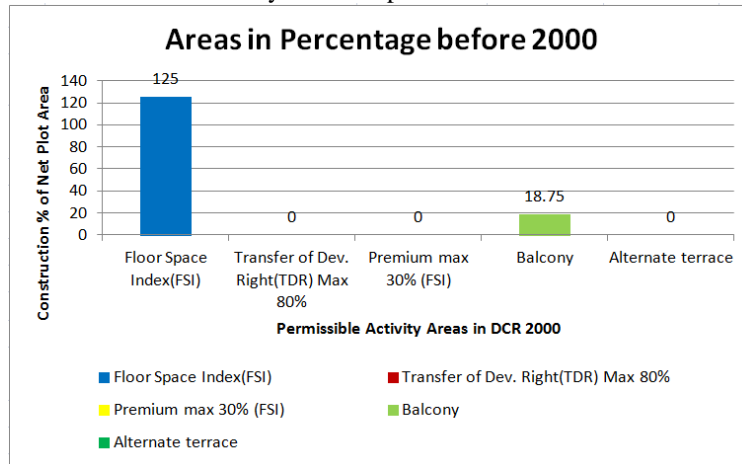


Figure 7 Areas in Percentage Typology A

3.2 Typology B-(2000-2005)

Assuming a plot, which admeasures 1337.8 Sqm in the study zone and creating a area statement for built up areas of construction and the DCR during 2000-2005 2000. Residential apartment Dwarkamai on Plot no. 133 Farmland, Ramdaspath, in the study area admeasures 1337.8 was sanctioned in 2003 with new base areas as premium areas. Maximum Development potential to which construction has carried out as per these byelaws is shown in table 3.

BUILDING TYPOLOGY B (2000-2005)					
SN	Particulars	Area Sqm	Provision of Principal DCR 2000	Area(Sqm)	% of Plot
BASE AREAS FSI PREMIUM TDR					
	Plot Area	1337.8	FSI 1 for plot below 1000 sqm	1337.8	100
a	Floor Space Index(FSI)	1.25	Since Plot exveeds 1000 Sqm Fsi is 1.25	1672.25	125
b	Transfer of Dev. Right(TDR) Max 80%		Not loaded	0	0
c	Premium max 30% (FSI)		Premium 30% taken	501.675	37.5
	Net Base Areas		Net Base Areas	2173.925	162.5
FACILITY AREAS BALCONY ALTERNATE TERRACES					
d	Balcony		Maximum upto 15% of Built Up (a& b)	250.8375	18.75
e	Alternate terrace		Not taken	0	0
	NET AREA	NET PERM. SUPERBUILT UP AREA (a+b+c+d+e)		2424.763	181.25
TENEMENT					
f	No of Tenements (Kitchen) Provided		Provided Tenements 24 Nos Permissble 33	33,445	24
	Average Super Builtup area per tenement			101.03	
	Land Share with Maximum density			55.74	4
MINIMUM PARKING AREAS FOR 40SQM APPARTMENT					
	Maximum Parking for 40 sqm				
	Car	15		234.375	
	Scooter	40		150	
	Cycle	40		70	
	Covered Parking area			454.375	33.96
	TOTAL CONSTRUCTED AREA			2879.138	215.214
	Volume of Building to Plot Area ratio (VPR)				6.78

Table 3 Area Statement Typology B

a) Base Areas: It is observed that maximum area, which can be developed, comes out to be 162.5%of net plot

International Journal of Innovative Research in Science, Engineering and Technology

