Naya Raipur and Palava City: A Lesson in Aspiring Smart City Planning

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ABSTRACT

Building new cities and townships from scratch is often more appealing in theory than practice. Chhattisgarh state's new capital Naya Raipur, which is struggling to achieve its perceived urban potential is an example. Palava City, an upcoming project Palava City in Mumbai is another instance of a new city being built in the outskirts of Mumbai and has ambitions to become the model for Smart City projects in India. This study showcases that while the aspirations while developing their plans have been the same i.e., to build efficient urban living spaces well-equipped with smart city level infrastructure, the outcomes may come out differently. While the project locations might be a huge factor in these differences, this study discusses the other urban planning aspects which might have caused them. This study also looks at Palava City's plan from a critical view and discusses if the already celebrated project (by Harvard University) would have the intended effects to the anticipated extent or not.

1. INTRODUCTION

Since the early 21st century, in countries like China and India, the concept of developing new towns to accommodate the population from nearby dense urban centers has been practiced, an adaptation of the concept by Ebenezer Howard's city model (Wang et al., 2010). Rajarhat New Town and Kolkata West International City in Kolkata, West Bengal are a couple of such examples. But each case of new city comes up with a unique set of challenges which may or may not overlap with other similar cases. Urban planners must balance the need for efficient transportation systems, water supply, sewage, and electricity with environmental sustainability and green spaces. Additionally, there is often resistance from local communities and stakeholders, concerns over gentrification, and the risk of social inequality if development is not inclusive.

1.1 Mumbai and Raipur

It is important to acknowledge that the location and setting of a new town contributes majorly into its future urban potential. For this comparative study, the two examples are Naya Raipur and Palava City. On first glance, Mumbai and Raipur seem to fall in completely different strata of cities and barely seem comparable. Mumbai is a Tier 1 city while Raipur is a Tier 2 city as per Government of India. However, they are both capital cities of their respective states. As per the findings of Jana and Sinha (2019), over the years, Raipur has also witnessed increase in population, and irregular urban sprawl due to this. Irregular growth and slums are common and well-known issues in Mumbai as well (Sanyal, 2018). While Mumbai as a city might not be comparable to Raipur,

the case studies of outskirts of Mumbai, where new towns are coming up, may have some comparable urban scenarios with the new capital near Raipur. This study is an attempt to draw those comparisons.

1.2 Development of New Townships and Smart City Mission

By the year 2030, 100+ smart cities and 50+ new cities are supposed to come up in Southeast Asia itself (Addanki and Venkatraman, 2017) and it is extremely important to keep working on the manifesto of developing new towns alongside. In his book, Pathak (2020) has provided the list of main challenges on the path of developing Smart Cities in India. The author addresses challenges such as inadequate infrastructure, urban poverty, environmental sustainability, governance issues, and over-reliance on technology solutions without fully addressing the social and economic dimensions of urban life, like inclusivity and accessibility (Pathak, 2020).

2. BACKGROUND

The Smart City Mission launched in India in 2015, is funded through a combination of central and state government allocations, along with private sector investments and public-private partnerships (PPP). The funds are distributed based on a competitive selection process, where cities submit Smart City Proposals (SCPs) detailing their vision, projects, and financial plans (NRDP, 2031). Successful cities are awarded financial grants, typically in installments, based on the milestones achieved in their proposed projects. While Naya Raipur is a certified Smart City, Palava City is a large-scale integrated urban development project by a private developer.

2.1 Naya Raipur Capital City

As per the Naya Raipur development plan 2031, the Government of Chhattisgarh envisaged the creation of a new city named Naya Raipur, intended to house state-level administration functions. After various considerations, a site in the southeast of Raipur, dotted with natural water bodies, was selected. The site was located to the west of the river Mahanadi, a perennial source of water, in the middle of the Naya Raipur Development Authority (NRDA) planning area (NRDP, 2031).

