

## **Role of Residents in Shaping Jaipur as a Smart City-A case study**

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**Abstract :** There has been much talk about ‘Smart’ or ‘intelligent’ cities these days. All around the world government officials, administrators and technocrats are working as a team to design an intelligent city that will provide an easy and better life to the people living there. But going through the literature it is observed that development of smart cities included latest digital technologies but with least involvement of the residents. So it seems that people are beneficiaries of these programs but are not given a chance to decide themselves what they want in their city. In our research we have tried to highlight the necessities and merits of citizen participation in development and growth of smart cities. A survey was carried out through questionnaire about citizen participation in transforming Jaipur as smart city. The key findings have been discussed. The paper also identifies few considerations that could be included in smart city programs for better involvement of citizens. The impact of residents in shaping future cities is found to be fruitful.

**Keywords:** Citizen Participation, Residents of smart City, Smart Cities, Smart citizens, Smart city project

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### **I. INTRODUCTION**

The idea of ‘Smart Cities’ has gained popularity worldwide [1]. This term ‘smart city’ has been applied to a city where technologies can speed up the flow of things and reduce the physical frustrations of city life [2].

But smart cities cannot be built simply by providing latest digital technologies. The designers of smart cities have often faced criticism since they are too concerned with hardware technology rather than with people. They have been also targeted for not focusing on the technologies that can solve pressing problems and testing solutions out in the real world. As a result, many smart city ideas have delivered high costs and low returns and were unable to fulfill their promise. So it is high time that the leaders respond to citizens’ suggestions and think beyond software, hardware or social media and reexamining the culture and organizational structures of cities. Many city governments are now trying to reap the full potential of new digital technologies along with citizen’s engagement. They are looking for solutions that involve the public in both shaping technologies and implementing them.

Smart cities of the future will combine the best aspects of technology infrastructure and citizens participation who power them. Our research mainly highlights how can these works in practice? Using digital technologies is it possible for cities to harness the power of citizens effectively? We carried out the research with following aims-

- First carrying out an in depth literature review related to our research.
- Secondly doing survey on citizen participation in smart cities through questionnaire in Jaipur city
- Thirdly try to highlight how citizen involvement in building smart cities can be enhanced.

For this reason, the aim of this work is to investigate about the evolution of smart city with the key role of the residents. To accomplish with this goal, we first carried out a large literature survey aiming to identify definitions about smart city and the role of citizens living there and then a research methodology has been framed to carry out the objectives. The final output of this work is a deep analysis of role of citizens in framing smart cities.

### **II. JAIPUR PROFILE**

Jaipur is the capital of Rajasthan and is also known as the ‘Pink City’. It has a total population of 3046163 and is spread over an area 484.64 sq.km. This city is a tourist place and also has a growing IT sector and an international airport. Jaipur city has a good economic growth which makes it a good place for investment, for getting good job opportunities, for educational and training activities. It has a pretty good and rising infrastructure status. It is working towards maintaining a good environment and health facilities for its citizens.

### **III. OBJECTIVE**

The main objective of the research is to study the role of the citizens in making of the smart cities. To achieve main objective following sub-objectives were set:

1. To study and find out the role and participation of the citizens before the formation of Jaipur as a smart city.
2. To assess the thoughts and ideas of the citizens while the making of smart city.
3. To identify the role of citizens in the policy making of the smart city.
4. To focus on the role of citizens after the formation of a smart city.
5. To study the benefits related to the involvement of citizens while making up of a smart city.

### **IV. LITERATURE REVIEW**

The concept of smart city pops up along with the urban development. For many people the life of city is full of pollution and filled with fear of crime and isolation but these can be changed by smart computing [3]. Thus traditional cities can be transformed into smart cities with the use of latest technology [4].

A smart city is a city which functions in a sustainable and intelligent way was defined by Hancke and Hancker to ensure sustainability and efficiency [5]. According to IBM report [6] the term smart city is interpreted as high tech city that has all the facilities that can make life better. But to maintain it we need accurate real-time information to improve and maintain the facilities.

