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Smart Cities and the Urban Artificial Intelligence Infrastructures: The Indian Experience

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Abstract

Smart cities have become a foundational paradigm in contemporary urban governance. They promise to use AI, big data, and digital infrastructure to make cities more efficient, sustainable, and focused on the needs of its citizens. In 2015, India has launched Smart Cities Mission (SCM). It is considered as one of the most ambitious national-level trials in this domain. It has chosen 100 cities to adopt the technology-driven interventions. A lot of policy discourse focusses on innovation and efficiency, but sociological studies show that there are underlying issues exclusion, discrimination, power, and governance. This paper, on the basis of literature from urban sociology and science & technology studies, tries to situate smart cities as socio-technical assemblages rather than neutral technological upgrades. Further, this paper methodologically synthesises secondary sources, policy documents, and critical commentaries on Indian smart cities. This paper concluded that AI enabled infrastructures reshape public services, surveillance system, and everyday life and interaction. It also argued that AI infrastructures in urban areas both sustain older forms of urban inequality and perpetuate new forms socio-technical exclusions. This study shows that smart cities cannot be just considered as technological phenomena but it has broader social, cultural, economic, and political dimensions to support democratic and inclusive urban futures.

Keywords: *Artificial Intelligence, Smart Cities, Urban Infrastructures, Urban Sociology*

Introduction

The policymakers and urban planners all around the world are interested in the idea of the "smart city". Smart cities are generally seen as a data-driven ecosystems where integrated interface of Artificial Intelligence (AI) and Internet of Things (IoT) devices work together to make urban governance easier (Townsend 2013). These cities are based on the idea that utilisation of digital technologies may enhance the urban efficiency and sustainability. In Indian context this idea gained momentum with the launch of the *Smart Cities Mission* (SCM) in 2015, a flagship initiative aimed at modernizing 100 cities through technological interventions in transportation, waste management, security, and service delivery (Ministry of Housing and Urban Affairs [MoHUA] 2017). There are certain sections of the supporters who describe the SCM as a chance for India to jump ahead in urban governance and planning by adding AI and digital infrastructure. Due to this India's cities can skip over traditional development problems and modernise quickly. The Smart Cities Mission is directly related to the idea of global competitiveness, which considers Indian cities as part of a worldwide network of technologically advanced urban centres (Datta 2018). However, urban sociologists argue that cities are not only

places where technology is stored. They are also social and political institutions where infrastructure affects power, inequality, and daily life (Graham & Marvin 2001; Mattern 2017).

Sociologically, urban AI infrastructures are neither neutral nor solely technological. Their decision making has been based on prioritisation of interests and desirable urban futures. According to Kitchin (2014) smart urbanism is the development of "real-time cities" in which data is perpetually gathered and utilised for significant surveillance and governance. These infrastructures change the whole concept of state, citizenship, choices and resource distribution. On the one hand, Indian smart cities offer efficiency and inclusivity. By many it is claimed that AI enabled devices will make the things easier and efficient in the urban areas. However, certain section of experts warn that these infrastructures would perpetuate and enhance existing social inequities. Sami and Anand (2020) contend that smart cities give priority to affluent consumption areas, while ignoring the informal urban settlements. In similar vein, Datta (2018) claimed that "smart citizenship" in India frequently presupposes digital knowledge and connectivity. This leads to marginalisation of significant segments of the population from substantive engagement.

This research seeks to contextualise Indian smart cities within the sociology of AI infrastructures with the case studies of three cities namely, Bhopal, Pune, and Bhubaneswar. These cities are regarded as benchmark for smart cities within the SCM framework. The success stories of these smart cities have been analysed through the prism of technological ambition and constraints of uneven rewards and persistent exclusions, highlighting the necessity for participatory urban governance. It will also explore the effective and efficient use of AI driven technology in the urban governance.

Literature Review

The literature related with AI and smart cities has a multidisciplinary dimension. The sociological literature has not only focussed on the working of smart technologies but also emphasize on that how these digital and AI technologies reconfigure social sphere and governance. In the late 2000s, companies like IBM, Cisco, and Siemens started selling integrated technology solutions to cities, which led to the phrase "smart city" (Hollands 2008). The smart city is usually described as a city that has been improved by digital technology and in such city real-time data collection and analysis make urban governance efficient. Smart cities are ecosystems of sensors, data centres, and citizen interfaces that work together to fix problems like pollution, traffic jams, and waste management (Townsend 2013). But certain scholars have contested this idea, such as Hollands (2008) argued that the "smart city" designation frequently serves as a branding tactic that conceals underlying political and economic intentions of the government. Similarly, Greenfield (2013) criticised the corporate dominance of smart-city stories, saying that cities were being thought of as places for technical experimentation instead of democratic debate.