2.2 Palava City

Palava City is an integrated smart city located near Dombivli in Maharashtra state. It is developed by real estate developer Lodha and is located between Thane, Navi Mumbai and Kalyan. As per the studies of Madakkan (2020), Palava City is the most well-planned Smart City in India and will soon become one of the topmost livable cities internationally. There is not much political intervention and ambition in this project as it is being constructed by a private developer.

3. COMPARATIVE ANALYSIS

The methodology is simple and that of comparing the facilities at both the sites. The following sections provide comparative information (gathered from various sources online and site visits) on both the projects based on 14 aspects. Figure 1 shows site visit photos of both the smart city projects.

Figure 1 Site Photos

3.1 Project Area, Aims and Objectives

The proposed area of Layer 1 of Naya Raipur is 95.22 sq. km including 500 m wide green belt area and the target population for the city in 2031 is 5.6 lacs.

Palava city is relatively a much smaller project, built on a 4,500-acre (18.21 sq. km) land and is expected to house around 1 lac people.

3.2 Land Use Planning and Land Management

For Naya Raipur, 26.37% of the total area is residential, 3.44 % is commercial, 5.7% industrial, 23.04% public and semi-public, 26.6% recreational, and 12.55 % for transport.

In Palava, Phase 1, residential area is 7.3%, commercial area is 11.6%, Education is 1.054%, Health infrastructure is 0.115%, recreational is 0.23%, and other public and semi-public utilities are 0.2%.

Naya Raipur has been planned in three phases up till 2031, starting with a target population of 1,50,000 in Phase 1 to 5,60,000 in Phase 3. Palava City is also being developed in three phases, with a sector wise development plan for the township. Dwelling density is also projected to be high, at about 55,000 people per square kilometer and more than central Mumbai. Started in 2009, with phase 1 essentially completed by 2015, the eventual build out is scheduled to be ending around 2035 (palava.in).

3.3 Housing

Naya Raipur has been planned to include approximately 1.25 lakh (125,000) housing units across various categories. This includes affordable housing for government employees, Middle-Income Housing, and High-End and Luxury Housing with villas, apartments, and premium housing. Meanwhile, the entire project of Palava is expected to be completed by 2025 and house one lakh families.

3.3.1 Affordability

In Naya Raipur, as per the Naya Raipur Mukhyamantri Awas Yojana, 40,000 affordable housing units were developed for EWS (INR 2.5 lac per unit) and LIG (INR 7 lac per unit) population. Apart from this, there are several smaller housing townships within Naya Raipur from private builders of different price ranges.

As per a study in 2017, in Palava City the sales of the houses have been brisk, indicating the desirability and affordability of the dwelling units, however there is a lag in occupancy, and in near future, a significant percentage of houses would not fall under affordable brackets for middle class Indians (Harvard, GSD, 2017).

3.3.2 Housing Variety

Naya Raipur consists of 8 housing sub-systems shown in Table 1 out of which most are private housing, but there is a significant percentage of cooperative housing societies as well.

Palava City has mainly four categories of housing, the mid-rise apartment, high-rise apartment, villas, and row housing.

Table 1 Housing Varieties at Naya Raipur

S No.	Housing Sub system	Number of Dwelling Units	Percentage of Housing stock (Naya Raipur)
1	Private Housing	74,602	60.23%
2	Co-operative group housing societies	14,430	11.65%
3	Housing for Government Employees	6,315	5.1%
4	VIP Housing	2,666	2.15%
5	Private Employee Housing	2,220	1.79%
6	Institutional Housing	7,780	6.28%
7	Others (CBD, Composite use, Facility corridor)	9,287	7.5%
8	Urban Villages	6,560	5.3%
	Total	**123,860**	**100%**

3.4 Physical Infrastructure

As per the official website of Naya Raipur (navaraipuratalnagar.com) the city has Information and communication technology (ICT) enablement for a centralized command and control center for governance, transport system, data and networking, utility and building management and surveillance.