Tranos and Gertner also described smart cities that have special characteristics that include digital infrastructure that leads to urban development. It included the agenda of social involvement via e-governance [7]. Caragliu et al [8] emphasized the role of ecological, social, cultural, and economic challenges to make a smart city. His review article highlighted the various angles of the smart city. Forrester defined the smart city as a city that uses smart technologies to design infrastructure and services of a city. This he rightly said in the context that past fifty years, people have been moving from the villages to the city. This has created several urban problems such as traffic, pollution, waste treatment and so on.

Nam and Pardo [4] in their paper discussed several models to make an information technological sound city. They highlighted that major features of the city can be connected through three main dimensions: technology, human, and institutional. They laid stress on relationship between government and citizens to make information sound city. Mitchell also said in his article that combining software and telecommunication networks, sensors, and identifiers creates intelligent cities [9].

Lombardi laid the major dimensions of a smart city that includes smart governance, smart human capital, smart environment and smart economy [10]. Dameri showed that to improve the urban quality of life, a strategy that is well discussed is needed. To support this strategy, technology plays a key role [11] that will lead to increase quality of life, delivering better public and private services. According to Kingston et al an intelligent city aims to collect knowledge and experience in the form of electronic government, planning systems and citizen participation [12]. The concept of a “cognitive city” was given in the paper by Mostashari et al. They described it as an environment where citizens learn and respond to any change and also adjust themselves [13].

According to article on Smart city platform during the process of developing a smart city citizens should not be left behind. This will satisfy the residents and give fruitful results. Emiko Jozuka has rightly said in her article [14] that smart cities present a vision of future as a perfect place where people will be in harmony with urban environments. She gave the examples of Masdar city in Abu Dhabi and South Korea’s Songdo which are very techno advanced cities. But these cities didn’t have success stories because these were designed by technocrats with little involvement of residents.

Tom Saunders et al. [15] in their article ‘Is there a role for citizens in India’s smart city challenge’ highlighted that citizen participation is one of PM Modi’s five key instruments to make a smart city. This area all around the world has been given least weightage. They have also provided various factors necessary for citizen participation and how can residents be engaged in shaping smart cities.

Cisco’s Menon [16] says that if cities are to fill the gap between need and resource both officials and residents must collaborate to develop a creative solution. Kendra L. Smith [17] also wrote in her article that residents must hold city leaders accountable for their efforts and their implications regarding development of smart cities to improve everyone’s life.

### **V. RESEARCH METHODOLOGY**

The research process was marked by moments of reconsideration, which led to refinements of the research design and influenced the methodology strategy of how to carry out this research. In order to achieve any goal, finding the approach to reach the goal is most important stage of work. In order to extract true conclusions we need a systematic solution of the research problem.

The most influencing factor was the desire to attain a broad picture on the involvement, participation and manipulation of and by the citizens in development of smart city Jaipur.

**Hypothesis-**It is assumed that the involvement and participation of the citizens will help in making Jaipur a smart city. It is also assumed that this will led to a huge upgrade in the knowledge, skill, education and lifestyle of the citizens.

In this research, the building of a smart city and its sustainability are dependent variables whereas the independent variables are citizens' thoughts and views, their effectiveness and requirements. Since the main objective of this work was to study the various thoughts and ideas of all the citizens in making of a smart city, so we used quantitative methods in order to discuss the various points. As the goal of this research is studying the role of citizens and try to find out the answers to the various practical questions, hence we can say that our research is an applied research. There are five primary research strategies, in the social sciences: experiments, surveys, archival analysis, histories, and case studies. The type of our research is explanatory and the aim of the study was to collect answers from various citizens of different cultures of the Jaipur city. In order to formulate the answer of the formation of the smart city, we have mainly chosen survey in form of questionnaire as our research strategy.

Components of the questionnaire:

The questionnaire which has been used in this research consists of general and specific questions and an attached letter.

