

A Review on Indian Smart Cities Development with reference to Post Covid Era

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Abstract — Smart Cities are the urban areas, which have been identified with an aim of providing essential infrastructure, environment that is hygienic & sustainable, and provide a good quality of life to their public through the implementation of ‘smart solutions’. In India 100 smart cities are been identified by the National Smart Cities Mission whose core objective is to promote urban areas for developing and improving the socio-economic, physical and institutional pillars of the city to grow the economy and increase quality of life. In this paper, we have reviewed the status and impact on development of smart cities with reference to post COVID-19 pandemic. Here we have studied on basis of six different fundamental aspects, which have seen a boom and downturn in its development after pandemic in their areas like Technology and Innovation, Health, Education, Mobility, Governance, and Environment. This paper outcome will help the policy makers to review their decision based on which aspect of development has positive impact and which sector has negative impact.

Keywords — Smart Cities; Development; COVID; Pandemic; Technology.

1. Introduction

The impact of COVID 19 pandemic was a worldwide concern due to which there was a sudden impact on the infrastructural development works, as the country like India which is densely populated and more affected due to pandemic but the nation has a vision on development towards great infrastructural projects especially like smart city mission, where 100 different urban areas will be upgraded using smart technologies, smart health and education, smart governance, smart mobility and smart environment which will be a drive towards smart economy. The smartness of these urban areas can be analysed on basis of fundamental factors like Technology and Innovation, Health, Education, Mobility, Governance, and Environment. In the post-pandemic era, these factors are influenced positively and some might have been negatively influenced too. The negative impacted areas would be suggested with the better solutions to develop in a positive manner. The final process is to evaluate how this smart city development after pandemic are directly or indirectly contributing the economy.

2. Review of Literature

The impact of solutions and technologies of smart city on resilience in light of the COVID-19 pandemic [1]. Here they reviewed 147 studies and discuss the issues and applications of Technologies and solutions during the pandemic. Plan and prepare, absorb, recover, and adapt are what this paper categorizes as its results. Specifically, this

review focuses on secrecy & safety issues, access to directly available data, scientific affordances, legal constraints, citizen engagement & technological viability. Also using smart city initiatives to further enhance resilience to future events like the pandemic will produce unprecedented opportunities for future resilience.

Smart City and Crisis Management: Lessons for the COVID-19 Pandemic [2]. A study focused on analysing technological advances roles in management of crisis in the last 20 years & providing strategy endorsements for managing the COVID-19 pandemic. In addition, this study tells that several technologies driven policies and actions enables in management of crisis, enhances community well-being, and increase resilience of urban area. According to analysts, policy makers can mitigate these side effects by enhancing digital literacy, liberating the digitalization process, and increasing access to digital services.

Towards the sustainability development of smart cities through mass video surveillance: A response to the COVID-19 pandemic [3]. Here in this study examines the implementation of sustainable development in a smart city through deep learning, providing an appropriate reply to the COVID-19 pandemic via widespread cinematic observation. Also, this research focuses on implementing social distancing monitoring by monocular camera which is used for detecting people in videos captured by means of deep learning based real time object detection models [4]. A real-world dataset of video surveillance has been used to validate system performance for deployment [5].

The role of Remote Working in smart cities: lessons learnt from COVID-19 pandemic [10]. According to the study, according to hour per 100 employees, remote working can save at least four litres of fuel which is used for transportation and eight kilograms of carbon dioxide when managing energy and environmental challenges in European cities.

Smart Cities after COVID-19: Ten Narratives [11] with respect to challenges for cities and regions in Europe whose focus is on understanding the consequence of the COVID-19 pandemic would be felt by urban development policies and by smart-city development and also After COVID-19, smart-city development policies should see a boost in terms of winning and losing approaches.

3. Objectives

- To study and understand the COVID-19 impact on smart cities development.
- To overview the smart cities development in COVID era.
- To analyse the post COVID effect using fundamental aspects.

4. Development of Smart Cities- Post Covid

Our study is formulated in analysing the development of smart city after pandemic based on six fundamental aspects, which are used to evaluate the smartness of these urban areas, which includes Technology and Innovation, Health, Education, Mobility, Governance, and Environment. All these factors are analysed individually on how they have influenced on smart cities development [6].

4.1 Technology and Innovation

The impact of COVID-19 has intensely re shaped the pattern of life and work [7]. These new changes have resulted in emergence of new technologies and innovations which are urging the business to quickly adapt. This aspect of technology and innovation in smart cities development has its own impact on economy through the following areas. *Employment Creation:* During this pandemic the jobs in urban areas, which had no influence towards physical and mechanical man power got a large scope, especially the service sector which uses technology has created a lot of job opportunities, which will act as a contributor for economic of the nation [8] [9]. *Contribution towards GDP growth:* In India the technological industries in smart cities can achieve annual revenue of \$300-\$350 billion by year 2025. Indian IT industry is experiencing a fast-growing potentiality of business through AI - artificial intelligence, cloud, cybersecurity, and other evolving technologies, bestowing to research conducted by industry body Nasscom & international accessing board firm McKinsey.