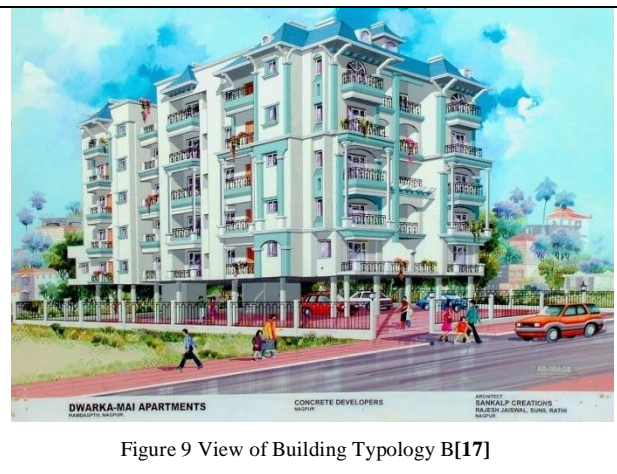
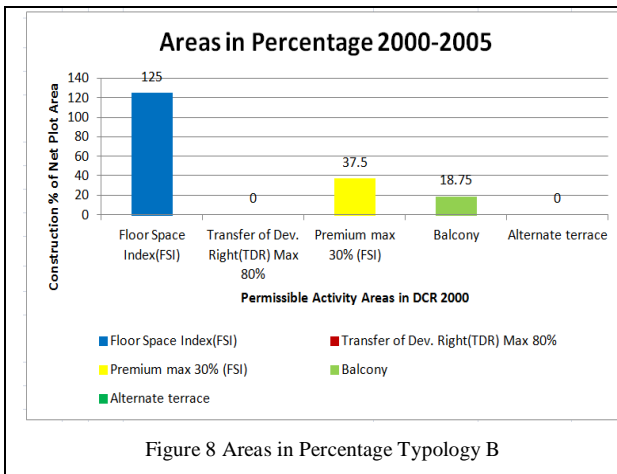
(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

- area since plot exceeds 1000 Sqm and FSI is 1.25. Additional 30% premium has been taken which is on FSI which comes out to be 37.5% of plot areas.
- Additional permissible facilities in form of 15% balcony areas on total FSI comes to be 18.75% of net plot. Total permissible super built area, which includes FSI and Balcony areas comes out to be 181.25% of net plot area.
 - Average super built up areas per apartment is 101 Sqm against 58 Sqm with full density as in Typology A.
 - The plot has been developed with varied apartment areas with 24 apartments as per sanctioned drawing. These include 10 apartment with carpet area above 80 sqm, 6 apartment with carpet area in between 40Sqm to 80 Sqm and 8 Apartment with Carpet area below 40 Sqm[13]. Average built up area per apartment is 73.48 Sqm since maximum tenement density is not achieved. The total area allotted to parking was 454 Sqm, which in includes 15 Car parking spaces, 40 Scooter parking spaces and 40 Cycle parking spaces. These parking areas contribute to 33.96 % of Net Plot area[17]. Thus total constructed area comes to be 2879 Sqm which amounts to 215 % of Net plot area
 - Volume of building measure in cubic meters to plot area measured in square meters (VPR) comes to 6.78 for this typology B of building.

These type of multi-storeyed residential developments with maximum potential was seen after 2002 even though land was available at higher rates. It is clear that the location preference for accommodation towards these prime areas have increased during this period. The construction share of premium and parking areas which are sold to buyers compensated with high values of land. Increase in average super built up areas per tenement reflects that this development typology was for higher socio income group without achieving maximum density. This typology has average six floors including dedicated one floor for FSI exempted parking.



3.3 TYPOLOGY C-(2005-2016)

Among a residential apartment located on plot no 126 Farmland Ramdaspath was sanctioned by town planning department, NMC Nagpur in 2010[17]. Plot admeasures 1393.5 Sqm is situated in the study zone. Maximum Development potential to which construction was carried out as per these DCR is shown in figure 4. The areas of Alternate Terraces as permitted in DCR have not been taken in example.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

