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GOVERNMENT OF INDIA
MINISTRY OF HOUSING AND URBAN AFFAIRS

150 YEARS OF CELEBRATING THE MAHATMA

स्वच्छ भारत
एक कदम स्वच्छता की ओर

CONTEXTUALISING NODE IN TOD (Transit oriented development)

USING 3V FRAMEWORK
A Case of Hyderabad

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UP METRO

12th Urban Mobility India Conference & Expo 2019

INSTITUTE OF URBAN TRANSPORT (INDIA)

OVERVIEW

01 BACKGROUND

02 NEED FOR THE STUDY

03 CONTEXTUALISATION OF TOD

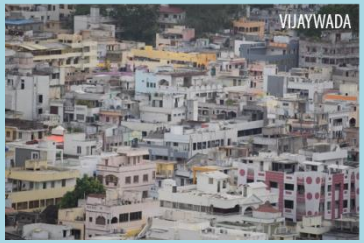
04 DEMONSTRATIVE CASE (HYDERABAD)

- City Dynamics
- Framework
- Node Value
- Place Value
- Market Value
- Co-relation
- Inferences
- Conclusion

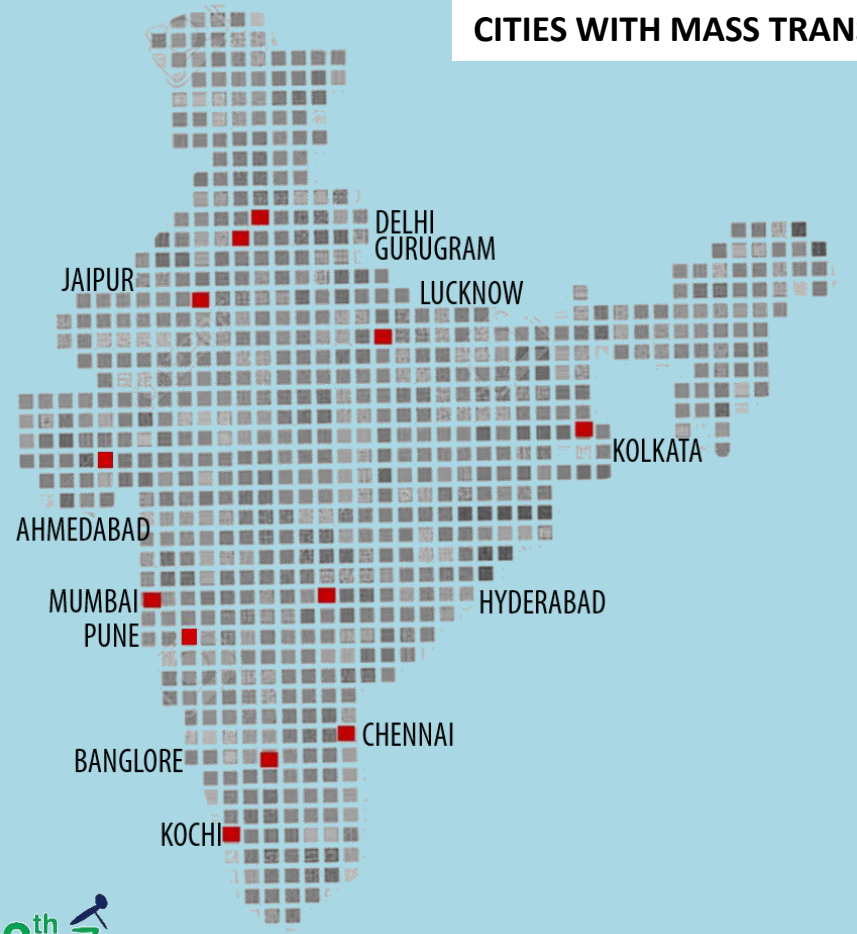
BACKGROUND

URBANISATION

340 Million (2008) → 450 Million (2018)[1] → 590 Million (2030)[2]



CITIES WITH MASS TRANSIT



TRANSIT ORIENTED DEVELOPMENT

Land use + Transport integration

The Hindu,2016

HMR metro rail

New transits into place

Pedestrian friendly neighbourhoods

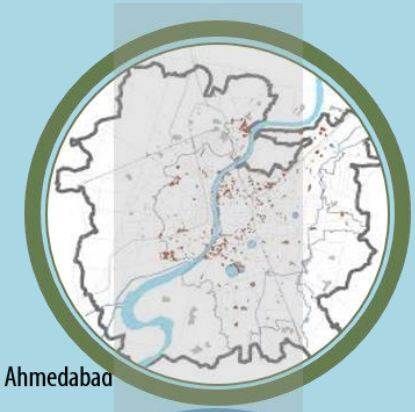
Planned land use

Planned development

12th Urban Mobility India Conference & Expo 2019

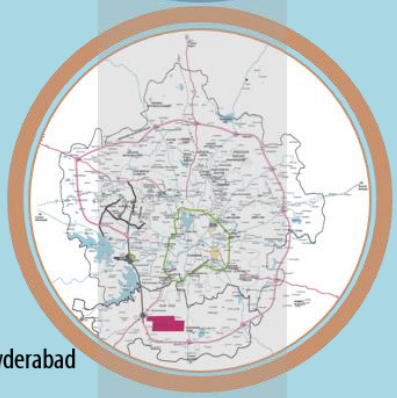
1.Worldometers. (2018).
2.Mc Kinsey. (2010). India's urban awakening : Mckinsey. (April).