Kitchin (2014) has introduced the idea of the "real-time city" to show that how smart cities are made up of data flows that keep an eye on and shape city life. He has cautioned that such advancements raise certain concerns around surveillance and social privacy and security. In the same vein, Mattern (2017) argued that "a city is not a computer," which only guided by certain algorithmic models but it is also guided by the institutions and norms of the urban social life. In the following years more complex interface between urban planning and digital technologies has emerged. Shelton, Zook, and Wiig (2015) proposed the concept of the "actually existing smart city." They argued that the smart technologies are not implemented uniformly in whole urban areas which sustain existing disparities and malfunctioning of governance. Therefore, smart cities are not just technological upgrades but they are inherent and inseparable part of social and political projects. Therefore, sociologists are very much interested in inquiring that how AI infrastructures transform urban governance and perpetuate social hierarchies.

The examination of infrastructures has emerged as a significant area of interest in sociology. The scholars argued that infrastructures are not only technical frameworks but also dynamic facilitators of social order (Star & Ruhleder 1996; Larkin 2013). The AI Infrastructures have its influence on temporalities and differential values. Graham and Marvin's (2001) in their important book on "splintering urbanism" illustrated how investments in infrastructure can make disparities worse by giving some groups more benefits than others. Urban AI infrastructures are not only tools for making things run more smoothly but also, they have capacity to change how people, businesses, and governments interact with each other. Plantin et al. (2018) characterised digital infrastructures as "platformized" systems that progressively integrate public and private services. In smart cities, this frequently involves giving technology companies the job of doing important government tasks, including keeping an eye on traffic or people.

The other dimensions of literature deal with algorithmic governance in smart cities. Algorithmic governance, mainly focus on the use of computer systems to make decisions, control populations, and distribute resources. Algorithmic governance is the implementation of authority through automated systems of regulations and feedback (Yeung 2018). In urban areas this might denote predictive policing and use of AI for welfare measures. Various studies show that algorithmic governance has a number of effects. Firstly, algorithms are often hard to understand and it makes hard for people to question and understand judgements (Pasquale 2015); secondly, algorithmic systems may replicate and reproduce biases inherent in training data (Noble, 2018); and thirdly, algorithmic decision-making might undermine political accountability. The elected politicians might delegate sensitive policy issues to "objective" computers, obscuring fundamental value judgements (Kitchin 2017).

The idea of surveillance authority has also been proposed by scholars. Zuboff's (2019) idea of "surveillance capitalism" is also a significant contribution in the field. He has rightly raised the issue of the breaching of privacy of the citizens by selling of the private data to the private organisations without the prior permissions of the citizens. Private enterprises use this data for predictive insights, which leads to a conflict between public responsibility and private profit. Therefore, algorithmic governance and surveillance capitalism provides a perspective that how urban governance is transformed by AI infrastructures by centralising the authority among the state and private entities and in this process the citizens has been marginalised.

Indian scholars have raised the issues of inherent contradictions of Smart Cities Missions. It embodies aspirations of global modernity but in the process, it has marginalised the urban vulnerable sections. She emphasised the need of "smart citizenship", according to which many people can't participate because they don't have access to or know how to use technology. Some have pointed about the neglect of democratic debate due to encouragement of digital technologies in SCM. Sami and Anand (2020) examine the techno-politics of smart cities in which they raised the issue of a digital divide between affluent neighbourhoods and unorganised informal urban areas. In the same vein, Chatterjee (2021) also argues that the mission has made "splintered citizenship". It means that those who are not on the digital grid, including informal workers and migrants, cannot be seen by governance systems.

Various empirical studies have highlighted these emerging issues in the urban governance. Many have admired the Pune's Integrated Command and Control Centre (ICCC) for making it possible to monitor traffic and public services in real time. However, detractors say it increases surveillance capacity without giving the people much say in such type of system (Anand, 2021). Also, in Bhopal AI enabled CCTV networks has raised the concerns about the privacy breach and bias attitude of police (Raman 2020). Similarly, Mukhopadhyay (2019) has discussed about the Bhubaneshwar city, which was earlier seen as a model smart city, but gradually the issue of the

right balance between investing in technology and meeting the needs of low-income neighbourhoods has emerged. Therefore, these studies show that Indian smart cities are not just technology upgrades but also reflected on that how AI systems work with long-standing inequities of caste, class, and gender, often making them worse instead of better.