In Palava, A smart card (Kotak Mahindra Bank) given to all Palava citizens will allow cashless transactions at retail centers, access to bus service, public Wi-Fi within Palava's premises, building and commercial points of entry and information access from the Palava experience center. This smart card is also capable of facial recognition and will be used as a key to enter buildings with advanced security systems.

3.4.1 Power and Water Supply Management

In Naya Raipur All the power supply network in the city is underground. Some of the key features of the smart energy system are to reduce redundancy, underground cable network, solar panels, wind powered streetlights (pilot project), intelligent street light management system, smart meters, and electrical charging stations. 14 numbers 33KV electrical sub-stations and all underground networks within the city have been implemented (navaraipuratalnagar.com).

Water treatment plant has been set up and treated water is supplied to the residents. Total 104 MLD Water Treatment Plan (WTP) has been proposed for Atal Nagar out of which 52 MLD plant is functional since 2015. Existing system has been upgraded and SCADA system has been set up to increase the system efficiency by provisioning of 24x7 fully pressurized Water Supply System, for real time monitoring, automatic meter reading and its integration with billing software (navaraipuratalnagar.com).

In Palava, the smart card would also operate the electrical equipment at home through motion sensor technology (Madakal, 2017). In addition, there is a promise of 30 per cent savings on electricity and water costs, from the Maharashtra State Electricity Distribution Co. Ltd. for 24-hour electricity supply and solar panels powering streetlights. It also has an intended tie-in with General Electric Co. (GE) for 100 per cent water recycling and automated water metering and billing, ensuring transparency and zero water loss (palava.in).

3.4.2 Sanitation and Drainage

As per the official website of Naya Raipur (navaraipuratalnagar.com) the city is covered with 100% piped domestic wastewater collection thereby making it a Zero Discharge City. Storm water, sewerage, recycled wastewater networks, decentralized STPs and sensors for monitoring have already been implemented. The recycled water is consumed for flushing, irrigation purposes and gardening. Five Sewerage Treatment Plant (STP) have been built in Atal Nagar out of which four modular STPs are Sequential Batch Reactor (SBR) and one is Membrane Bio Reactor (MBR) for Capitol Complex (Shridhar, 2023).

In Palava Large-scale Sewage Treatment Plants (STPs) are used to treat wastewater, which is then repurposed for irrigation and flushing purposes, significantly reducing the need for potable water. These STPs are designed to be more energy-efficient, contributing to sustainable water management across the developments. At Palava, the waste management system is self-sustaining, with over 90% of the energy required to operate the plant being generated in-house from the organic waste itself, making it an example of energy-efficient and sustainable waste management (palava.in).

3.5 Transportation

For Naya Raipur, there are four major roads within the site selection region viz., three National Highways, namely, NH-6, NH-200 and NH-43 and one State Highway i.e., SH-5. The other important road is the one connecting Raipur to Baloda Bazar passing through the prospective mining area and with the potential of handling high traffic volume while putting this area under intensive economic use (Ahmed and Jain, 2023). The region is said to have good railway connectivity. The railway lines run almost parallel to the National and State Highways. Raipur airport is about 13 km away from the city of Raipur towards the Southeast.

As per Madakan et al. (2017) in Palava, the already operational eco-drive buses provide service within the city and a state-of-the-art transport hub will connect with external transport facilities. The Fleet Management System will ensure efficient operation of public vehicles while system enablers that predict traffic will help prevent congestion. The Parking Management System will ensure hassle-free parking. 24/7 monitoring and emergency

response teams, video surveillance, a highly trained security force, street level panic alarm systems, electronic access control and automatic fire alarm systems in buildings will ensure total safety in the city.

3.6 Walkability

For Naya Raipur, transit-oriented development (TOD) was adapted, and the Station Areas are defined by a 800m / 10 minute walk distance as radius from the TOD point. In Palava, each neighborhood will have a pedestrian-focused design and is planned to be self-sufficient, with all daily needs met within a 5-to 10-minute walk from home and public facilities merely 15 minutes away.