NEED FOR STUDY



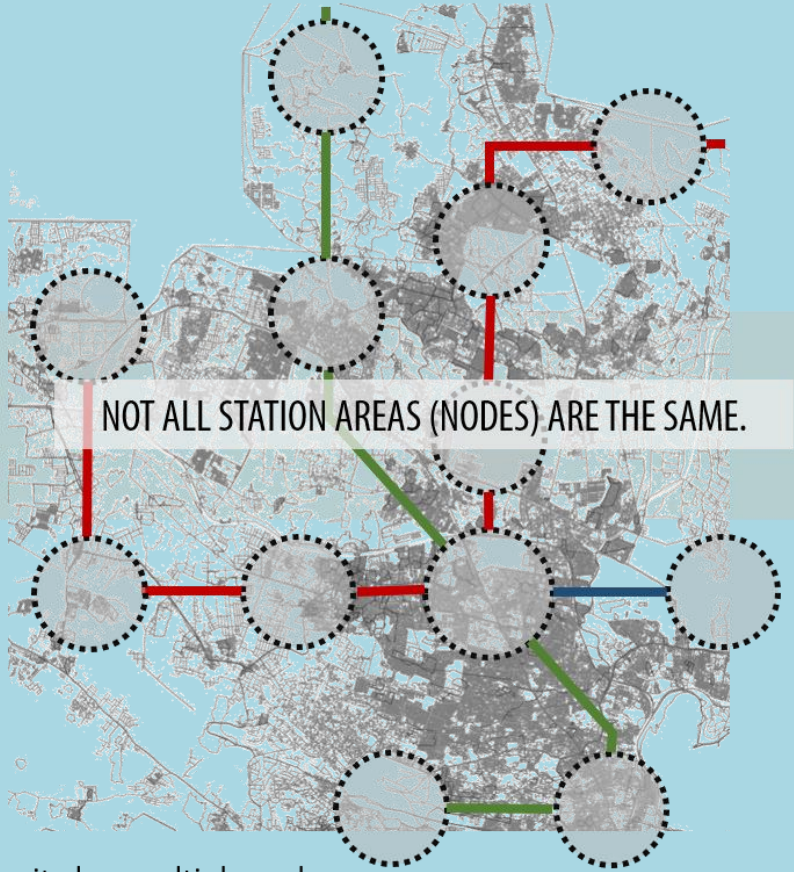
Ahmedabad

Kochi



Hyderabad

A FRAME WORK TO FORMULATE THE STRATEGIES THAT HELP THE CITIES TO DEVELOP ARE REQUIRED(3V Approach).



Every city has multiple nodes .

A total blanket development principle for all the nodes. This type of development forgets the fact that various nodes greatly differ in form, function and impacts.

CONTEXTUALISATION
OF TOD

AHMEDABAD[4]

Transit-Oriented Zones (TOZ) as part of the development plan

DELHI[4]

Master plan has an entire section dealing with TOD provisions

BANGALORE[4]

Started preparing Station area plans (SAP)

NATIONAL TOD POLICY[5]

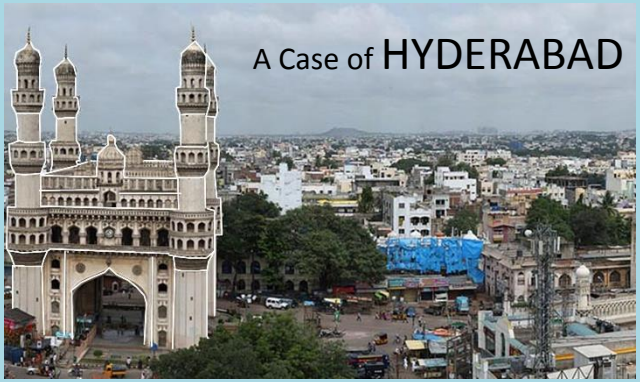
It focuses on the integration of other modes with the metro rail.

3V APPROACH[6]

A framework formulated by world bank which can be replicated and adapted in all the cities. To implement transit oriented development strategies at the metropolitan ,network and local level .

Similar approach for cities

- Guided development
- **CONTEXTUALISATION**

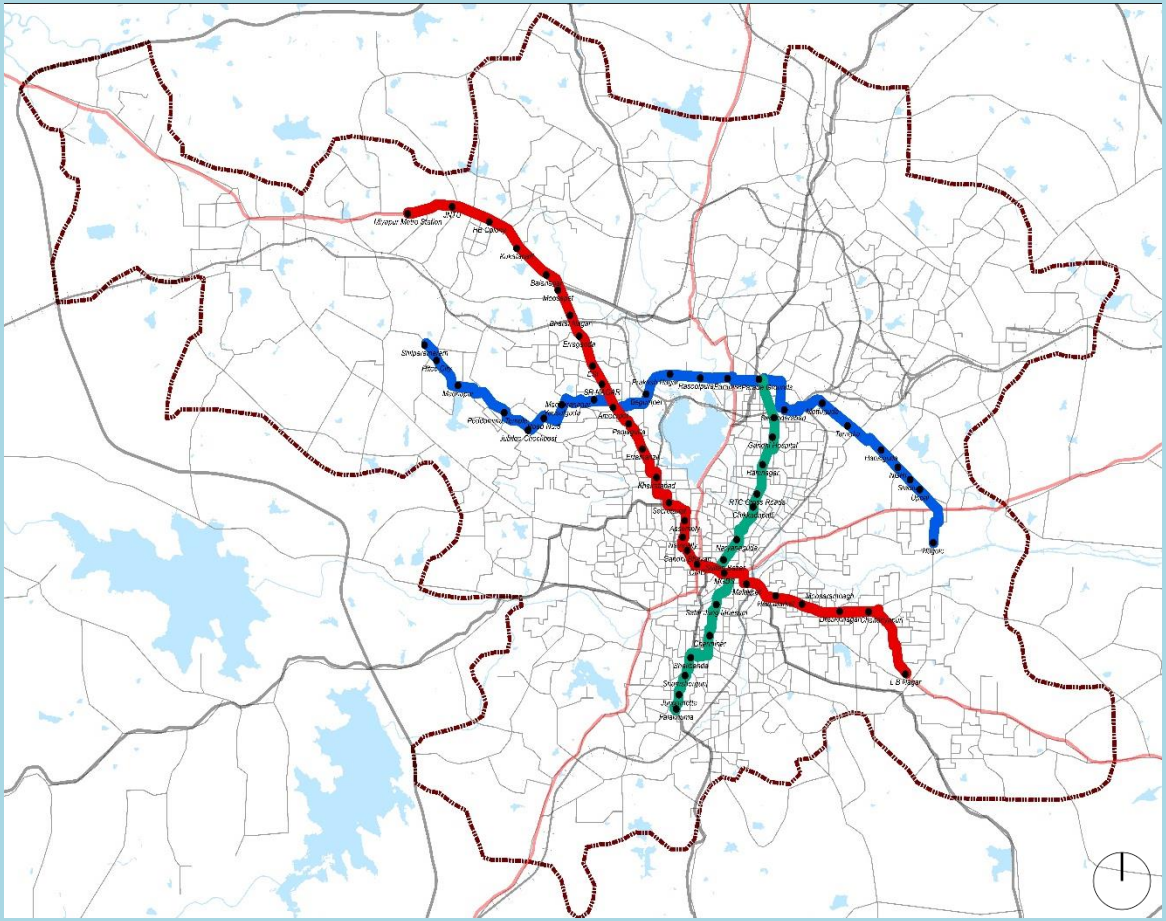


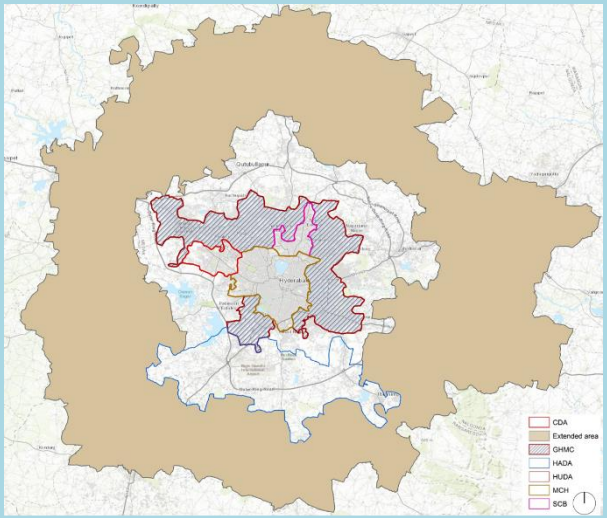
3,4. Joshi, R., Joseph, Y., Patel, K., & Darji, V. (2017). Transit-Oriented Development : Lessons from Indian Experiences Transit - Oriented Development : Lessons from Indian Experiences. (January).
5.Ministry of Housing & Urban Affairs. (2017). *National Transit Oriented Development (TOD) Policy*. 1–18.
6. Ollivier, S. S. and G. (n.d.). Transforming the Urban Space through Transit-Oriented Development The 3V Approach.