- Letter:

The questionnaire was accompanied with a letter to describe that what purpose the survey was conducted. Both the letter and questionnaire were subject to much effort to make the questionnaire appealing to the respondents. Also the importance of friendly cooperation of the respondents in fulfilling the questionnaire has been explained in this letter.

- General Questions:

This section includes 7 questions concerning socio-demographic information of respondents such as name, age, gender, address, profession, contact number and date.

- Specific Questions:

This section includes four parts. Part 1 consists of 4 questions regarding basic awareness of smart cities; Part 2 having 12 questions concerning feedback related to citizen participation in smart cities, all of them have been considered to investigate and examine the attitude and views of respondents about research question with 5 point Likert scale; Part 3 consists of questions on general feedback by the citizens towards the various ideas of the smart city, all of them have been required to answer in yes or no; Part 4 consists of questions that identify which "smart city" projects are visible to the citizens and are examined on 5 point Likert scale.

## **VI. KEYFINDINGS**

The review work done has been provided in the literature review. The following points highlight the outcome of the review work-

- There has been search for a new culture in the cities where residents are no longer passive consumers of services but participate actively to improve the planning and operation of their cities.
- In order to manage city services in more responsive way citizens are generating data in real time. For example, Singapore's citizens use Beeline app [18] that allows residents to book seats on buses run by private operators in areas that are not served by public transportation.
- Also the app developed by the Government Digital Services team at Singapore helps operators to predict demand and in turn improve bus schedules and routes.
- In Boston, residents use smartphones to track road defects [19]. This allows municipal authorities to detect potholes and other road issues, enabling them to make better decisions about roads.
- With PetaJakarta[20], an online open-source platform collects information about floods with the help of residents so that emergency management services can work in an effective manner.
- Madrid while working with IBM has developed a platform that collects data from feedback given to them by citizens or vendors in order to track the supplier's performance.
- The data generated by their inhabitants also help cities to make improvements to the quality of life, as Boston city has been able to reduce traffic jams.

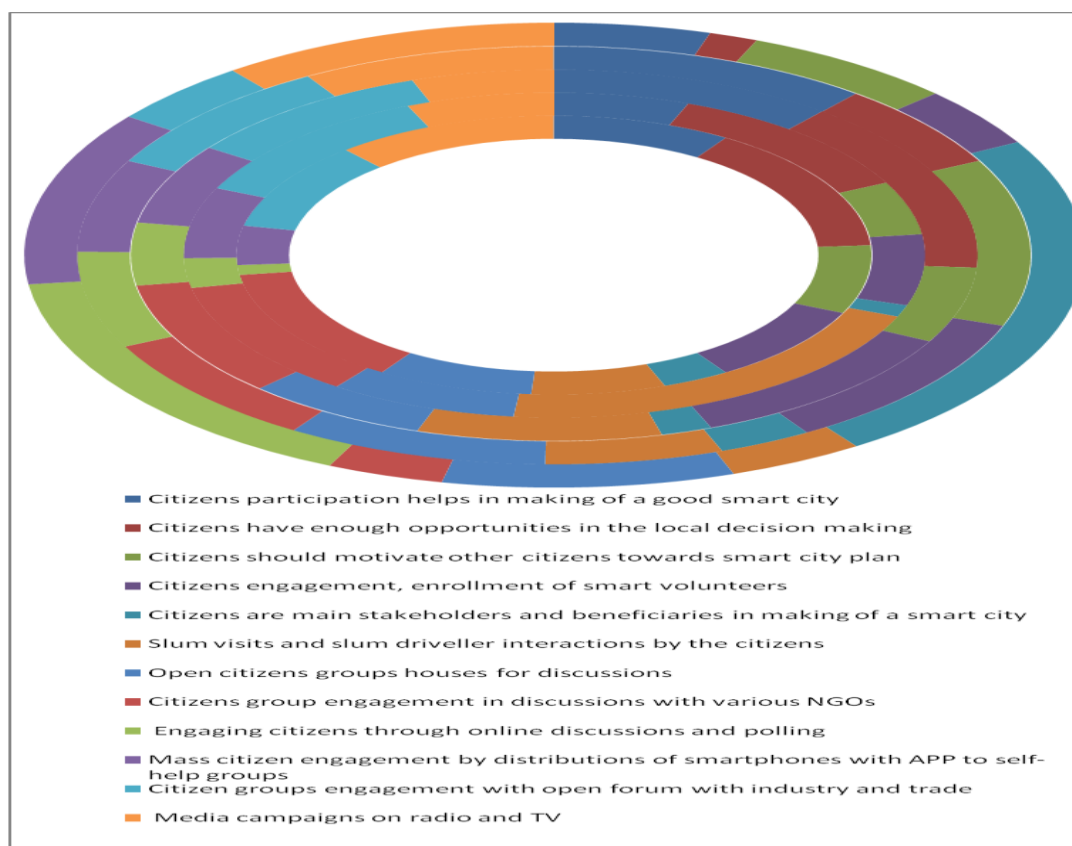
These are some of the examples that various governments' world over have taken up to maximize resident involvement in building smart cities.