BUILDING TYPOLOGY C (2005-2016)					
SN	Particulars	Area Sqm	Provision of Principal DCR 2000	Area(Sqm)	% of Plot
BASE AREAS FSI PREMIUM TDR					
	Plot Area	1393.5	FSI 1 for plot below 1000 sqm	1393.5	100
a	Floor Space Index(FSI)	1.25	Since Plot exceeds 1000 Sqm Fsi is 1.25	1741.875	125
b	Transfer of Dev. Right(TDR) Max 80%		80% of plot area TDR loading	1114.8	80
c	Premium max 30% (FSI)		Premium 30% taken	857.0025	61.5
	Net Base Areas		Net Base Areas	3713.6775	266.5
FACILITY AREAS BALCONY ALTERNATE TERRACES					
d	Balcony 15%		Maximum upto 15% of Built Up (a& b)	428.50125	30.75
e	Alternate terrace 15%		from 2010 15% of Built Up (a& b)	428.50125	30.75
	NET AREA		NET PERM. SUPERBUILT UP AREA (a+b+c+d+e)	4570.68	328
TENEMENT					
f	No of Tenements (Kitchen) Provided		provided tenements 21 permissible 34	34.8375	21
	Average Super Builtup area per tenement			217.65	
	Land Share with Maximum density			66.36	5
MINIMUM PARKING AREAS FOR 40SQM APPARTMENT					
	Maximum Parking for 40 sqm				
	Car	21	FSI Free Parking provided in 2 Floors	525	
	Scooter	44		264	
	Cycle	53		148.4	
	Covered Parking area			937.4	67.27
	TOTAL CONSTRUCTED AREA			5508.08	395.269
	Volume of Building to Plot Area ratio (VPR)				12.45

Table 4 Area statement typology C

- Base Areas: It is observed that maximum area, which can be developed, comes out to be 266.5 % of net plot area since plot exceeds 1000 Sqm and FSI is 1.25. 80% TDR as per the policy can be loaded. Additional 30% premium has been taken which is on FSI and TDR which comes out to be 61.5 % of plot areas.
- Additional permissible facilities in form of 15% balcony areas on total FSI and TDR comes to be 30.75% of net plot. Alternate Terrace policy amended in 2010 in DCR permits additional 15% of Built up area of FSI and TDR results in additional 30.75% construction. Total permissible super built area, which includes FSI, TDR, Balcony areas and Terrace areas comes out to be 328% of net plot area.
- Average super built up areas per apartment increased to 217.65 Sqm as against 58 Sqm with full density in Typology A and 101 Sqm as in Typology B
- The plot has been developed with almost uniform apartment areas with 21 apartments as per sanctioned drawing. All the apartment are above 80 Sqm as carpet area. The total area allotted to parking was 937 Sqm, which includes 21 Car parking spaces, 44 Scooter parking spaces and 53 Cycle parking spaces which is over and above DCR requirements[13, 17]. These parking areas contribute to 67.27 % of Net Plot area. Thus total constructed area comes to be 5508 Sqm which amounts to 395 % of Net plot area.
- Volume of building measure in cubic meters to plot area measured in square meters (VPR) increased to 12.45 for this typology C of building.