HYDERABAD

Area - **175** Sq.km to **650** Sq.km (2007)[7]

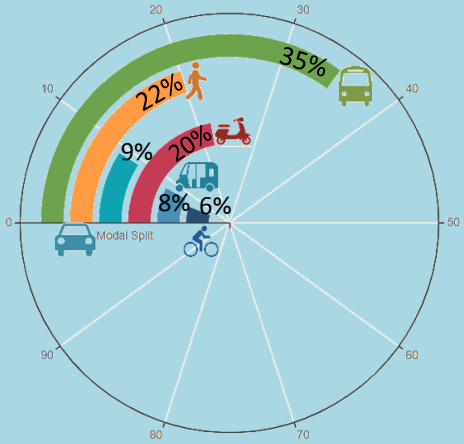
The city is enormously expanding in terms of population accounting to a growth of almost **87%** by the census 2011.





7257 Sq.km **HMDA**

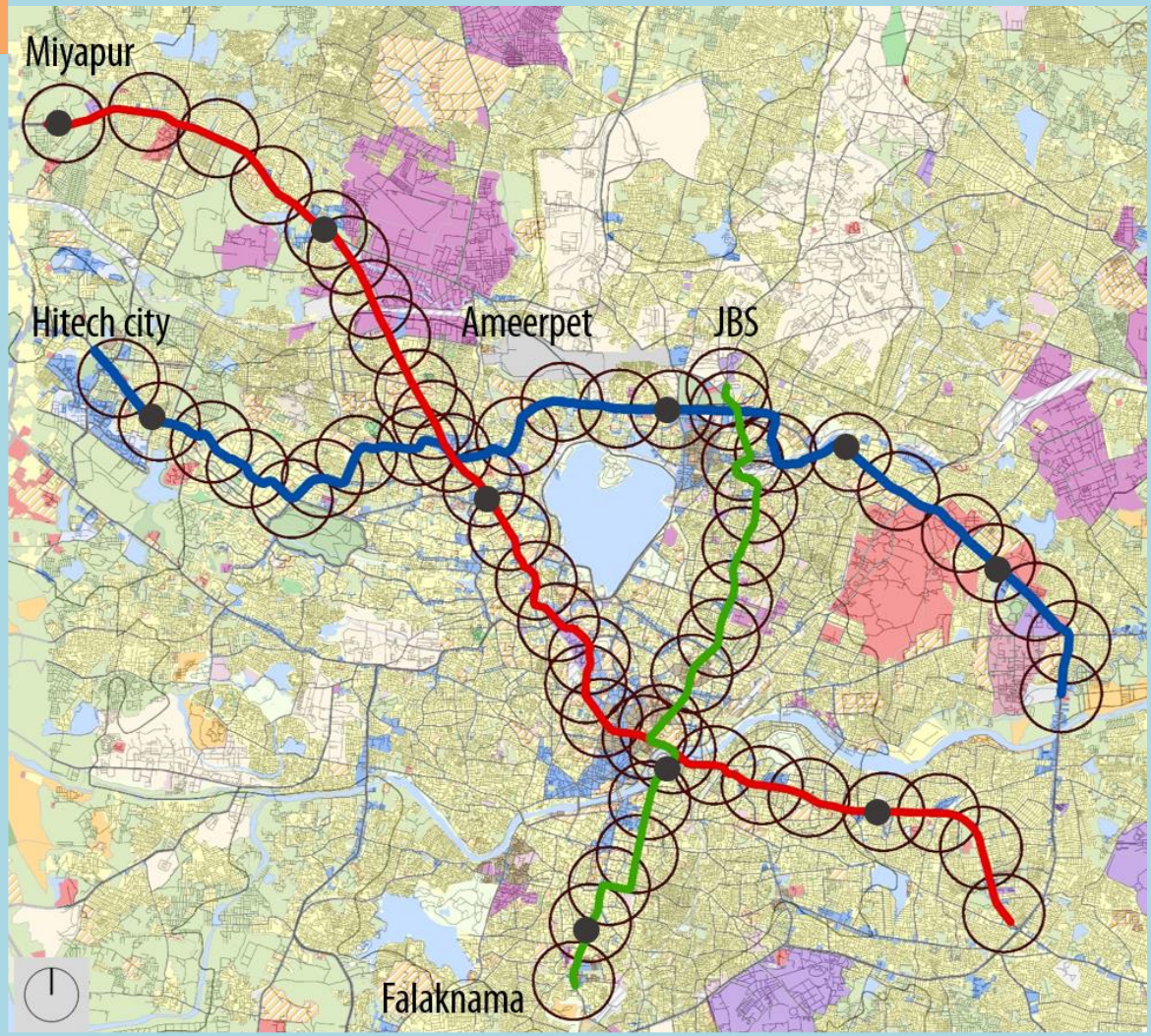
10477 /Sq.km (9.4 M population)[7]



MODAL SPLIT OF THE CITY

7. HMDA (Oct,2013) Comprehensive transportation study (CTS) for Hyderabad Metropolitan Area(HMA).

Hyderabad looks TOD as a **"BUSINESS OPPORTUNITY"**



174992 PPL - 40 FUNCTIONAL STATIONS[8]
(FEB 2019)

Corridor -01	Corridor -02	Corridor -03
29 kms	15 kms	18 kms
27 stations	13 stations	23 stations

