

# Use of Technology and Development Strategies in Creating Safe and Smart City: A Case of Lucknow

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**Abstract**— Smart city are the need of the hour because currently we are facing social and environment issue. It is also proved in current studies that very less focus is given in development strategies of city which help in creating safe environment in our urban hub. While creating strategies for smart city policy maker focuses on or their concern was on transport, governance, education, industry, energy and environment. Safety became a sideline in the development process.

The safe city concept includes mechanical surveillance, centrally managed policing, technology for crisis management. These all aspect and related technology focuses on the post event of the crime occurred at any place. Today, the need is to create development strategies and technology such that criminals avoid doing any crime in public space. The built form of cities and technology should be such that it prevents beforehand in occurrence of crime at public place. In this paper gap is identified and various ways to prevent crime at city level through the use of technology and city planning and designing is explained. At the end of the paper few development strategies and recommendation or creating safe and secure environment for the resident is formulated and elaborated in the paper.

**Index Terms**— smart city, safe city, built environment, perception survey.

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## I. INTRODUCTION

Smart city is an urban area which created flexibility, efficiency and sustainability with the help of information technology and telecommunication, this upgrades the urban management system and it helps in developing safe, green and easy functioning city. Lainak & Ristej explain smart city “It is a integration of technology and natural environment, it increases the effectiveness of processes in every field of its functioning, in order to achieve sustainable development, safety and health of inhabitants with the aim for increasing the quality of life of citizens, near community and environment”. Smart city project started in 1993, when Amsterdam started their digital city project to attain the sustainability in their city.[1] Then in 2004 soth koreaq started their u-city project. There are many cities are using AI and ML to improve their street in western world, For example Philadelphia uses low cost imaging device to take the picture of their street covering 30 feet and after that through ML it analysis by itself

by reading the image and prepare 5 year plan for road improvement. This city also uses AI in monitoring the trash bin in the city. Philadelphia also uses a cloud based ML tool for identifying the illegal trash dumping in the public space by the users. It automatically segregates the video clip and photograph of the trash dumping activity and send it to authority in charge. These AI and ML has been also used in doing the surveillance of the public space, which eradicate the use of human resource sitting in front of the multiple screen all the time. All these initiative helps in taking the steps after the crime has been occurred. There are many other countries who also runs safe city program in their countries. A holistic approach is needed to reduced crime from any area.

### 1.2 Safe city program:

Safe city program works holistically to eradicate the crime from the area. According to safe city program a city should be emancipate all types of crime from the society [2].The built form should not create an environment to conduct criminal activity by the offender. The built environment should be help in maintaining the local’s prosperity. The citizen should feel that they are residing in the safest, joyful and prosperous environment. This situation can be achieved through few objectives which are.



Fig.1 Safe city initiative, source [2]

- 1.Area should be free from any criminal activity against people and against movable or unmovable property
- 2.Area should be prepared for any kind of natural or man-made calamity
- 3.Area should have maintained their social and moral integrity
- 4.Area’s street should be designed and planned for any accident.
- 5.Area’s citizen should be sensitive about their surrounding safety and they knew about the different initiative and legislation for people’s safety.

In Malaysia a safe city program is running from 2004. In this program they have identified 23 step to convert their city into safe city. These 23 step are majorly focusing on target hardening, environmental design strategies, maintenance and management and by disseminating of knowledge by public awareness program or social activity (refer Fig.1). To run this program many government and non-government agencies were involved like planning department, local

development authority, Malaysian crime prevention foundation, police department and many more. The safe city program is started in 38 cities or district of the country. This initiative involves separation of motor vehicle and pedestrian pathway. Installation of bollards and gate, cleaning and maintenance of small and hidden spaces which are major not in the public sight. Installation of lights in dark areas. The second strategy of Malaysia safe city program is intensifying the police patrol on hot spot using G.I.S based mapping for . The third important strategy is implementation of CPTED.