The survey was conducted among 3654 citizens of various areas of the Jaipur city and the questionnaire was sent to the various households. Among the 3654 citizens 34% were youths, 46% were middle aged people, 20% were old aged people, 64% were male citizens, 36% were female citizens.

**Table 1: Citizen Participation feedback**

QUESTION	YOUR OPINION				
	1	2	3	4	5
Citizens participation helps in making of a good smart city	8%	10%	28%	38%	16%
Citizens have enough opportunities in the local decision making	13%	20%	39%	23%	5%
Citizens should motivate other citizens towards smart city plan	7%	9%	17%	45%	22%
Citizens engagement, enrollment of smart volunteers	8%	12%	29%	37%	14%
Citizens are main stakeholders and beneficiaries in making of a smart city	3%	2%	5%	11%	79%
Slum visits and slum driveller interactions by the citizens	6%	35%	24%	21%	14%
Open citizens groups houses for discussions	7%	14%	18%	31%	30%
Citizens group engagement in discussions with various NGOs	12%	20%	26%	30%	12%
Engaging citizens through online discussions and polling	1%	5%	14%	26%	54%
Mass citizen engagement by distributions of smartphones with APP to self-help groups	4%	12%	18%	25%	41%
Citizen groups engagement with open forum with industry and trade	9%	20%	25%	31%	15%
Media campaigns on radio and TV	10%	11%	14%	30%	35%

\* 5 being most satisfied and 1 least satisfied



**Figure 1: Citizen Participation feedback**

In part 1 of the questionnaire

- Most of the citizens of Jaipur city describe smart city as a city that make use of various latest technologies and as a city which is technological sound city.
- Few people however described smart city in terms of livability, workability and sustainability.
- Very few knew nothing about smart city project.
- Nobody actually considered present Jaipur city as a smart and innovative one.
- In opinion to make your city smarter or more innovative, most of the citizens had different views. These included good availability of public transportation, proper sewage system, availability of nice public parks and open spaces, pollution free environment, more job opportunity.

In part 2 of the questionnaire,

- Citizens highly valued the making of their city a smarter one.
- Jaipur citizens felt that they do not have enough opportunities in the local decision making
- They believed that other residents should also be motivated towards the making of Jaipur a smart city.
- Most of Jaipur citizens agreed to the enrollment of smart volunteers.
- Maximum Jaipur citizens believed that citizens are main stakeholders and beneficiaries in making of a smart city
- There was mixed reaction to slum visits and slum dwellers interactions by the citizens.
- The citizens highly valued discussions with various NGOs and open houses.
- Most of the citizens agreed to engage citizens through online discussions and polling in framing Jaipur as smart city.
- Citizens believed that distributions of smartphones with APP to self-help groups will enhance the smart city project.
- Citizens believe that there should be proper campaign on TV and radio about smart city campaign and project.