Theoretical Framework

To understand and analyse the smart cities and urban artificial intelligence infrastructures, I tried to look it from three different but complementary perspectives. Firstly, the perspective which looks infrastructure as social formation. It emphasized on how socio-technical assemblies sustain and perpetuate social order by situating whose needs are prioritized and which forms of expert knowledge count. Secondly, the perspective of algorithmic governance which examine that how various predictive models and automated decision systems function as instrument of governance. It also analyses that how these predictive models and automated decision systems shapes the public services, social security and welfare delivery measures. Thirdly, justice-oriented and interpretive approaches which contest the idea of discrimination in inclusion and exclusion of various social categories. The methods include attention to who is made visible by data and who is left out. Overall, these perspectives provide us various sociological lens to understand the urban artificial intelligence infrastructures as simultaneously technical, institutional, and normative systems.

Discussion

Among the 100 chosen cities for the Smart Cities Mission (SCM), 3 of them (Bhopal, Pune, and Bhubaneswar) has been selected as a case study for this research paper. These cities are often cited as successful stories of the Smart Cities Mission by the policy makers and implementors of the urban governance.

Case 1-Bhopal: Bhopal Smart City Development Corporation Limited (BSCDCL) has spent a lot of money on an Integrated Command and Control Centre (ICCC) that uses AI-enabled CCTV cameras, traffic monitoring systems, and predictive analytics to stop crime before it happens. The urban governance officials of BSCDCL considers the ICCC as a "nerve centre" of urban government and promise that it will be safe and efficient system (Raman 2020). From an urban political economy point of view Bhopal's smart city initiatives show the nexus between the private technology companies and international corporations for technological devices and support and this led to novel channels of capital accumulation. As Graham and Marvin's (2001) splintering urbanism shows that how these expenditures in infrastructure mostly help select places. It includes planned neighbourhoods and core commercial districts and exclude the outlying and informal areas.

AI enabled grid make certain sections of the population hyper-visible while some other sections remain obscured. Street vendors, migrant workers, and informal settlements often show up in the data streams as "problems". It means they are considered as cause for traffic jams or unrest. In the framework of smart city their needs for housing, sanitation, or cheap transport are not of importance or intentionally ignored. This imbalance meant that infrastructures not only support but also leave out certain sections of the urban population (Star and Ruhleder 1996). If we, look from the algorithmic governance point of view then we found lack of transparency and accountability in the functioning of ICCC. People of the city don't know the process of data gathering and its utilisation. It also raises the issue of predictive police algorithms which led to social biases towards the people from lower castes and classes. Therefore, Bhopal smart city is the case of "surveillance society" (Lyon 2018), which assured safety and security but at the cost of increased governmental monitoring.

Case 2-Pune: Pune has launched its ambitious Integrated Command and Control Centre (ICCC) in 2018. It is always referred as model for other smart cities. The Pune's ICCC brings together information from traffic cameras, environmental sensors, public transit feeds, and citizen service

platforms into one unified dashboard. It also done an exemplary task during the COVID-19 pandemic in which it was used to identify infection hotspots, handle quarantines, and coordinate emergency actions to facilitate the required multitasking activities (Anand 2021). If we analyse from the urban political economy perspective, the smart-city narrative of Pune is an example of the entrepreneurial city model (Harvey 1989). The policy makers promote the digital governance to market the city and develop it as innovation centre around the world. This certainly reflects the neoliberal ideas of competition but it sidelines the idea of distributive justice.

The urban investments are mostly going to major corridors and high-tech zones, but informal settlements still lack infrastructure (Sami & Anand 2020). There is a discrepancy between the claims of real-time dashboards as proof of "smartness" and problems of everyday realities which has to be faced by the people such as not having enough water or having trash picked up on time. This condition exemplifies that infrastructures have a poetics of desire yet may not correspond with quotidian realities (Larkin 2013). AI assisted traffic management and predictive analytics in Pune shows that congestion in wealthy areas gets a lot of attention, but informal settlements typically don't show up on the data grid. Additionally, the algorithmic classification of Pune's residents during the epidemic into "compliant" and "non-compliant" families exemplifies the transformation of data-driven government into disciplinary monitoring of its residents.