3V FRAMEWORK

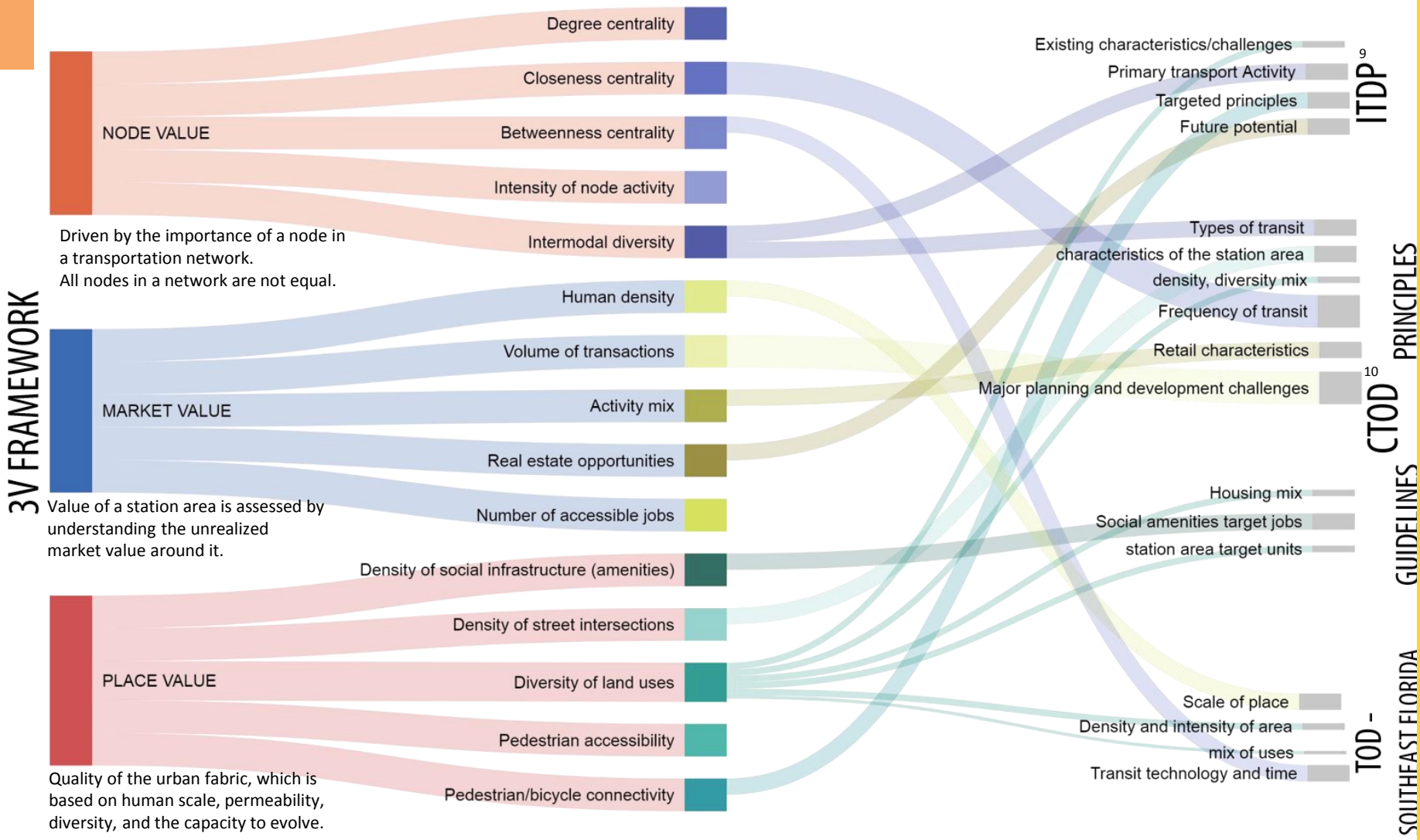
To implement transit oriented development strategies at the metropolitan ,network and local level .

The 3V Framework explores different aspects of planned stations, including
- Their role in the transit network (**node value**);
- The scale of change expected (comparing existing uses to future uses and assessing **place value**);
- How **market** timing, development opportunity, and the scale of investment can come together to identify opportunity sites and key activities to support or strengthen market activity.

8.Data from HMRL, Hyderabad

FRAMEWORK

Formulating a framework from inferences of other guidelines and principles.



9. Horejsi, J. (1994). ITDP's principles of urban development for transport in urban life. 1–77.
10.Brooks, A., Bleiweiss, P., Daggs, N., Watkins, A., & Sims, R. (2008). Station area planning, TOD 202.

NODE VALUE

Value based on stations location in network

NODE VALUE is driven by the importance of a node in the transportation network. All the nodes are not equal to the certain set of parameters that decide the value of the place are mentioned below with 3 main sub-index, all of these are not direct values few proxy values are taken in the case of Hyderabad as mentioned below

1 CENTRALITY

Degree centrality
Closeness centrality
Betweenness centrality

From the metro network

2 INTENSITY OF NODE

Ridership of metro (January 2019)