3.7 Green Spaces and Open Spaces

In Naya Raipur, a total of 2137.36 Ha area (26.67 %) has been designated to recreational and open spaces which consists of a film city, parks, playgrounds, stadium and sports complex, nature resort, theme park, water body, botanical garden, plantations, and reserved forests (NRDP 2031).

Palava City incorporates large parks, themed gardens, and man-made lakes, cycling tracks, and sports facilities encourage outdoor activities, while urban forests and green corridors enhance the city's environmental sustainability. The integration of green spaces, public art, and community areas ensures that Palava City offers a vibrant, inclusive, and eco-friendly urban living experience.

3.8 Economic Development and Employment

As per the development plan, the main sources of employment for the new capital would be- proximity to Raipur, Cement plants (such as ACC and Century) on the northern and western side of Raipur city, the Bhilai steel plant on the western side, and the mining site on the northern side of NH-6 (NRDP 2031). However, the main issue is that all these industries or employment centers are surrounded by their own residential areas and towns, and people working there would not shift to Naya Raipur. However, the software technology park area designated as a Special Industry zone was established to employ skilled and semiskilled workforce.

In Naya Raipur, a four-tier system of commercial activities (CBD, Community Shopping Complex, Neighborhood shopping center, housing area center) has been adopted to accommodate the retail shopping facilities integrated with other services such as entertainment, business, etc. (Ahmed and Jain, 2023).

Palava City is situated between Thane, Dombivali and Navi Mumbai. It is, thus, well connected by road, rail, air, and waterways. The city is strategically located and is an approximately 30 minutes' drive from the upcoming Navi Mumbai International Airport (Panvel). It is also a short drive from the key employment hubs of Kalyan, Thane, and New Mumbai. It will take hardly one hour from the central point of south Mumbai to reach Palava via the new eastern express highway (Madakan, 2020). Palava is expected to generate 3.5 lakh jobs compared to 1 lakh people residing in it. The Central Business District (CBD) in Palava City will offer millions of square feet of world-class offices at competitive rates and world-class infrastructure. Palava's vision is to create 3.5 lakhs jobs by 2025 across retail, education, medical, entertainment, services and other sectors. This will truly make the objective of 'walk to work' life for Palava citizens a reality. The Centre for Arts and

Culture, lakefront and river-front plazas, a 0.5 million sq. ft. mall with a multiplex, high street retail and a 100-acre central park are just some of the numerous spaces in the city (Harvard, GSD, 2017).

3.9 Social Infrastructure and Community Services

Naya Raipur (now known as Atal Nagar) is being designed as a modern, sustainable city with all the necessary infrastructure to cater to a growing population. The city's development plan includes provisions for schools, hospitals, and other essential services to ensure the well-being and convenience of its residents (navaraipuratalnagar.com).

The technology-driven consulting firm IBM has entered into an agreement with real estate player M/s. Lodha Group to design, develop, deploy, and manage Smart City infrastructure through technologies in Palava, which is a completely Wi-Fi-enabled city (Madakam et al., 2017).

3.9.1 Healthcare

In Naya Raipur The master plan envisions at least 10-15 hospitals in Naya Raipur, which include Public hospitals (Government-run hospitals), Private hospitals (Including multi-specialty hospitals, and Specialized medical institutions. Apart from this the plan also has a medical college and associated research facilities are also part of the city's longer-term development plans.

In Palava, A multi-specialty hospital affiliated with the university to encourage R&D, pharmacies and clinics is planned to be within a 10-minutes' walk from one's home, and it will ensure world-class healthcare.