Evolution of new product and services industries: The pandemic has made to learn and innovate new ideas which are converted into products and services, and even after post COVID, these industries are seeing a boom in its business. Multi layered face masks, sanitizers, face shields, anti defectant sprays etc are the products which have seen a large hope in its business and the enterprises in smart cities contributed the country's economy in larger way. *Workforce revolution:* The employees who are working in IT sector in smart cities that have been insisted to work from home during pandemic, and the same is being continued in the post pandemic era also which has bought the revolution in the employment norms with respect to human resource department is concern. *Business innovation:* The innovation in business plays a vital role after pandemic, since the business enterprise should be mentally and economically ready to face any further pandemic situation without affecting the smart city development.

4.2 Education

Education sector has benefited from the COVID-19 outbreak in many ways through online digital platform, which means smart education through online classes and this will be positive hope in building of smart cities through smart education. But yet it has become a burden to the economically weaker sections of the society who wants to learn in present education system. The uneven flaws in the education have driven considerable losses and inequalities in learning. This type of education system will not be a positive hope for development smart cities, as there will be imbalance in the literacy rate.

4.3 Health

The impact of epidemic is a global issue. It has caused serious impacts on social, political, economic and also healthcare sector concerning various smart cities in India. The COVID-19 has become a remarkable issue for many aspects of healthcare systems especially with regard to their overall willingness. The various programmes like public health surveillance were not really considered. In addition, the health sector was unable to administer the over work load on the frontline workers. Considering the formal situations of these smart cities, there were many new implementations in health care systems such as diversifying the huge patient numbers to remote care, increased focus on surveillance system and data analysis (3T- Track, Test and Treat) and also making necessary changes in political and legislative and health care systems.

4.4 Mobility

In smart cities development, mobility is a major sector that has been seriously affected by the COVID-19

outbreak. During the financial crisis, both passenger and freight transportation have been affected severely. Commuters have experienced significant changes in their daily travel habits and mobility behaviour due to the epidemic. As part of the pandemic lockdown, the mobility of smart cities was severely disrupted due to subsequent reasons: orders for forcibly stay at house, closed retail, & terror of contracting the virus, planning for any trip was purposely restricted during the lockdown. But as per post pandemic, there is the increase in usage of mobility in spite of people are switching to private vehicles, bicycles, or even walking as an alternative to crowded transportation.

4.5 Governance

In smart cities the governance has been seen a large disturbance in the management of COVID-19 to promote and prepare the institutional reforms. The post pandemic primary measure which had taken by the government was vaccination programs, an efficient, equitable, and rapid delivery of vaccines to a large number of people. The program must be well managed by the government, and the population must participate willingly. This brief is intended to provide a quick overview of some of the most important aspects of universal vaccination in terms of governance and institutional concerns. Apart from vaccination process, government has faced a various issues managing the economy, as the collection of various taxes were paused during pandemic, and now during post pandemic recovering of till up-to-date is a challenging been a factor.

4.6 Environment

In addition to its short- and long-term impact on smart cities development activity and the economy, COVID-19 and its response pose considerable long-term challenges. Economic drivers and regional consequences will greatly influence the long-term changes in environmental pressure. Environment had its own pros during COVID era, now which has become its cons, as the quality of water was enhanced because the pollutants in the water bodies was minimized during COVID era, but in post COVID era it was not able to maintain the minimal rate of pollutants in the same water bodies. The emission of harmful gases like CO₂ and CH₄ from vehicles were minimized during COVID lockdown, as the part of post COVID these harmful chemical gases have started increasing and reached back to old stage. But the agriculture sector has faced a positive impact on with respect to post COVID era as the crop production and agricultural activities were accelerated.

5. Conclusion

In our analysis of smart city projects in the outcome of the COVID-19 pandemic, we considered the pillar areas

that were positively and negatively affected in various ways. Our study briefs you with an overview of the impact on these areas, here technology and innovation area has a greater positive impact, Educational area has majorly positive impact but with minimum negative impact on weaker sections of the society, Health sector had seen a positive impact in its field after post COVID, Mobility or the transportation sector had seen a worst impact early in pandemic stage, but in post pandemic the same sector is struggling to bounce back from negative to positive impact, Governance is a sector which is under pressure in all stages of pandemic during the management of various administrative processes, this sector continues under negative impact till the pandemic ends. Environment is the sector where there was an improvement during pandemic, but in post COVID era this sector is facing reverse development. After discussing all the factors which impacted on the development of smart cities during post COVID era, a separate individual study can be carried out on each aspect.

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