Ridership from HMRL`

3 INTERMODAL DIVERSITY

No. of bus routes

TSRTC

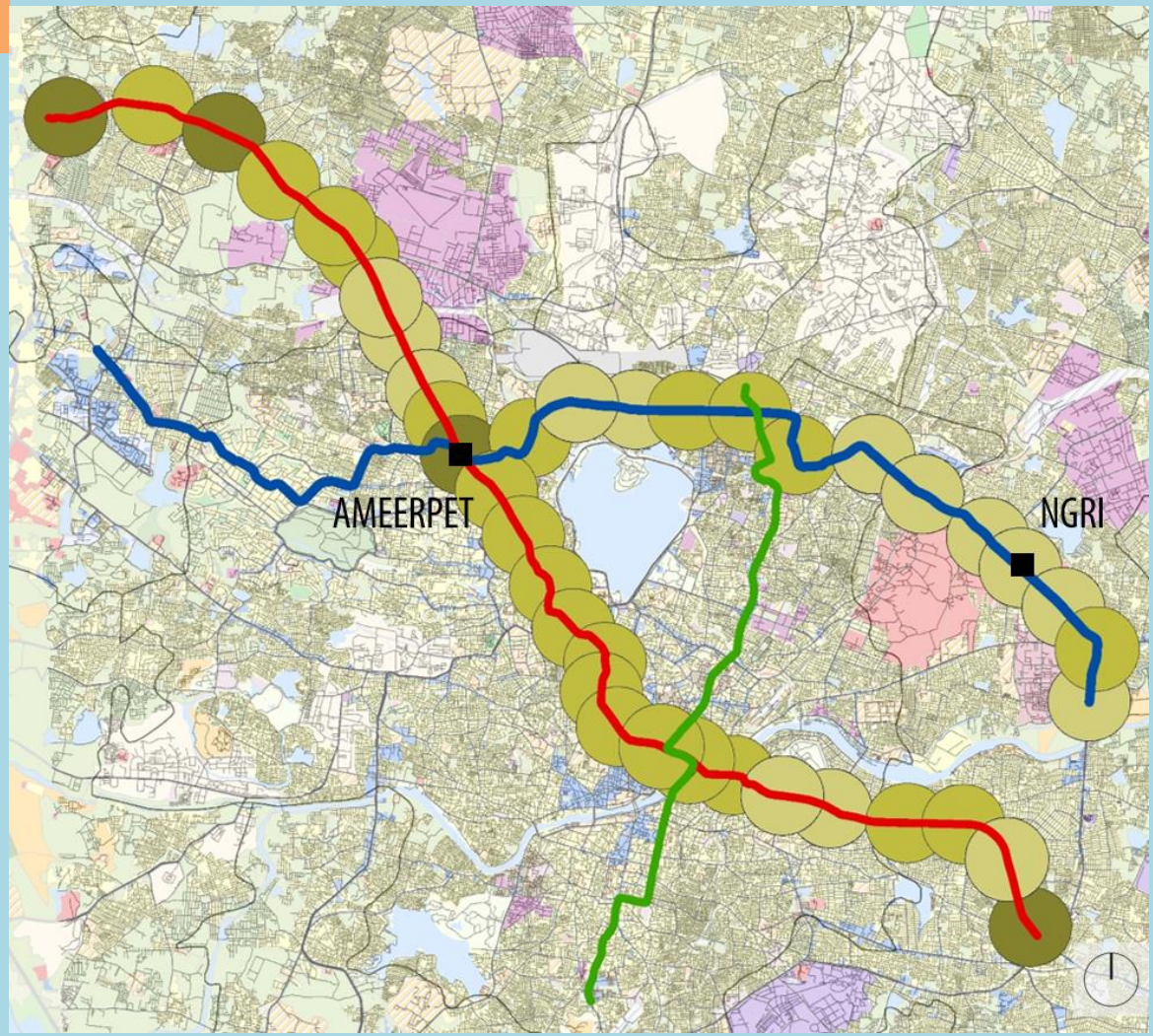
Bus stands
Bus terminal
MMTS

GOOGLE MAPS

		NODE VALUE																			
	STATIONS	Degree Centrality (No of links for a station)		Closeness centrality		Betweenness centrality		AGREGATED CENTRALITY RATING		INTENSITY OF NODE				INTERMODAL DIVERSITY							Node Value
																					0.1*Centrality +0.6* Intensity of Node + 0.3*Intermodal Diversity
1	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Corridor	Station	Degree	Relative Grading Degree	closeness	Rating	Frequency of metro	Rating	Average	Relative Final centrality rating	Alighting	Boarding	Ridership	Relative Grading Intensity of Node	No. of busses	Relative Grading	MMTS	Bus stops	Bus depot	Total	Relative Grading	Total grading	Final node value Centrality + Intensity of Node + Intermodal Diversity
[illegible]	[illegible]	1	0.25	0.2	0.27	6	0.75	0.455	0.46	342621	361723	704344	0.85	382	0.45	0	5	1	1.25	0.29	0.32	0.65
		2	0.5	0.35	0.47	6	0.75	0.59	0.59	263630	264433	528063	0.63	387	0.45	0	10	0	2	0.46	0.46	0.58

10% + 60% + 30% = NODE VALUE

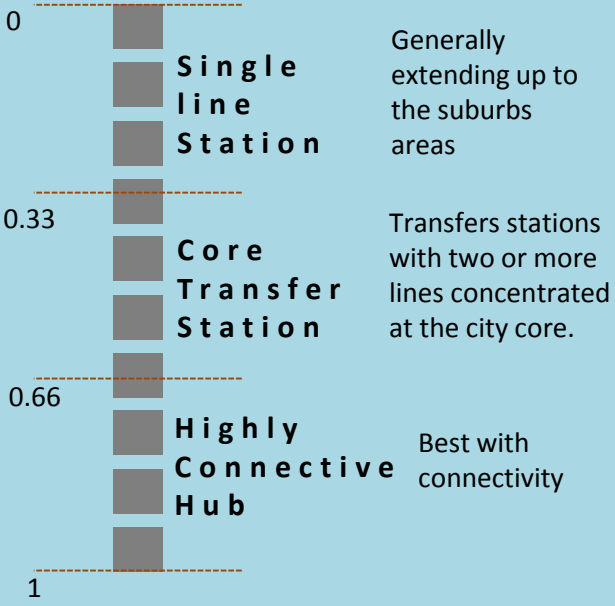
NODE VALUE



MAX NODE VALUE **AMEERPET(0.91)**

MINIMUM NODE VALUE **NGRI (0.17)**

The node value at 4 stations is extensively high and most of these stations are in the medium range of distribution.



PLACE VALUE

Value based on stations Urban Qualities

PLACE VALUE defines the quality of a place and its attractiveness to the residents it defines the overall built environment based on a human scale, permeability, diversity and the capacity to evolve of the place it deals with 4 major sub-indexes-

1 **INTERSECTIONS**
No. of intersections per 800sq.km diameter
GIS DATA STREETS

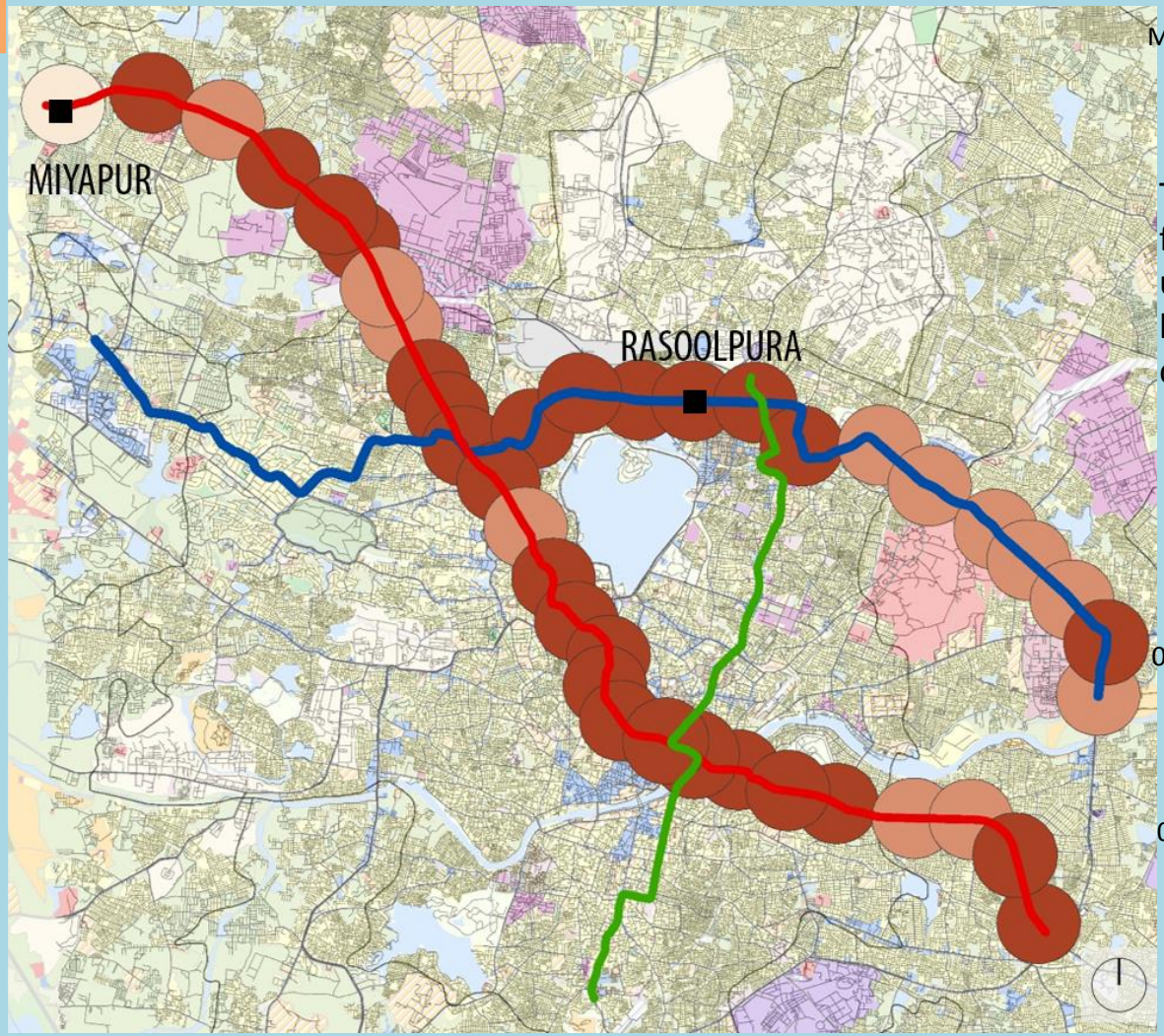
2 **BLOCK PERIMETER**
Average block perimeter
GIS DATA STREETS