Case 3-Bhubaneswar: The first Smart Cities Mission competition put Bhubaneswar, the capital of Odisha, in first place. The Smart City Mission proposal put a lot off efforts by policy makers and government officials to make the city safe for kids, making it easier for people to go about, and using ICT platforms that work together for better urban governance. To improve the urban governance the Bhubaneswar Smart City Limited (BSCL) has built several infrastructures like smart parking, Wi-Fi-enabled areas, and a city operations centre (Mukhopadhyay 2019). Bhubaneswar's success as a model smart city signifies its capacity to leverage technocratic planning knowledge and secure government funding. But as Datta (2018) points out, this also makes things less inclusive in urban settings. Smart city grants for urban development made development even more uneven, on one hand, the Area-Based Development (ABD) concept focused resources on some affluent areas which includes the planned Janpath corridor, whereas, on the other hand, surrounding slums and informal settlements which are home to many informal labourers are generally ignored for the investment purposes. There are certain tensions inherent in infrastructure imaginaries in the urban governance of Bhubaneshwar city. The ICT based urban governance grievance redressal platforms assume that people know how to use computers and have access to smartphones, but in the process, it excludes those who are not digital literate and are also belong to low-income group. Here infrastructures necessitate particular modes of participation and the individuals who are unable to engage digitally are marginalised from the advantages (Star 1999).

Algorithmic governance is used in Bhubaneswar's traffic management systems and surveillance networks. These makes the urban governance better in some areas, but they also make what Yeung (2018) terms "regulation by code" stronger, where people are controlled by automatic alarms and classifications. People who reside in informal settlements or slums are usually labelled as trespassers or criminals. This "regulation by code" sometimes make the mechanisms of urban governance discriminatory for the disadvantaged groups of the city. Therefore, Bhubaneswar is an example of how smart cities can be utilised as role model to represent modernity and get investment and respect nationally and internationally. But sometimes everyday real-life situations show that there are exclusions and contradictions in the urban areas which has to be identified and tackled properly.

Findings

The analysis of Bhopal, Pune, and Bhubaneswar reveals several interrelated and interconnected

sociological dynamics in India's Artificial Intelligence driven smart city transformation which are as follows:

- Artificial Intelligence urban infrastructures in smart cities have totally changed the working pattern of urban governance. Nowadays decision-making in urban governance is done through various digital platforms such as Integrated command and Control Centres (ICCCs). These digital platforms are very helpful in the aggregation of real-time data on traffic management, waste management, and dealing with security issues. No doubt centralization of decision-making enhances administrative efficiency but on the other hand it depoliticizes urban governance by transferring the decision-king authority from elected representatives to technocratic experts. Therefore, it reduces the scope for deliberative participation of the citizens in decision-making.
- Artificial Intelligence urban infrastructures in smart cities have generated digital inequalities. Across all the selected three smart cities it has been observed that there are discriminatory and spatially selective infrastructural investments which are mainly concentrated in affluent and planned settlements, while ignoring the informal settlements and underprivileged areas. It leads the chances of invisibility of vulnerable sections from the digital governance. Furthermore, there is the case of digital divide which increase the rate of inequality on the basis of digital literacy, accessibility of smart phones and knowledge of English language.
- On the basis of three cities case studies, it has been found that Artificial Intelligence has enhanced the surveillance in the urban areas in the name of safety and efficiency. Simultaneously, there are incidences of data breaches and misuses. So, in the absence of full proof data protection laws there is always concern about the privacy and security issues of the people. In addition, surveillance infrastructures discriminately monitor the marginalized urban neighbourhoods and perpetuate the existing social hierarchies and also have the tendency of criminalizing the poverty.
- It has been observed that now there is emergence of "corporate urbanism". Nowadays big private corporate entities play a significant role in shaping the technological and financial architecture of Indian smart cities. Public-private partnerships are new norms for the urban development and due to this the private organizations have more control on data infrastructures. It has raised the issues of transparency and accountability.