**Table 2: General Feedback**

QUESTIONS	YES	NO
Have you been asked about creating a vision for city?	18%	82%
Have you been asked for detailed solution to key pan-city issues?	27%	73%
Will the privacy of the citizens be affected because of smart city program?	28%	72%
Have you been a part of the open citizen discussion forums?	38%	62%
Do the citizens provide feedback on potholes, uncollected waste or supplier performance?	26%	74%
Have you been asked about development opportunities and issues in each core sector?	52%	48%
Have you properly understood the various smart features of the smart city?	55%	45%
Is there is focus on accident reduction?	67%	33%
Is there a better road network and connectivity?	25%	75%
Are the citizens willing to share data and provide feedback?	79%	21%
Is there sufficient availability of the local public transports?	89%	11%
Is there a control on the unauthorized water connections?	40%	60%
Is it necessary for government to promote transparency in every function of government offices to grow faith and better in involvement of citizens?	84%	16%
Is there any improvement in the transport of waste?	66%	34%
Do residents use smartphones to track road defects?	28%	72%
Do you feel that maximum residents feel less engaged with smart city projects?	67%	33%
Will the smart cities be more expensive to live in?	51%	49%
Will only younger generation be able to enjoy all the benefits of a smart city?	43%	57%

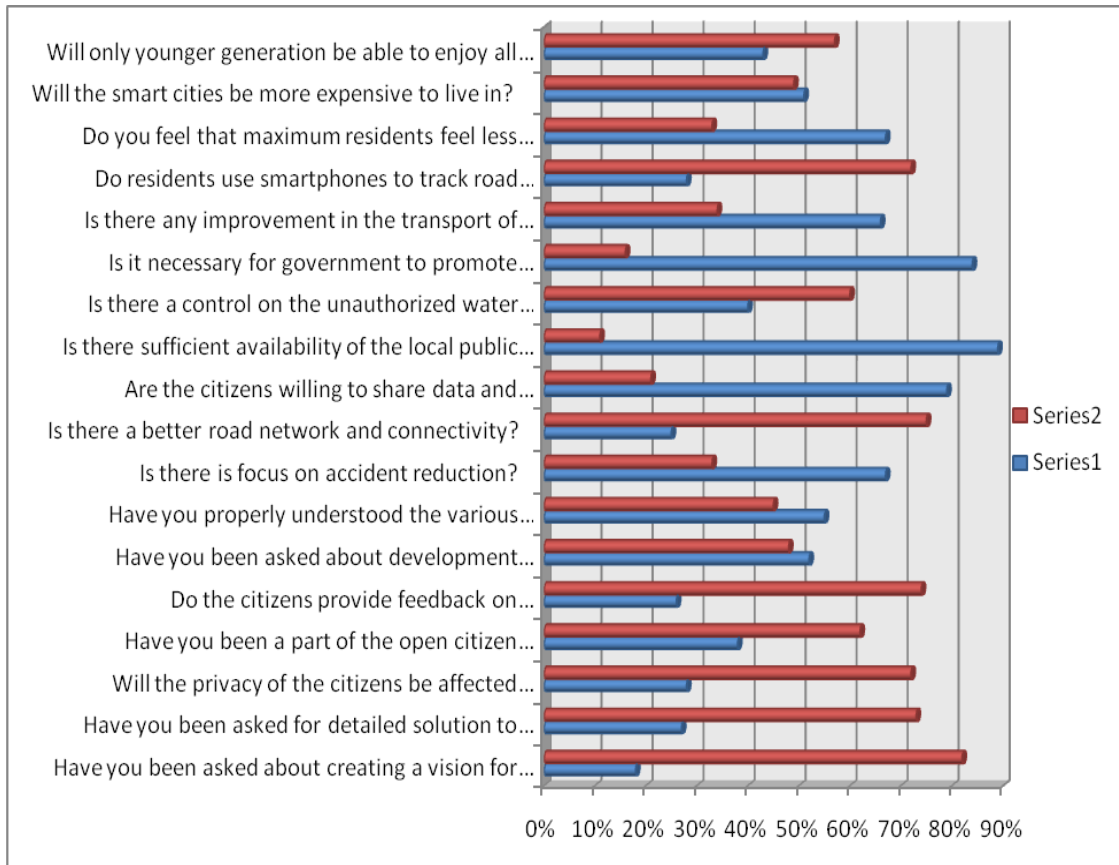


Figure 2: General Feedback

In the general feedback,

- Citizens of Jaipur indicated that they have never been asked for creating a vision for their city nor they have been asked about pen-city issues.
- The citizens identified that their privacy will not be affected because of the smart city program.
- Maximum citizens did not bother to provide feedback on the pot-holes or waste collection. However they were willing to provide feedback if proper action was taken.
- In answer to basic amenities like transport most citizens feel there is scope for improvement.
- Maximum feel that they are less engaged with the smart city project.

In part 4 the smart city project,

- Most of the citizens were unaware of the smart city projects.
- Some have only heard the name smart city.
- Very few knew about smart city projects that were in progress.
- Most of the citizens wanted to know the activities related to their basic needs such as pollution, health, population, water, education, etc.
- Citizens were concerned mainly about energy requirement fulfillment, pollution control measures taken, education and skill development and waste disposal and sanitation; but they were least aware of the projects being undertaken to improve these facilities in process of building smart cities.
- Only few percentages were satisfied with the results in these areas.
- Most of the Citizens were satisfied in areas like transportation, city governance, recreation etc.
- The main reason behind the lack of awareness about smart city project was that it was not publicize properly.
- It did not discuss or involved people in carrying these activities.