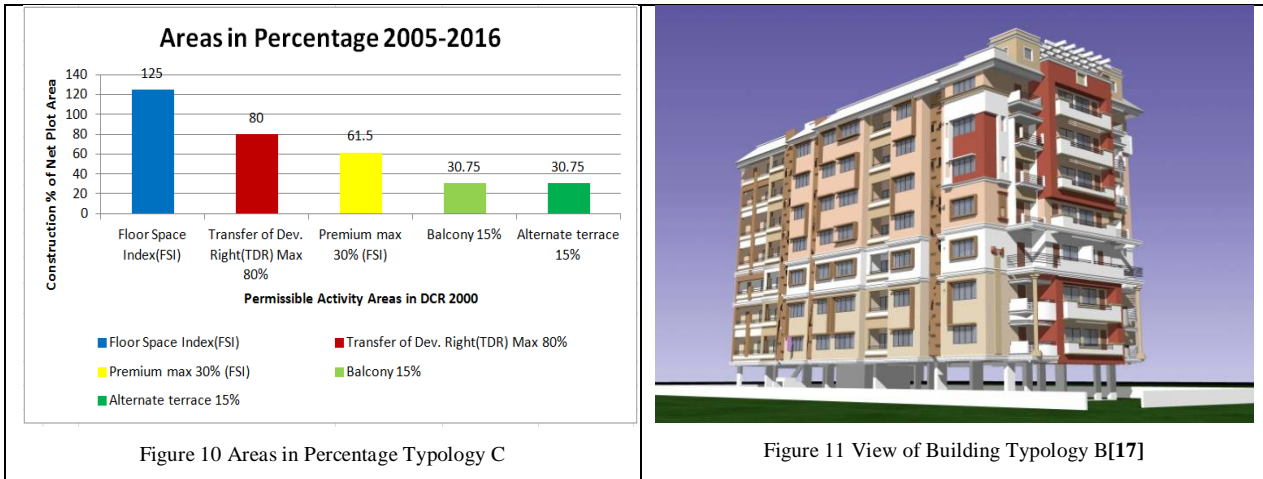
These type of multi-storeyed developments typology C was first constructed in 2008 and was applicable till 2016. It has almost changed the skyline of city in various prime areas with almost eight storied structures which included multilevel FSI exempted parking floors. Further Increase in average super built up areas per tenement reflects that this development typology was for Elite group. The construction share of premium & TDR at a lower price, additional alternate terraces and parking areas which are sold to buyers compensated with high values of land. Case study indicates that this typology is being explored for super higher income groups in study areas with additional parking spaces over and above required.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017



IV. DISCUSSION

Timely amendments in DCR of Nagpur from 2000 onwards have been carried out by Town Planning Department, NMC Nagpur. These has seen several drastic increase in the development areas within the same plots. Summary of area statement of the three building typology studies are listed in table 5

SUMMARY OF BUILDING TYPOLOGY TILL 2016 IN NAGPUR						
USE	Typology A	Typology A	Typology B	Typology B	Typology C	Typology C
	Before 2000	Before 2000	2000-2005	2000-2005	2005-2016	2005-2016
	Sqm Are	%	Sqm Are	%	Sqm Are	%
Plot Area	1337.80	100	1337.80	100	1393.50	100
Floor Space Index(FSI)	1672.25	125	1672.25	125	1741.88	125
Transfer of Dev. Right(TDR) Max 80%	0.00	0	0.00	0	1114.80	80
Premium max 30% (FSI)	501.68	0	501.68	37.5	857.00	61.5
Balcony 15%	250.84	18.75	250.84	18.75	428.50	30.75
Alternate terrace 15%	0.00	0	0.00	0	428.50	30.75
Total Super Built Up	2424.76	144	2424.76	181	4570.68	328

Table 5 Summary of building Typology till 2016 in Nagpur

- a) Base areas percentage of net plot area, as allowed in DCR has increased from 125% in 2000, 162.5% in 2005 to 266.5% from 2005 onwards which include Base FSI, Premium and TDR. One of the seven success factors suggested by [7] is to include adequate infrastructure to accommodate the additional development which is in the form of TDR as additional FSI. However it seems that the receiving areas in form of zones have a wider area in zone B, the basic infrastructure seems to be unassessed specifically in receiving zones. Kankariya simply defined TDR as additional floating Floor space index that can be bought and sold to developers at current market price.[18]. However the TDR in Nagpur was comparatively available at a lower price than the average price of land in receiving zones due to wider boundary of same zone. This has changed the total speculative market for developers giving them freehand to load TDR at comparatively very lesser price than the average market price of land. Market Incentives, Transfer Ratios for sending and receiving zones, Conversion Factors related to loading of TDR as discussed by Pruetz [7] was not considered till 2016 in Nagpur DCR till 80% of TDR was already loaded

