

# ROLE OF INTERNET OF THINGS IN SMART CITIES: A CASE STUDY OF JAIPUR CITY, RAJASTHAN

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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. As now there is Smart Cities Mission is going on the cities which are declared by the government. Smart City Mission, is an urban renewal and retrofitting program by the Government of India with the mission to develop 100 cities across the country making them citizen friendly and sustainable. According to my survey on Smart cities of State Rajasthan a big role was played by telecommunication, internet, Road Transportation, Railways including Metro in Jaipur and also Physical as well as Cyber securities.

**Keywords—** Internet of things (IOT), Smart Cities, Industries, Education, Transportation.

## I. INTRODUCTION

The term “Smart City” is very much popular throughout the world. It can be defined as the city in which the use of technology is increasing rapidly, not only in commercial or industrial purpose but also in House automation it is playing vital role.

Technology doesn’t mean any gadget which can be accessed by remote. It refers to the combination of electronics, software, sensors and human interest to make a best out of it.

As smart city cannot be built by political decisions or any kind of citizen involvement, it can be built up by the new technologies which are reducing human efforts and increasing the efficiency of the work. As other factors also plays important role but major role is played by technologies. In this research we carried out various aspects of internet of things on smart cities of Rajasthan:-

- First we will be sharing pros and cons of internet of things on the smart cities.
  - Secondly what is the review of public or citizen on the rapid use of technology in smart cities?
  - Thirdly what is the conclusion of the above research?
- So by this research the main aim of the work is to investigate the role of internet of things in the evolution of smart city.

## II. OBJECTIVES

To achieve the objective i.e. internet of things used in Cities we followed some sub-objectives:

1. To find out the development of Cities in terms of Digitization.
2. To verify whether that digitization is helping the citizens.

3. To focus on the various projects which will be the combination of human and technology.

4. To discuss the demerits or the problems which will be faced by cities during the period of becoming Smart cities.

## III. AJMER PROFILE

Ajmer is one of the most oldest and historic city of Rajasthan. It is the Centre of the Rajasthan. Ajmer district has an area of 8,481 Km<sup>2</sup> with a population of 551,101. To make Ajmer as a smart city government invest and passed a budget of Rs 1947 Cr (Inr).

## IV. LITERATURE REVIEW

There are three National Highways connecting Ajmer to different cities and states, also eight state highways are connected which gives the huge amount of revenue to the government.

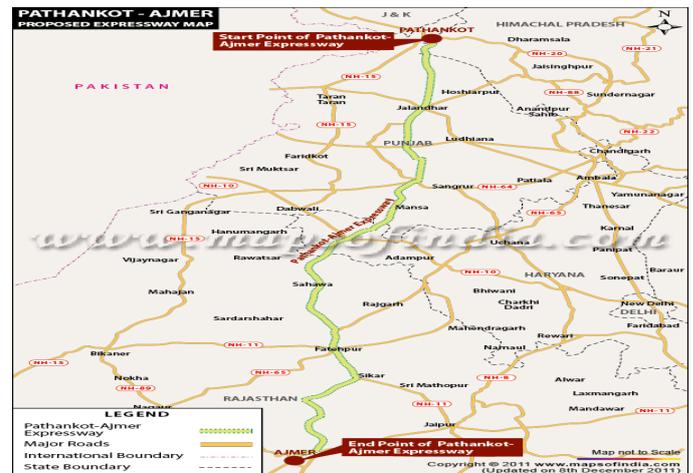


Figure 1. Expressway connecting to Ajmer and Pathankot

As we see that now a days all the system at toll plaza is computerized and it makes the work simpler for everyone, although its investment cost is much higher than that of man-made setup but in the ways of security and efficiency it is best. Also Nagar Nigam of Ajmer has launched Ajmer-311 application through which the citizens of Ajmer can complaint about any social or civic issue. Moreover many MNC’s are investing in Ajmer such as there are more than six lavish malls are situated so it increases employment. And in last Airport at Kishangarh is the major reason for the consideration of Ajmer

as a smart city because an airport requires a large network control and especially if it is an international airport, it requires all the type of technologies and a vast network area.

Just like these there are 80 projects which are considered as Smart city mission. So these are some of the points in which internet of things is required to make Ajmer as a smart city and also various other things like telecommunication, railway system and Educational institutions are at a good growth in Ajmer in terms of technologies like “Smart Boards” are used in various schools. But still Ajmer has to go a long way to become a completely smart city.