3.9.2 Education

In Naya Raipur Approximately 40-50 schools are planned in Naya Raipur. These include Primary schools, Secondary schools, Higher secondary schools. Specialized educational institutions (for vocational training, arts, and higher studies are also in the plan. Additionally, the city is expected to have specialized higher education institutions, such as engineering colleges, medical colleges, and management institutes, contributing to its long-term educational landscape.

Palava City will be home to over 20 schools, a multi-disciplinary university and a Sports Complex with international-level professional sports academies. Palava already has operational world-class facilities such as the Lodha World School and a preschool, sports facilities and training academies in clubhouses, a cricket ground, a FIFA standard football field and a nine-hole golf course, apart from convenience retailers.

3.10 Safety and Surveillance

Naya Raipur (Atal Nagar) is being developed as a smart, secure city with cutting-edge safety and surveillance features. The city will have a comprehensive CCTV network with real-time monitoring, including advanced technologies like facial recognition and ANPR systems for traffic and security management (NRDP, 2031). Emergency services will be streamlined with smart police stations, GPS tracking for emergency vehicles, and an integrated alert system to ensure rapid responses. Smart street lighting and movement sensors will enhance safety, while fire safety infrastructure and disaster management systems are designed to protect residents during

emergencies. Additionally, the city will include community-based safety programs and environmental monitoring to safeguard public health. These features, combined with strong cybersecurity measures, will create a resilient and safe living environment for the residents of Naya Raipur (navaraipuratalnagar..com).

In Palava, the lighting in common areas is proposed to be solar or LED, while utility meters will be installed to reduce wastage, for example, by detecting any water leakages. IBM will also support a central hub to monitor and enable coordination among Palava city and agencies involved in public safety and emergency management system. Palava City Management Association, with a membership consisting of residents, will deal with day-to-day issues, as well as 311 grievance helpline number and 911 emergency helpline for citizens. Palava's technology also extends to planning for 500 surveillance cameras that capture real-time data from entire city, face recognition for entry and exit, panic alarms every 200 meters.

3.11 Urban Governance and Public Participation

As per the official website of Naya Raipur (navaraipuratalnagar.com) an Integrated Command and Control Centre has been setup for monitoring and controlling of all systems discussed above in one platform. ICCC is the centralized hub of integration for various components envisaged under the Atal Nagar Smart City System. It acts as single roof for all the data capturing processing, consolidation reporting, monitoring, and control. Teams of various stakeholders shall operate on their respective areas from ICCC. The integrated GIS based Command and Control Centre (CCC) comprises workstations, video wall, CCC application, contact center etc. to manage city operations.

For Palava, IBM is building a service platform for citizens to interact with city administration and manage various services offered by the city. Using mobile and social technology, the service platform will enable citizens to communicate with city officials, access amenities and services, report on issues and receive feedback from city officials. This will enable city officials to better handle citizen concerns, rapidly gather feedback via social media (Facebook, Twitter, LinkedIn) and more effectively manage city resources to fulfil various needs. Some of the technologies for participatory governance include Palava e-Portal and smart cards.

3.12 Cultural Heritage and Preservation

Purkhouti Muktangan is a 24.2-hectare (60-acre) cultural and sculpture garden in Naya Raipur which is a vivid showcase of the indigenous cultural richness(navaraipuratalnagar.com). This place also known as Purkhauti Haat sprawled over 60 Acres in the Chattisgarh region famous for its open-air museum with gardens.

The Palava Smart City project would comprise a center for arts and culture, as big as Mumbai's NCPA with multiple theatres, where one can watch famous plays, music and dance performances, concerts and enroll in workshops promoting artistic pursuits and other activities. The Downtown area will be the heart of Palava City with entertainment hubs, buzzing shopping streets and vibrant cultural spaces (Madakam, 2020).

3.13 Media Perception and Critique

Land Acquisition has been a great challenge for the Naya Raipur project and that is evident from the 150 news articles covering this issue from the project's announcement date in 2002 till its inauguration in 2012 (Figure 2). However, even in this coverage, media focuses more on the positive aspects (blue bubbles) of the project rather than the negative ones (red bubbles).