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

- b) Since additional facility areas in the form of Balconies and alternate terrace was also applicable on TDR the total Super built up areas increased form 144% in 2000, 181 % in 2005 to 328 % from 2005 onwards which include Base FSI, Premium and TDR, Balcony and alternate terrace. Additional Alternate terrace areas introduced have helped in generating personal apartment spaces however the enclosed balcony spaces by paying premium amount in [13] have resulted into typical prototype of building.
- c) Maximum density of 250 tenement per hectare which comes to be 40 Sqm per tenement was kept constant for receiving zones as well. It is observed from the case studies that this density is not achieved for the bigger plots. Pruetz suggest for extra density for developers for making TDR to work effectively[7]. Average Super Built up area per tenement form 58.28 Sqm in 2000, 101.03 in 2005 to 217.65 from 2005 onwards. It is clearly observed that maximum density is not achieved for Typology B and typology C resulting into more Super built up areas per tenement. This clearly reflects that the recent development typology is focussed towards a specific Elite group rather than for a socioeconomic group having a lower income while loading of TDR is concerned.

SUMMARY OF BUILDING TYPOLOGY TILL 2016 IN NAGPUR						
USE	Typology A	Typology A	Typology B	Typology B	Typology C	Typology C
	Before 2000	Before 2000	2000-2005	2000-2005	2005-2016	2005-2016
	Sqm Area	%	Sqm Area	%	Sqm Area	%
Average Super B/U area per tenement	58.28		101.03		217.65	
Covered Parking area	322.82	24.13	454.38	33.96	937.40	67.27
Volume to Plot Area Ratio (VPR)	5.29		6.78		12.45	
TOTAL CONSTRUCTED AREA		167.88		215.21		395.27