Safe city project also has been adopted in south Korea since 2008, it is called as u-Seoul safety service. It is a location based technology and also uses the network of CCTV to assigned authority if any one is in distress, it connects to the family member immediately so that help can be provide3d and people can be connect to the person who is in need of help. A system is created for children and patient of Alzheimer, if they leave their designated area or zone which is safe for them , then an immediate information is send to the assigned person and rescue team. This system is a mobile based service. Multiple input and multiple output(MIMO) is also use to identify the missing child as soon as possible.[3][4]

Safe city initiative was also promoted by the government of India. In this initiative, government has identified some indicator to analyze the livability, sustainability, inclusiveness, tolerance and use of technology of a city in its development. The vision of this initiative to study the public safety because good governance and safety of the citizen is the primary function of government. The outcome of this initiative is envisage as it will help in building safety by reducing urban vulnerabilities, it will in building safe urban environment with the help of governance, planning and management and lastly it will improve governance of safety.[5] The Bureau of police research and development has identified eight indicator of safe city which are,

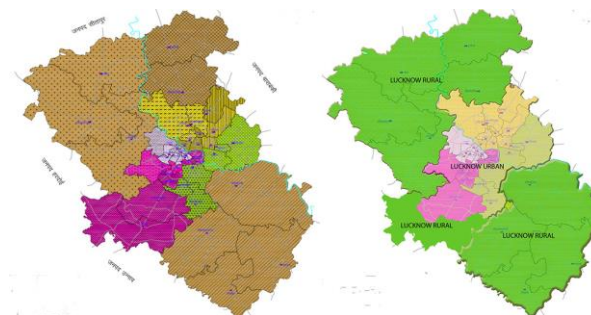
- Personal safety indicators
- Social- economical security indicators
- Institutional safety indicators
- Traffic and road safety indicators
- Digital security Indicators
- Infrastructure Security Indicator
- Health and hygiene Security Indicator

Infrastructure to Cope with pandemics



## II. CONTEXT

Lucknow city is capital city of Uttar Pradesh, which is India's most populated state. Uttar Pradesh has approximately 59.1% of conviction rate which is the highest among the all state of India, and this rate is just double of conviction rate of India which is 26.6%. Crime is one of the major issue which Lucknow city is facing, approximately 2-3.5% of total crime of India occurs only in this city.



Lucknow district has been divided into two parts urban Lucknow and rural Lucknow. The Urban Lucknow again divided into 34 Thana boundary area, which area Hazratganj, Husainganj, Gautam Palli, Mahila Thana, Alambagh, Manak Nagar, Para, Krishnagar, Sarojnagar, Banthara, Wazirganj, Chowk, Thakurganj, Kaiserbagh, Aminabad, Naka, Sadatganj, Bajarkhala, Talkatora, Aliganj, Madiyaon, Jankipuram, Mahanagar, Husainganj, Vikasnagar, Gajipur, Gudamba, Indiranagar, Chinhat, Gomtinagar, Vibhuti khand, Cantonment, Ashiyana, S.G.P.G.I. Among these 34 gomtinagar register every year most number of crime and Indira nagar register least number of crime every year.

### III. LITERATURE STUDY

Quantification is needed while analyzing the existence or status of safety indicator of a city. The safety is based on 4 important point which are PREVENTION, DETECTION RESPONSE AND RECOVERY. If only personal safety is the prime focus of analysis, then understanding of what are the preventive strategies has been implemented to reduce the vulnerability against the people is a starting point of study. The reliable and a comprehensive step which has been taken before hand to avoid any type of offence to be conducted in the area will come under preventive strategies. This is the essential requirement or practice of governance to make people feel safe and secure in the environment[5]. Altering the built environment is main preventive strategies to avoid any type of crime from an area. Simulation can help to know where alteration is needed in the built environment to avoid crime. Apart from simulation, few forecasting technology is also there which works in predicting the spaces where can be conducted in the future. Detection for citizen safety is very important tool for creating of safe environment. The detection in public safety can be conducted by analyzing the data collected from various department and then an early warning can be given to authority. The department which can play major role providing the data can police department, transport department, social media etc. the third important indicator is response, in this indicator the key organization which are meant to respond at the time of emergency or threats is examined. How those key player is responding to any event, how much planning they have done or how much thought process has been given to envisage any situation which they need to confront in the future and how much they are prepared for it. Use of information, communication and technology can help in sending the message to the right authority in very limited time period.[6] The fast and clear communication is major aspect of Response indicator of safety. The last indicator is Recovery, in this post event activity is analyzed. The assistance given to the victim, data received from the spot of crime, search of the suspect and even rescue operation will be judged under recovery indicator.[7]