3 **DIVERSITY OF LANDUSE**
Entropy of landuse
ELU – GHMC 2012

4 **DIVERSITY OF AMENITIES**
Entropy of social amenities
GOOGLE MAPS

		PLACE VALUE										
	STATIONS	DENSITY OF STREET INTERSECTION				BLOCK PERIMETER		DIVERSITY OF LANDUSE		DIVERSITY OF SOCIAL AMENITIES		Place value
												0.2*intersection +0.35*perimeter+0.35*landuse+0.1*social amenities
1	2	21	22	23	24	25	26	27	28	29	30	
Corridor	Station	No of intersection per sq.km within 800m diameter	Area in km	Intersection/ area	Relative Rating – Street intersectio	Average Block Size (perimeter in metre)	Relative Rating – Average block size	Diversity of LU(Entropy formula)	Relative rating	Diversity of SA (Entropy formula)	Relative rating	Agregated place value
C	Mayapur	183	2.01	91.065373	0.22	45.64191055	0.22	0.341484216	0.40	0.82825	0.83	0.34
	JNTU College	588	2.00	293.926156	0.71	147.3156138	0.71	0.49272315	0.58	0.90321	0.90	0.68
	KPHB Colony	424	1.99	212.742324	0.51	106.6263258	0.51	0.497843489	0.59	0.99497	1.00	0.59

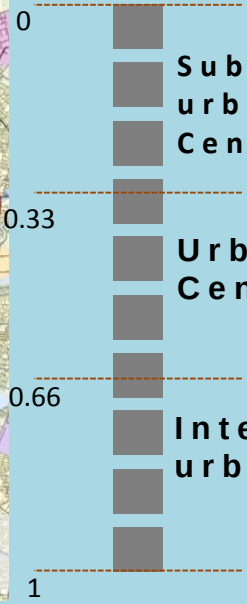
PLACE VALUE



MAX PLACE VALUE **RASOOLPURA(0.94)**

MIN PLACE VALUE **MIYAPUR (0.37)**

The place is above the second quadrant for many of the nodes as they deal with urban quality of the area ,the metro location is the core city so better urban quality .



Generally the non-transit areas close to transit that do not possess the urban character.

The areas with moderate or substantial populated areas

A combination of high diversity and intensity of uses

MARKET VALUE

Value based on stations economic potential

Market value refers to the market response to any development of the changes the new infrastructure alters in the area. Market demand at the city level varies from time to time based on the trend. The indexes involved are both supply and demand drivers.

1 POPULATION DENSITY

Population based on residential units and household size

ELU – GHMC 2012

2 JOB DENSITY

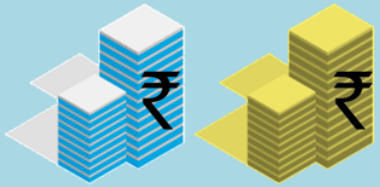
Commercial unit size and standard space requirements

ELU – GHMC 2012

3 REAL ESTATE VALUE(COMMERCIAL + RESIDENTIAL)

Average market price of residential and commercial units in magic brics, prop tiger ,99 acres.