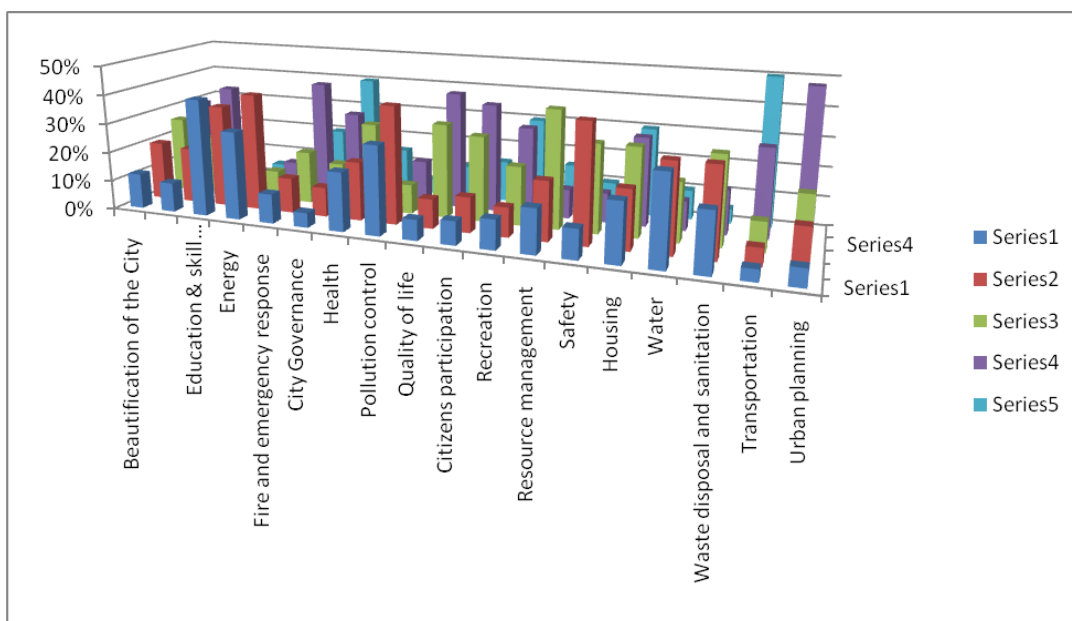
**Table 3: Smart city projects**

Question of this section identify which “smart city” projects are visible to the citizens.						
Indicate which of these general sectors relate the projects about smart city project you know of?	My city is working on following projects	I’m satisfied with the results of these areas				
		1	2	3	4	5
	Beautification of the City	12%	20%	26%	30%	12%
	Digital infrastructure & e-services	10%	19%	20%	36%	15%
	Education & skill development	40%	35%	15%	5%	5%
	Energy	30%	40%	10%	10%	10%
	Fire and emergency response	10%	12%	18%	40%	20%
	City Governance	5%	10%	15%	30%	40%
	Health	20%	20%	30%	15%	15%
	Pollution control	30%	40%	10%	15%	5%
	Quality of life	7%	10%	32%	40%	11%
	Citizens participation	8%	12%	29%	37%	14%
	Recreation	10%	10%	20%	30%	30%
	Resource management	15%	20%	40%	10%	15%
	Safety	10%	40%	30%	10%	10%
	Housing	20%	20%	30%	30%	30%
	Water	30%	30%	20%	10%	10%
	Waste disposal and sanitation	20%	30%	30%	15%	5%
	Transportation	4%	6%	10%	30%	50%
	Urban planning	6%	14%	20%	50%	10%

If no...

Do you think that your city is not adequately publicising its activities?	
Is there some other reason for not being aware of your city’s projects?	
About which activities your city should inform more?	

\* 5 being most satisfied and 1 least satisfied



**Figure 3: Smart city projects**

## VII. DISCUSSIONS

It is clear from examples provided in key findings that if citizens can provide feedback on potholes, uncollected waste or supplier performance, they may also expect to be able to raise their voice for bigger issues.

From the survey carried out in Jaipur city through questionnaire it was found that citizens of Jaipur are aware of smart city concept. They believe that their participation would have a positive impact on making Jaipur a better place to live. However, there are very few opportunities for the people to take part in local decisions.

Based on above inputs, it is design a citizen engagement model for success of formation of smart cities with smart residents. Simply giving latest technology and opening up access to data will not involve citizens wholly to build smart cities. This means beyond software, hardware or social media there is need for reexamining the nature, culture and structure of government.