However, after the project came into existence, despite an appealing development plan, there have been media reports about Naya Raipur becoming a 'ghost town' with most of the houses remaining unoccupied (Das Gupta, 2017; Naidu 2024). At the same time there are articles about how efficient and well-planned Naya Raipur is (Frantz, 2018; NDTV, 2022). Kaur (2020) in a news article has pointed out how lack of power and water supply, no nearby healthcare, and other basic infrastructure issues have led to the failure of setting up of the IT park. In the same article, an IT investor has urged Chhattisgarh government to take IT investors more seriously. Some news articles have also pointed out the lack of consideration and compensation during the land acquisition process for Naya Raipur (Tiwari, 2022).

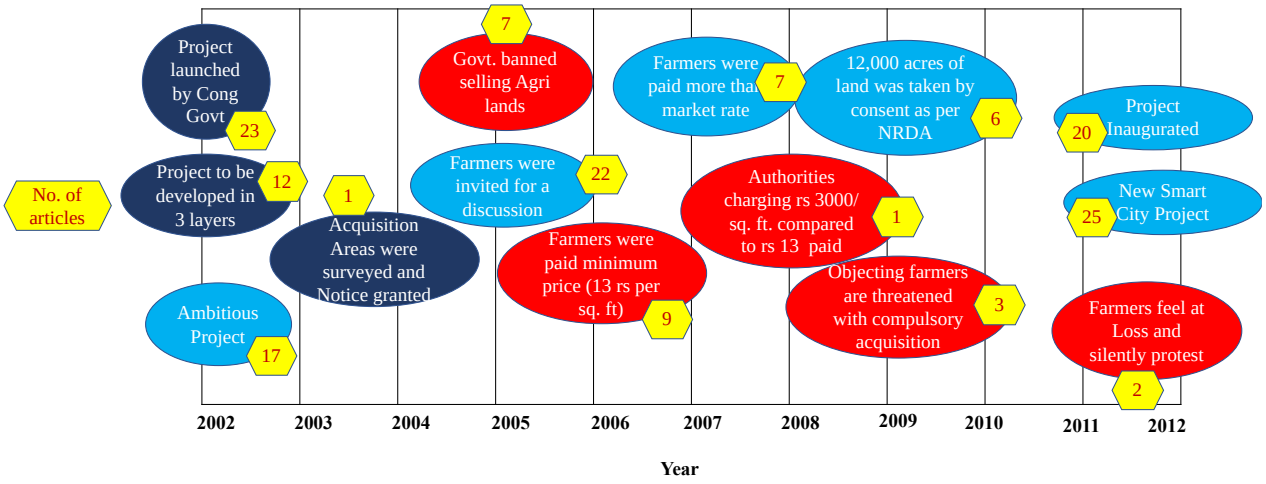

Figure 2 Media coverage of Naya Raipur

While for Palava, there is a plethora of media articles praising the plannings and design, there are also few articles raising some issues. News reports have brought up the issues of crime and residential safety (Patole, 2024), exceeding property taxes (Nambiar, 2023), and instances of flooding due to Palava's proximity to water body (Gupta, 2019). Over the course of a decade since its announcement in 2010, media has covered various aspects of the project but a constant media discourse around the project's multi-phase approach and proximity to economic center of Mumbai (Figure 3).