Magic brics,prop tiger,99 acres

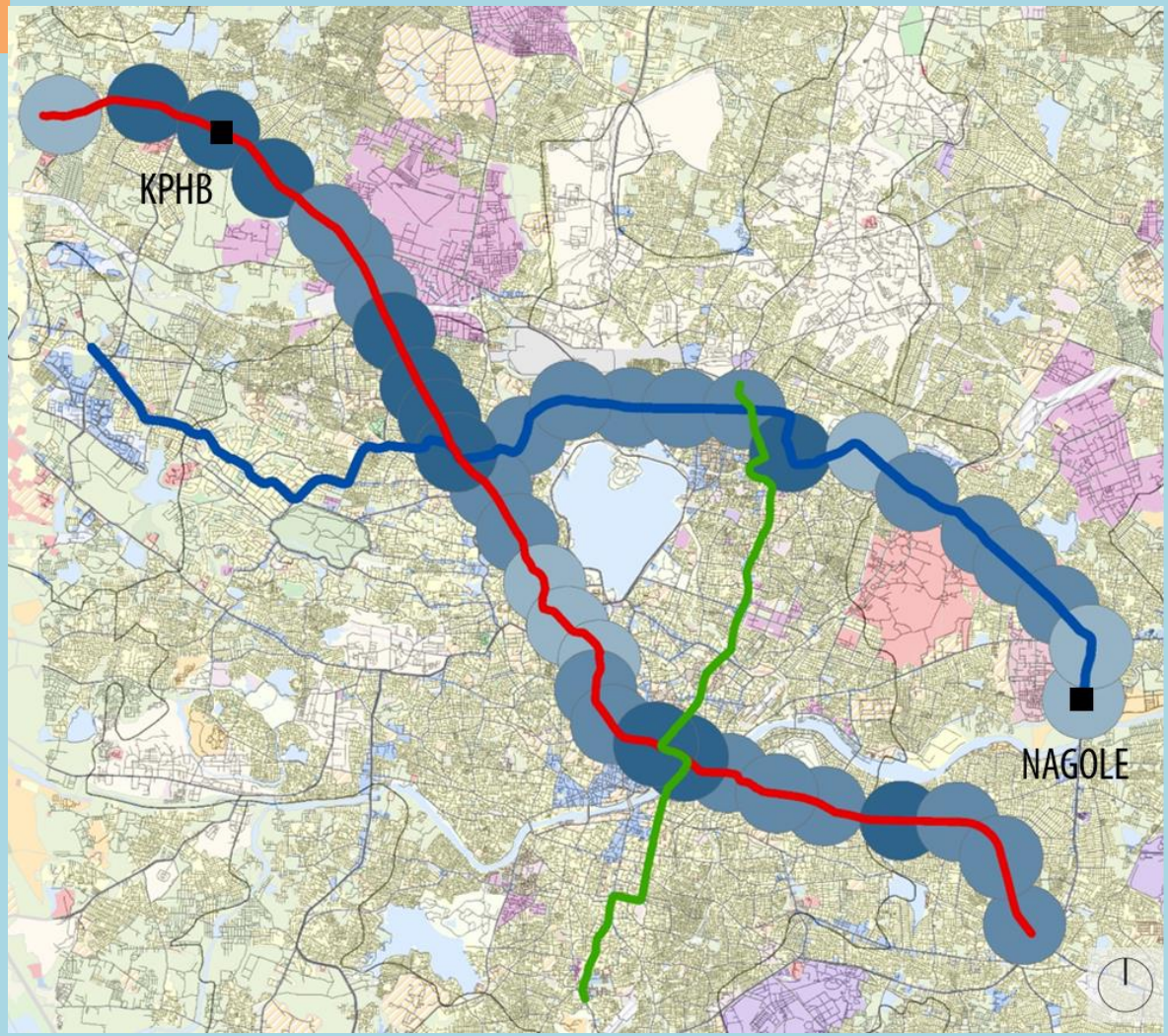


		MARKET VALUE												
	STATIONS	POPULATION DENSITY				JOB DENSITY			REAL ESTATE OPPURTUNITY					Market value
1	2	32	33	34	35	36	37	38	39	41				44
Corridor	Station	Population	Area	Population density	Relative average	Jobs	Jobs/residential ratio	Relative average	Commercial	Residential	Commercial+Residential	Relative real estate value		Agregated Market value
	Miyapur	33,853	2.01	16846.3177	0.01	10000	0.30	0.02	4755	3250	8005	0.35	0.38	0.27
	JNTU College	1,798,687	2.00	899117.4711	0.64	11954	0.01	0.00	6170	3950	10120	0.44	1.08	0.77
	KPHB Colony	2,787,118	1.99	1398438.627	1.00	20301	0.01	0.00	5277	3950	9227	0.40	1.40	1.00
	Kukatpally	423,307	1.89	224190.1355	0.16	20201	0.05	0.00	17603	3570	21173	0.92	1.09	0.77
	Balanagar	173,220	1.96	88472.016	0.06	258773	1.49	0.10	9765	3400	13165	0.57	0.74	0.53

33.3% 33.3% 33.3%

MARKET VALUE

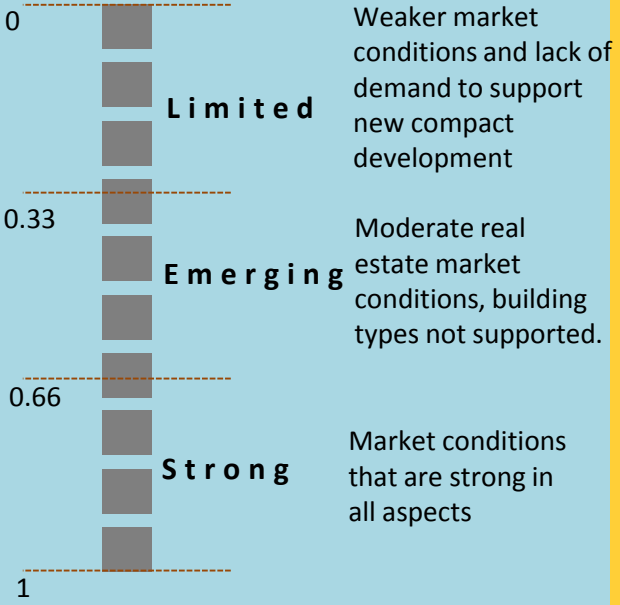
MARKET VALUE



MAX MARKET VALUE **KPHB (1.00)**

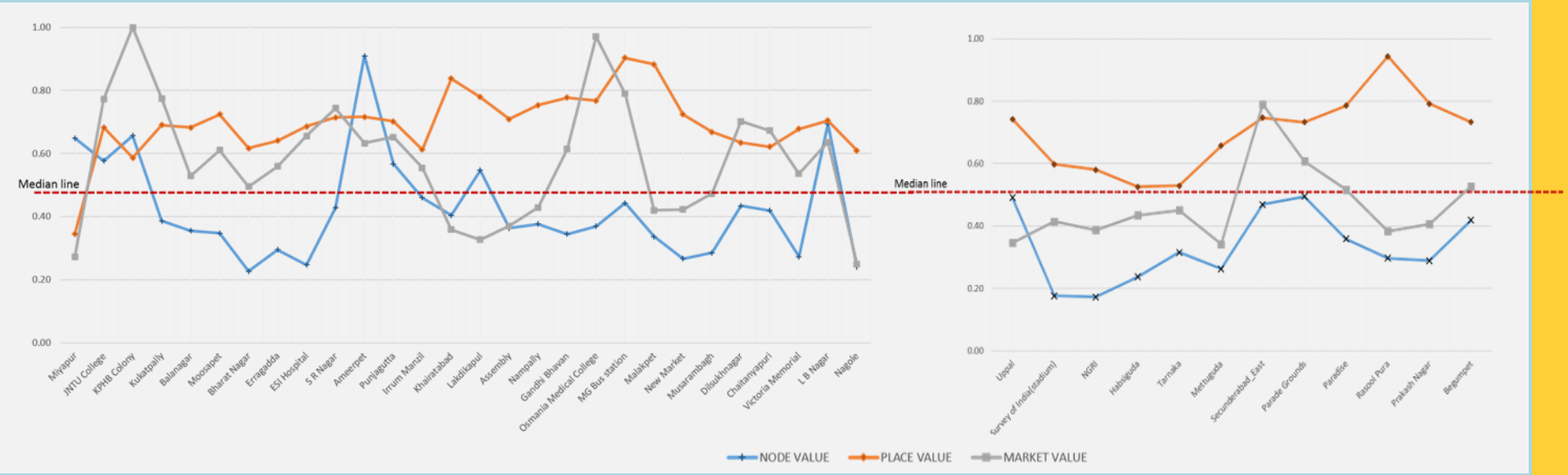
MIN MARKET VALUE **NAGOLE (0.25)**

The market value of the area various based on the jobs and land use of the area. Hence the city experiences diverse variations in market value.