Table 6 Summary of Building Typology till 2016 in Nagpur

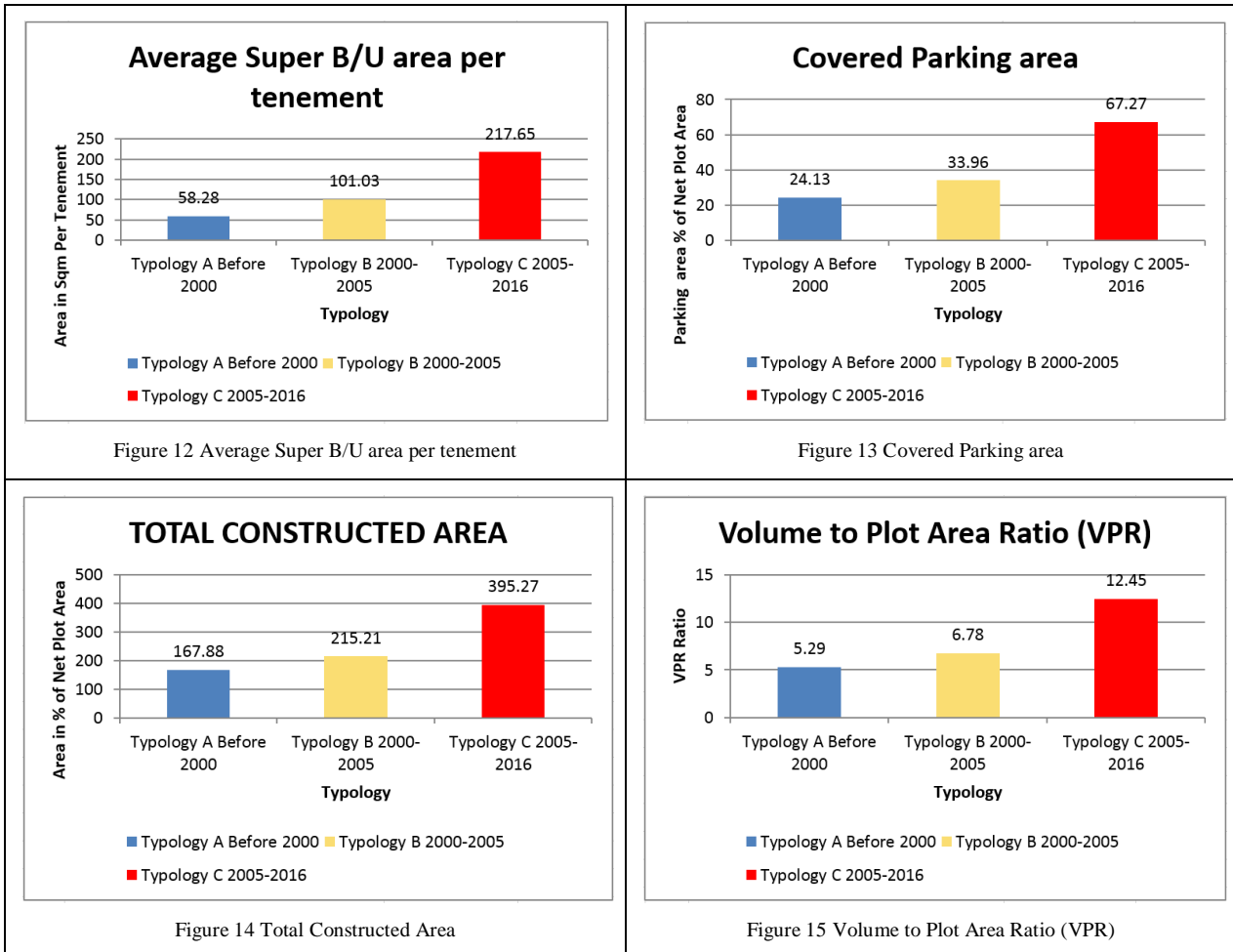
- d) Mandatory area such as parking areas which are prescribed in DCR 2000 have been achieved. The parking requirements are higher for bigger apartment sizes and are fulfilled. This has also resulted into increased covered parking spaces form 24.13 % in 2000, 33.96 % in 2005 to 67.27 % from 2005 onwards on net plot areas. All the parking spaces irrespective of additional parking spaces provided are exempted from any FSI and are not charged by municipal councils until they are enclosed[13]. Additional burden on plot in form of covered parking spaces have drastically increased the total construction areas on plots from 167.88 % in 2000, 215.21 % in 2005 to 395.27 % from 2005 onwards which includes all covered spaced including parking. It is observed that these exempted parking spaces are resulting into more built spaces since parking over and above required is provided because of requirement of elite category in prime areas. The parking spaces required for bigger apartment size are higher than the lower tenement sizes. It reflects that the additional traffic is being generated in these areas. Additional parking over and above will add to the existing traffic thereby having certain adverse impact on surrounding areas.
- e) Volume of building measured in Cubic meters to Plot area measured in Square Meters (VPR)[13] ratio drastically increased into from 5.29 in 2000, 6.78 in 2005 to 12.45 from 2005 onwards. Cubic meters volume of building is calculated considering with average height of 3.15m per floor. The VPR ratio in typology C has increased drastically since multilevel FSI exempted additional parking is provided. This VPR ratio is responsible for various aspects related to infrastructure requirement, Environmental impact on surrounding areas.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017



The current policy tends to disperse the use of TDR rather than concentrating in a few selected area. Higher FSI requires higher concentration of infrastructure investments in some places. It does not increase the population of a city, but concentrates the population in a smaller area[19]. TDR along with other market driven development mechanism has somehow changed the developmental skyline during last two decades in specific areas in Nagpur. All the examples listed clearly indicate development through these mechanisms are biased towards specific masses having a higher income group. The policy of Transferable Development Rights is an attractive proposition for the real estate developers and can be a very good tool to create public facilities and amenities without acquisition of land[20]. Author is of opinion that the public facilities are created at the generating zones or the specific, but the receiving zones have been overloaded with these mechanisms. Chiodelli quoted that the equality potential of a TDR program is not properly linked to the transferability of development rights; it is linked to the conferment of building indexes (the transfer of development rights is only a mechanism with which to ensure the effectiveness of the land use plan and the functioning of the land market).[21]. Most of the end buyers have already paid for the facilities which are exempted from FSI where only construction cost is required. Comparatively the apartment rates should have decreased as a result of TDR policy but vice versa even though TDR was available at a lower price.