We suggest few considerations that could be included in smart city programs so that there is greater involvement of the residents:

- It is clear that citizens are willing to share data and provide feedback but success lies on the fact how well these data are analysed and applied to sort their problems. Cities will be smart only if someone responds to the complaint.
- It is true that technology is a powerful tool to connect residents but its value will only be meaningful if cities can develop a culture based on partnership and collaboration i.e. shifting citizens from passive consumers to active participants in shaping the city's future.
- Maximum residents feel less engaged with smart city projects than they do with other services of the city. So leaders must try to involve citizens in long term projects of the city and city budget. They should look beyond the apps and find more direct involvement of citizens in the political process.
- While citizens show willingness to share their data with cities, there is fear in their minds about misuse of the data. So a robust governance framework is necessary for protecting privacy. This will increase citizen involvement.
- It is necessary for government to promote transparency in every function of government offices to grow faith and better involvement of citizens.
- Thus it is seen the path toward citizen engagement will not be easy. Digital technologies enable citizens to engage with cities, but in doing so they also stir up the working of government, forcing leaders to work according to citizen requirement in running city services and embrace new, innovative approaches. This kind of openness can be threatening to leaders. But they must go mentally from being threatened to recognizing that this can help it. The cities that will adapt to this new world, the rewards could be rich. This will make cities smarter, more environmentally sustainable and ultimately more appealing places to live.

## VIII. CONCLUSION

Thus we see citizen involvement must be much more than a ceremonial participation. Smart people must involve themselves in the definition of the Smart City. They should take decisions to obtain smart solutions, implement reforms, doing more with less and oversight during designing post-project structures in order to make Jaipur, the Smart City.

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