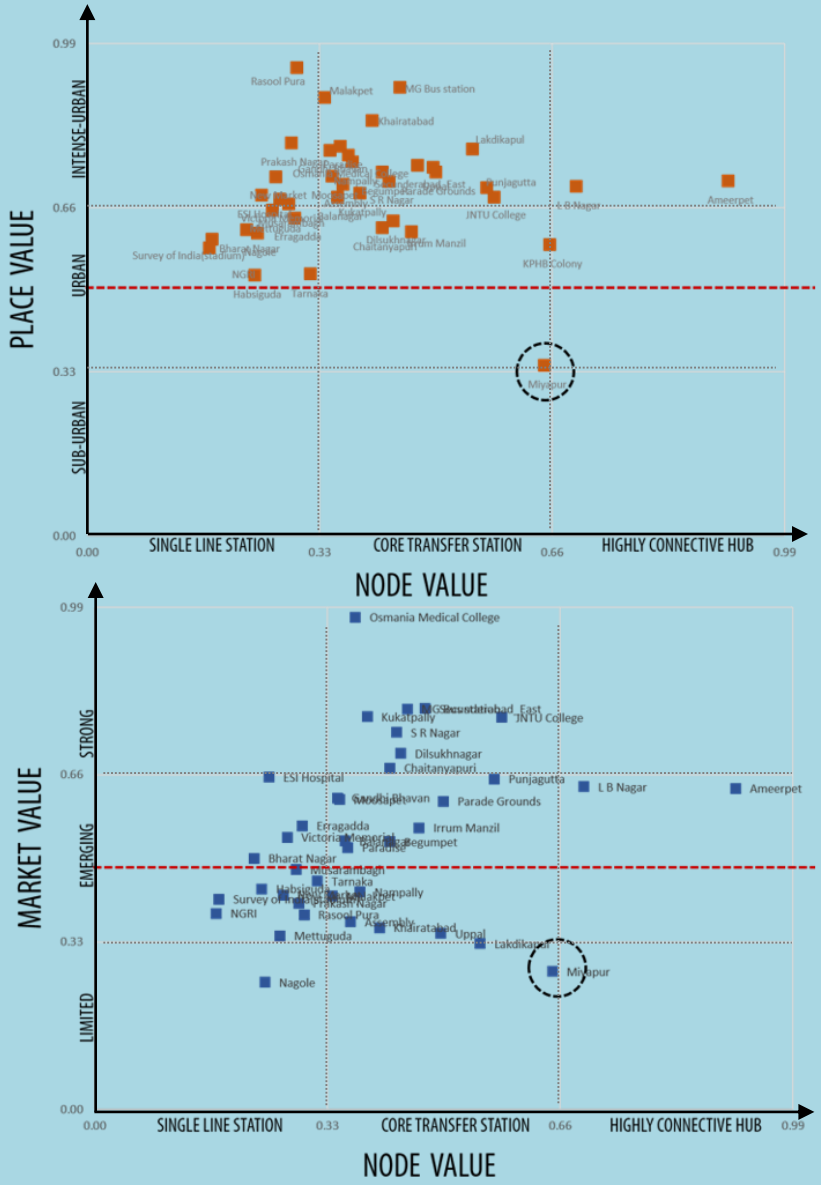
INFERENECES

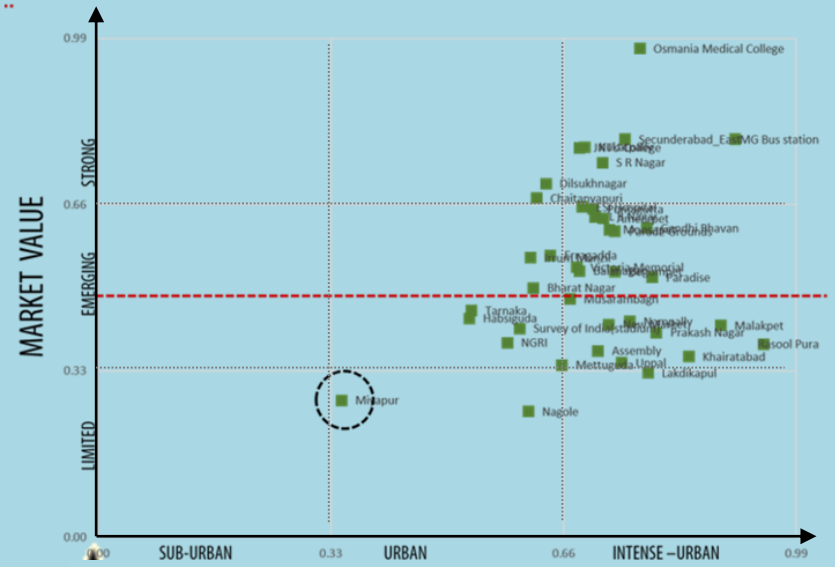
NODE , PLACE, MARKET values at various stations are plotted

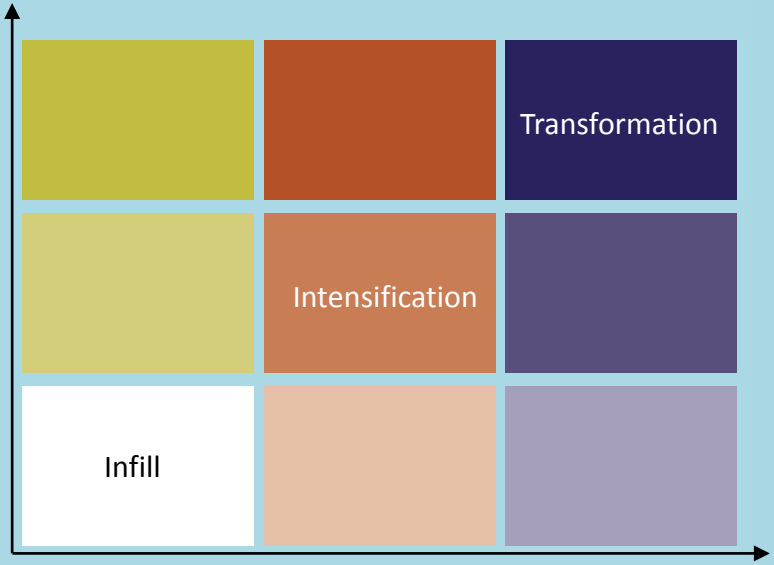


- To build a typology of stations that classifies all stations in a mass transit network into clusters
- To identify various imbalances between connectivity, accessibility, place quality and market potential values at a given station.
- Addressing the imbalances creates a high potential of development
- The nine types of development in each matrix are grouped into three clusters.
- The types on the diagonal are balanced types, needing infill, intensification, or transformation depending on their value.

INFERENECES



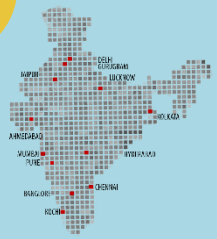




3V FRAMEWORK

Transit oriented development strategies at the **metropolitan, network and local level.**
This identifies necessity of any place and gives a better understanding on how to transform a transit station area

To support Implementation of above mentioned strategies, Local Area Plan(LAP) as a tool can be used.



Hence, **3V Framework** can act as a Prototype where **context** oriented TOD can be developed in every Indian City.

THANK YOU