The personal safety and security indicator can be bifurcated into 7 major heads under which personal safety needs to be checked. The 7 major heads are: safety from violent crimes, safety from property offence, children and women safety, senior citizen safety, safety of children in education institute, safety of women at their workplace, safety of vulnerable section. Various technology related to four indicator of safe city is mentioned in table 1

S NO.	Indicator	Technology
1.	Prevention	Built assessment through simulation, use of AI and ML will help in Random forrest, gradient boosting, hot spot analysis, near repeat method, Risk- terrain analysis, spatiotemporal study
2.	detection	Perimeter intrusion detection

		system(PIDS), Automated Plate number identification, biometric verification, CCTV
3.	Response	SatNav, GPS, GIS,
4.	recovery	CCTV,

#### IV. METHODOLOGY

This research is using mixed methodology because the aim of this research is to understand the people's perception of safe city indicator and its impact on occurrence of crime in the area and prevention of crime in the area. complementary methods are utilized to achieve the aim of the research. Lucknow city which also one of the identified city for regeneration program to reduce the crime from the city, has been used strategies of safe city initiative and their strategies.

Case study research can contribute to the existing knowledge base for specific reader, group or researcher.[8] This case study research is a single unit case study research, to achieve the aim and objective through single unit case study, it requires data collection from the site, some information for cross analysis of the relationship of the indicator.[9] To fulfill the aim, the survey questionnaire also quantifying the age, gender and length of their residency in the area and city and this will become the basis for the survey to test the three hypotheses through people's perception, the hypotheses are:

H1 1: Women and girls think that use to technology in prevention, detection, response and recovery will help in reducing crime from area

H1 2: Teenager think that use to technology in prevention, detection, response and recovery will help in reducing crime from area

H1 3: citizen staying in the city for more than 10 years think that use to technology in prevention, detection, response and recovery will help in reducing crime from area

And the correspondent null hypotheses of the above mentioned are:

H0 1: women and girls think that use to technology in prevention, detection, response and recovery will help in reducing crime from area

H0 2: Teenager think that use to technology in prevention, detection, response and recovery will help in reducing crime from area

H0 3: citizen staying in the city for more than 10 years think that use to technology in prevention, detection, response and recovery will help in reducing crime from area.

A chi square test was run for age of the citizen, their gender and the length of the residency in the city.

The prepared questionnaire was survey in all Thana boundary of the city. The survey type was used stratified sampling survey to gather the perception of resident of all Thana boundary area.

the questionnaire was prepared in English and Hindi as well and questions were asked in the language in which responded are comfortable.

## V. RESULT AND DISCUSSION

In this study a total 67 surveys were collected. From the total number of survey most responses were i.e. 38% of response were belong to age 30-40 years. Least number of responses i.e. 14% responses were from the age group 18-25 and 15 % responses belong to age group 50-65. From the total number of survey 40% of responses were collected from male and 60 % of responses were collected from female. 47% of population at least staying in the city from past 10 years or more. The result of chi square test represents that specific gender and their perception on use of technology in creating safe city has no relationship that that means that first hypotheses is not valid. Test also shows that it also not ages specific that same group person feels that they think that use technology will help in creating safe city. The third test also represent that residency period doesn't affect their perception on use of technology in creating safe city.

All four factors of safe city indicator considered for the study and through this investigation space users and profile of the organization were studied. The study promotes the use of technology in creating safe environment.

Table: 2 result of perception survey

Sno.	questions	Perception	score
1.	Do you feel safe in the city?	poor	2
2.	Technology can improve safety of the city?	fair	4
3.	Is there any role of built environment in creating safe city?	good	3
4.	Role of technology in prevention of crime	fair	4
5.	Role of technology in detection of crime	good	2
6.	Role of technology in response to the crime	Fair	3
7.	Role of technology in the process of recovery	fair	3

## CONCLUSION

- People think that use of technology in creating safe city will be helpful and this perception is not limited to any age gender or their residency in any city.
- For creating safe city there is lot of understanding to this concept is needed among the government authority and governance body.

- Functional role of each stakeholder should be identified and informed about the safety and security of the citizen.
- The safety and security of a city can be achieved through proper planning and by creating a developing road map of activities by which safety of the citizen can be ensure.

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