CONTEXTUALISING NODE IN TOD (Transit oriented development)

USING 3V FRAMEWORK
A Case of Hyderabad

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BACKGROUND

NEED FOR THE STUDY

CONTEXTUALISATION OF TOD

DEMONSTRATIVE CASE (HYDERABAD)

- City Dynamics
- Framework
- Node Value
- Place Value
- Market Value
- Co-relation
- Inferences
- Conclusion
CITIES WITH MASS TRANSIT

TRANSIT ORIENTED DEVELOPMENT

Land use + Transport integration

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

NOT ALL STATION AREAS (NODES) ARE THE SAME.

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

Master plan has an entire section dealing with TOD provisions

Started preparing Station area plans (SAP)

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

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.

• Guided development
• CONTEXTUALISATION

A Case of HYDERABAD


The city is enormously expanding in terms of population accounting to a growth of almost 87% by the census 2011.
Hyderabad looks TOD as a “BUSINESS OPPORTUNITY”

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.

Data from HMRL, Hyderabad
Driven by the importance of a node in a transportation network. All nodes in a network are not equal.

Value of a station area is assessed by understanding the unrealized market value around it.

Quality of the urban fabric, which is based on human scale, permeability, diversity, and the capacity to evolve.

Existing characteristics/challenges
Primary transport Activity
Targeted principles
Future potential

Types of transit
characteristics of the station area
density, diversity mix
Frequency of transit
Retail characteristics

Major planning and development challenges
Housing mix
Social amenities target jobs
station area target units

Scale of place
Density and intensity of area
mix of uses
Transit technology and time

**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

### Centrality
- Degree centrality
- Closeness centrality
- Betweenness centrality

**Intensity of Node**
- Ridership of metro (January 2019)
- Ridership from HMRL

**Intermodal Diversity**
- No. of bus routes
- Bus stands
- Bus terminal
- MMTS
- TSRTC
- Google Maps

<table>
<thead>
<tr>
<th>STATIONS</th>
<th>Degree Centrality</th>
<th>Closeness Centrality</th>
<th>Betweenness Centrality</th>
<th>Aggregate Centrality Rating</th>
<th>Intensity of Node</th>
<th>Intermodal Diversity</th>
<th>Node Value</th>
</tr>
</thead>
<tbody>
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<table>
<thead>
<tr>
<th>Corridor</th>
<th>Station</th>
<th>Degree</th>
<th>Relative Grading</th>
<th>Degree</th>
<th>Closeness</th>
<th>Betweenness</th>
<th>Closeness</th>
<th>Betweenness</th>
<th>Rating</th>
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<th>Relative Final Centrality</th>
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<th>Rating</th>
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<th>Rating</th>
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<th>Totalgrading</th>
<th>Final Node value</th>
<th>Value of Node + Intermodal Diversity</th>
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<td>0.65 + Intermodal Diversity</td>
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<td>0.41</td>
<td>0.55 + Intermodal Diversity</td>
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</table>

10% 60% 30%
The node value at 4 stations is extensively high and most of these stations are in the medium range of distribution.

MAX NODE VALUE **AMEERPET (0.91)**
MINIMUM NODE VALUE **NGRI (0.17)**

Generally extending up to the suburbs areas.

Transfers stations with two or more lines concentrated at the city core.

Best with connectivity.
**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. There are 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

The Place Value index is calculated using the following formula:

\[
\text{Place Value} = 0.2 \times \text{Intersection Value} + 0.35 \times \text{Perimeter Value} + 0.3 \times \text{Landuse Value} + 0.15 \times \text{Amenities Value}
\]

The Place Value index is further divided into 4 categories:

- **DENSITY OF STREET INTERSECTION**
- **BLOCK PERIMETER**
- **DIVERSITY OF LANDUSE**
- **DIVERSITY OF SOCIAL AMENITIES**

The Place Value table below shows the calculation for a specific area:

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Station</th>
<th>Density of Street Intersection</th>
<th>Block Perimeter</th>
<th>Diversity of Landuse</th>
<th>Diversity of Social Amenities</th>
<th>Place Value</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No. of intersections per 800km</td>
<td>Average block</td>
<td>Entropy of landuse</td>
<td>Entropy of social amenities</td>
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<tr>
<td></td>
<td></td>
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<td>perimeter</td>
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</tbody>
</table>

**Place Value Analysis**

- Intersection Value: 20%
- Block Perimeter Value: 35%
- Diversity of Landuse Value: 35%
- Diversity of Social Amenities Value: 10%

**Place Value Table**

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**12th Urban Mobility India Conference & Expo 2019**
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 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.

**Market Value**

Value based on stations economic potential
The market value of the area varies based on the jobs and land use of the area. Hence the city experiences diverse variations in market value.

- **Strong** conditions that are strong in all aspects
- **Emerging** market conditions, building types not supported.
- **Limited** conditions and lack of demand to support new compact development
- **Weak** conditions

Max Market Value: KPHB (1.00)
Min Market Value: NAGOLE (0.25)
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.

NODE, PLACE, MARKET values at various stations are plotted.
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.