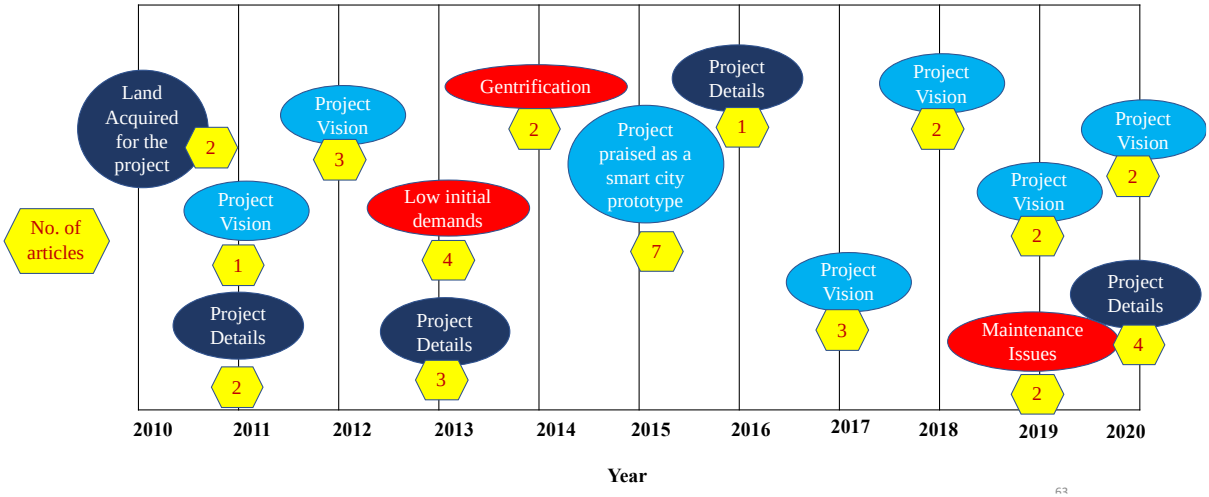

Figure 2 Media coverage of Palava City

4 MAJOR FINDINGS

The major differences between the two case studies arise because of one being a new capital city and the other being a gated township by a private developer. Their scales and settings are different. However, when one studies the aims, objectives and claims in their development plans, there are many similarities. The manifesto for every city which aims to become a 'Smart City' consist of the same terms of advanced operational aspirations. Naya Raipur, being a government project has more inclusive housing typologies, and the plan tends to use wide and generic terminology for its facilities. Meanwhile Palava has a limited target consumer bracket, and the manifesto consists of very specific terms for the technology being used.

The reason is that Palava enjoys a very organized and orchestrated set of collaborations with tech and finance companies. This has helped them to implement the desired technical support. Meanwhile for Naya Raipur maintaining the claims of both basic and hi-tech infrastructure provisions has been strenuous.

Maintenance becomes difficult when the inflow of investments, funds, and residents does not go as per expectations and puts strain on state funds. Hence, the planning must excessively consider the economic projections of jobs to be generated.

5. CONCLUSIONS AND RECOMMENDATIONS

For Naya Raipur's smart city provisions to function with utmost efficiency, it is important for the manifesto to have realistic claims, and strong collaborations with tech giants. Naya Raipur also seems to be overly reliant on nearby industries as a motivation for people to move. It should be taken into consideration that the local population of Raipur, Bhilai, and other nearby towns are more comfortable travelling for work and returning. Naya Raipur needs to have a stronger employment generation plan to draw in residents. For Palava, maintaining access for middle income groups in the future can be a challenge. For both Palava and Naya Raipur, the claims of international level high-tech facilities must be first matched with uninterrupted infrastructure supply.

It is natural for any township or city to experience incidents of crime, system failures and civic issues. Even the highest-ranking cities in the world do. But it is important to understand that the label of 'Smart City' comes with utmost responsibility of excellence in terms of infrastructure. Or there are chances for the term to lose its significance. Indians have become so used to living in congested areas with bare minimum facilities that it will take a stronger effort than just new constructions and city beautification to motivate them to move into a new township, leaving behind their old homes.

New and upcoming capitals like Naya Raipur need to incorporate stronger collaborations and ensure regular supply of infrastructure. Ambitious projects like Palava need to be more considerate of the affordability of the middle- and low-income group to contribute towards people's needs. Because there is no scarcity of gentrified, luxurious townships in Mumbai which are inaccessible to most living in the city.

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