Conclusion

This paper dealt with the interface between smart cities and urban artificial intelligence infrastructures by focussing on Bhopal, Pune, and Bhubaneswar as case studies. The analysis shows that smart cities are not just neutral additions to technology but it has certain complex differential socio-technical dimensions that change how cities are run, who lives there, and how people live in cities. The Smart Cities Mission is an example of neoliberal urbanism from an urban political economy point of view which mainly emphasise on financial investments and promote cities as globally competitive hubs. This "smart" urbanism has stratified the cities into those who are having the control over resources and decision-making power and on the other hand are those who often left out in the development process. Smart Cities also delineate parameters of inclusion and exclusion. Integrated Command and Control Centres (ICCC) make some people hyper visible and others very less visible. The urban population those who have digital literacy and access to smart phones and formal address they have better life chances in comparison to those who are lacking in these. At the same time, these infrastructures represent modernity in a way that makes people want to be more efficient and in control, even when they are not able to meet their everyday demands. Surveillance algorithmic urban governance makes people even more worried about who owns their data and also about their privacy and safety. Overall, we can say that Indian smart cities are places of both hope and despair. Urban AI infrastructures could make things more efficient and responsive. On the other hand, they can sustain and perpetuate inequality, increase

surveillance governance, and also could pave the way for differential citizenship in which some are included and others are excluded.

References

1. Anand, A. (2021). Urban governance in Indian smart cities: Pune as a case study. *Journal of Urban Affairs, 43*(2), 215-234.
2. Chatterjee, I. (2021). Splintered citizenship in Indian smart cities: Exclusions and digital divides. *Urban Studies, 58*(5), 1023-1041.
3. Datta, A. (2018). The digital turn in postcolonial urbanism: Smart citizenship in the making of India's 100 smart cities. *Transactions of the Institute of British Geographers, 43*(3), 405-419.
4. Graham, S., & Marvin, S. (2001). Splintering urbanism: Networked infrastructures, technological mobilities, and the urban condition. London: Routledge.
5. Greenfield, A. (2013). Against the smart city. New York: Do Projects.
6. Harvey, D. (1989). The urban experience. Johns Hopkins University Press.
7. Hollands, R. G. (2008). Will the real smart city please stand up? *City, 12*(3), 303-320.
8. Kitchin, R. (2014). The real-time city? Big data and smart urbanism. *GeoJournal, 79*(1), 1-14.
9. Kitchin, R. (2017). Thinking critically about and researching algorithms. *Information, Communication & Society, 20*(1), 14-29.
10. Larkin, B. (2013). The politics and poetics of infrastructure. *Annual Review of Anthropology, 42*, 327-343.
11. Lyon, D. (2018). *The culture of surveillance: Watching as a way of life* (2nd ed.). Polity Press.
12. Mattern, S. (2017). A city is not a computer. *Places Journal*. https://doi.org/10.22269/170210
13. Ministry of Housing and Urban Affairs [MoHUA]. (2017). Smart Cities Mission: Statement and guidelines. Government of India. https://smartcities.gov.in
14. Mukhopadhyay, S. (2019). Smart city planning and governance in Bhubaneswar: Aspirations and contradictions. *Economic & Political Weekly, 54*(45), 34-41.
15. Noble, S. U. (2018). Algorithms of oppression: How search engines reinforce racism. New York University Press.
16. Pasquale, F. (2015). The black box society: The secret algorithms that control money and information. London: Harvard University Press.
17. Plantin, J.-C., Lagoze, C., Edwards, P. N., & Sandvig, C. (2018). Infrastructure studies meet platform studies in the age of Google and Facebook. *New Media & Society, 20*(1), 293-310.
18. Raman, S. (2020). Surveillance and smart city governance in Bhopal. *Indian Journal of Public Administration, 66*(4), 610-623.
19. Sami, N., & Anand, A. (2020). Smart cities in India: Urban futures shaped by techno-politics. *Urban Studies, 57*(4), 853-872.
20. Shelton, T., Zook, M., & Wiig, A. (2015). The actually existing smart city. *Cambridge Journal of Regions, Economy and Society, 8*(1), 13-25.
21. Star, S. L., & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research, 7*(1), 111-134.
22. Star, S. L. (1999). The ethnography of infrastructure. *American Behavioral Scientist, 43*(3), 377-391.
23. Townsend, A.M. (2013). Smart cities: Big data, civic hackers, and the quest for a new utopia. W. W. Norton & Company.
24. Yeung, K. (2018). Algorithmic regulation: A critical interrogation. *Regulation & Governance, 12*(4), 505-523.
25. Zuboff, S. (2019). The age of surveillance capitalism: The fight for a human future at the new frontier of power. New York: PublicAffairs.