There is hardly any consideration related to Rationalization of TDR fixation during generation and reflection of the Market Prices and Construction Costs as suggested by [22] till 2016 since the policy is effective from 2000 in Nagpur. Ahluwalia suggested to ensure that TDRs are priced correctly and that the grant of TDRs is within the overall

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

framework of building regulations with respect to density, land use, public transport and financing. However, in all such cases, additional FSI bought by builders through TDR should be allowed in areas that have been selected in advance as part of a city spatial plan or development policy[19]. Most of the receiving areas in urban fabric of Nagpur are capable enough to sustain this additional burden of FSI is a question. Furthermore there should be satisfaction in between generating and loading areas in terms of equitable aspects. The loss of 'happiness' to the surrounding residents cannot be measured, and thus would be excluded in a rational assessment of the effects of TDRs. This dichotomy highlights how TDR use undermines traditional planning objectives such as fairness, justice and equity for all, while lining the pockets of developers[8]. Receiving areas where such type of market driven mechanism are likely to face dissatisfaction from the community where inadequate infrastructure is getting overloaded. Such type of receiving areas are already facing challenges related to infrastructure including roads traffic congestion there by affecting quality of life. Pruetz has suggested for seven parameters for receiving areas customization for any successful TDR program. Majorly these include adequate infrastructure to accommodate the additional development, political acceptability, compatibility with existing development, clear designation, consistency with the comprehensive plan, location where developers perceive a market for higher density, a receiving area located in another jurisdiction if the sending area is in a community that cannot accept more growth [7].

Life for the average city dweller in India would become a lot tougher with average water supply and sewerage treatment dropping down [2]. Quality of life is a potent political concept often used to describe satisfaction with different residential locations. Among the community features that contribute either positively or negatively to quality of life are traffic, crime, job opportunities, and parks.[23]. The new found recognition of the concept's importance for the economic development creates a strong bridge between citizen and business interest [23]. It is presumed that Quality of life has improved in the sending or generating zones since most of TDR is acquired for public purpose in that zone under amenity areas. The wide boundaries of receiving zones capability to sustain the additional development in the form of FSI has not been considered in the program, thereby leading to overburdened situation in specific areas. These include destruction of vegetation cover, less percolation of water by adding more foot print, more waste generation. He clearly observed that there land conversion in the Nairobi rural-urban fringe is leading to social, cultural, economic and environmental transformations of this space. Thuo concluded that the transformations are leading to improvement of livelihood for a number of actors, some transformations are insidious in that they are leading to communal and social breakdown among the indigenous group, and also affecting the environmental quality as in case of Nairobi rural-urban fringe. Similarly quality of life in adjacent preents are getting affected in Nagpur where market driven development have occurred. Focusing on quality of life issues may help us to build a new consensus about planning goals and decisions [24]. All Planners, a politicians, policy makers should take into account all the aspects related to the impacts of decision specifically related to land development.

V. CONCLUSION

Market driven policy TDR has helped the ULB to implement development plan proposals thereby giving various infrastructure facilities in the generating zones. The policy has also added to the generation of revenue for Nagpur Municipal Corporation thereby helping city to fund for other aspects related to infrastructure. However the receiving areas in the zones are not specifically planned for loading of TDR. Most of the areas acquired under TDR for the development plan roads, however new infrastructure in form of widening of roads in receiving zones is not considered. Existing policy of additional areas in the form of premium areas has increased the total development in for of Super builtup areas drastically.

Chronology of amendments and Study of built form revealed certain facts related to FSI, premium areas, TDR, total construction, per tenement areas and VPR ratio which needs to be studied in details for further impact assessment. It is observed that specific mass oriented development has occurred in specific areas as a result of market oriented policy. Maximum potential have been explored at the receiving end for the speculative market without providing adequate infrastructure there.

We are of the opinion that the whole market oriented policy was intended to be good for the city and People of sending or generating areas but needs certain refinement depending on the receiving areas as well since existing infrastructure is being affected in receiving zones. The affected areas in the form of infrastructure, Traffic congestion,

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

Environmental degradation with built masses, Necessary parking and others needs to be addressed beforehand specifically in receiving zones or areas where additional FSI is granted since these add to the existing problems in city.

REFERENCES

- [1] Booz&Co.; CISCO, "A Report on Intelligent Urbanization: Roadmap for India," Confederation of Indian Industry, New Delhi, 2010.
- [2] McKinsey Global Institute, "India's Urban Awakening: Building Inclusive Cities, Sustaining Economic Growth," McKinsey&Company, 2010.
- [3] GOI, THE CONSTITUTION (SEVENTY-FOURTH AMENDMENT) ACT, 1992, 1992.
- [4] GOI, The Land Acquisition act, 1894.
- [5] MRTP Act, "Maharashtra Regional and Town Planning Act," Government of Maharashtra, 1966.
- [6] URDPFI, URBAN AND REGIONAL DEVELOPMENT PLANS FORMULATION AND IMPLEMENTATION GUIDELINES, Town and Country Planning Organisation, 2014.
- [7] N. & S. Rick Pruetz, "What Makes Transfer of Development Rights Work?: Success Factors From Research and Practice," Journal of the American Planning Association, pp. 78-87, 2008.
- [8] K. L. H. F. & R. B. Alexander Altskan, "Transfer of Development Rights in New York City:Policy, Perception, Impact," 2016.
- [9] A. Tavares, "Can the Market Be Used to Preserve Land?The Case for Transfer of Development Rights," in EUROPEAN REGIONAL SCIENCE ASSOCIATION 2003 CONGRESS, 2003.
- [10] Government of India, Ministry of Home Affairs, Government of India, Ministry of Home Affairs, 2011. [Online]. Available: <http://www.censusindia.gov.in>. [Accessed April 2015].
- [11] CRISIL CDP Nagpur, "City Development Plan for Nagpur, 2041," Nagpur, 2015.
- [12] N. NIT, "Development plan Nagpur," Government of Maharashtra, 2000.
- [13] DCR,NMC, Nagpur Municipal Corporation, Nagpur, 2000.
- [14] GOM, Gunthewart Act, MAHARASHTRA GUNTHEWARI DEVELOPMENTS (REGULARISATION, UPGRADATION AND CONTROL) ACT, 2001, 2001.
- [15] Town Planning Department NMC Nagpur, TDR Generation and utilization certificates Nagpur, 2015.
- [16] A. Bertaud, "Mumbai FSI conundrum:The perfect storm: the four factors restricting the construction of new floor space in Mumbai," 2004.
- [17] Sankalp Creations, Architects for Dwarkamai and Amogh Apartments Ramdaspath Nagpur, Hotel Meghdoot Cotton Market Sqr Nagpur India, 2003,2010.
- [18] B. Kankariya, "Transfer of Development Rights: An Effective Tool for Sustainable Urban Development," vol. IV, no. VII, pp. 82-86, July 2015.
- [19] I. J. Ahluwalia, "Planning for Urban Development in India," ICRIER, 2011.
- [20] H.S.Sancheti, "Policy of Transferable Development Rights in," Institute of Town Planners, India, Vols. 8-2, pp. 45 - 52, April-June 2011.
- [21] F. Chiodelli, "EQUAL TREATMENT IN LAND USE PLANNING:investigating the ethics of the transfer of development rights," 2015.
- [22] R. Nallathiga, "Land-based Instruments for Urban Infrastructure Development: The Experience of TDR in Mumbai," NICMAR Journal of Construction Management and Research, vol. XXIX, no. 1, pp. 51-65, 2014.
- [23] D. Myers, "Building Knowledge about Quality of Life for Urban Planning," Journal of the American Planning Association, September 1988.
- [24] A. D. M. Thuo, "Impacts Of Urbanization On Land Use Planning, Livelihood And Environment In The Nairobi Rural-Urban Fringe, Kenya," INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH, vol. 2, no. 7, 2013.