**V. PROBLEMS COULD BE FACED BY GOVERNMENT**

1. As citizens are not aware of the technologies so the major problem faced by government will be to acknowledge the people and to aware them about the technologies.
2. As many of the areas are not developed of Ajmer than government should develop those areas first and then introduce the advance technologies.
3. Some areas are not clean and infrastructure is so poor specially those areas which are near to Dargah Sharif they should be taken in the consideration first.



Figure 2. Above pictures showing congested part of Ajmer where plotting any line of project would be the most difficult challenge.

As discussed in the figure below, total number of projects which are completed or on the way of completion (under tendering, DPR i.e. Detailed Project Planning).

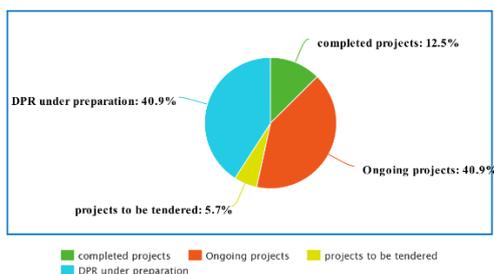


Figure 3. Smart City projects in Ajmer

And also, cost required for the projects of Smart city is discussed in the below figure, and cost is in Cr.

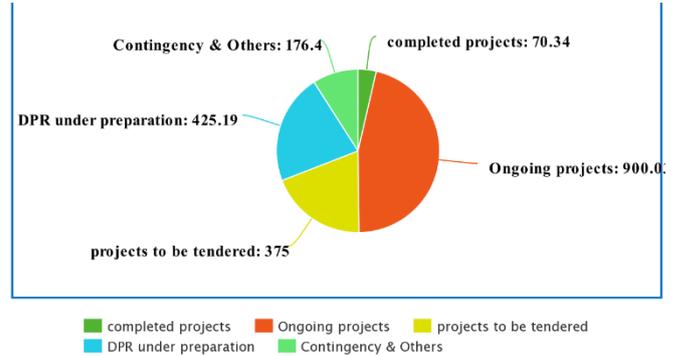


Figure 4. Cost of projects in Ajmer (Amount in cr.)

**VI. KOTA PROFILE**

Kota formerly known as kotah. It is also known as “the coaching capital of India”. Kota district has an area of 5,217 Km<sup>2</sup> with a population over 1,950,491. To make Kota as a smart city government invest and passed the budget of Rs 1,493 Cr (Inr).

**VII. LITERATURE REVIEW**

As the industrial point of view, Kota comes at first position in Rajasthan and one of the powerful energy resource in Northern India. May be this is one of the major reason to consider Kota as a “Smart City”, because there are five major power plants comes under or near to Kota territory.

Those are: Kota Super Thermal Power Plant (Kota), Rajasthan Atomic Power Station (Rawatbatha), NTPC Anta Gas Power Plant (Antah), JawaharSagar Power Plant, Kalisindh Thermal Power Station (Jhalawar).

And in order to make these power plants works better automation (Internet of things) played very important role. Some of the major IOT devices used in power plants are:

- Supply Chain Management
- Smart Pumping
- Workshop Mirroring
- Self-dependent Systems

And many more automation techniques which are used and which plays a huge role to create a smart industry. Another reason for making Kota as a Smart City could be rapidly growing rate of institutions because major role in economy of Kota is played by these educational institutions. As from different part of the country students arrive and also to make institutions work smarter and frequently, also to hold and nourish a huge number of crowd automation is required. Like Smart Boards in Class rooms, projectors, various labs to teach student effectively. Also replacing all the street lights with LED lights is also proposed in agenda as the promotion of IOT devices. Also government should place CCTV cameras on every entrance of city and exit also, moreover in most public places also, so that girls and women could be safer. Also public transport must be connected to GPS system. So these were few of the IOT which helps to make city smarter.



Figure 5. Smart room class in Kota



Figure 6. Thermal power plant in Kota

VIII. PROBLEMS COULD BE FACED BY GOVERNMENT

- As now, some areas of Kota are still present which are undeveloped with respect to other areas of city like “Patan Pole”, “Kaithuni Pole” etc. but these are the major areas which are totally unaware of IOT devices and government should do some campaign to make them aware.
- Also the investors are willing to invest but quality employment is not available at that quantity.
- Government need to bring more investors through various means and have to involve local people for the employment.

As discussed in the figure below, total number of projects which are completed or on the way of completion (under tendering, DPR i.e. Detailed Project Planning).

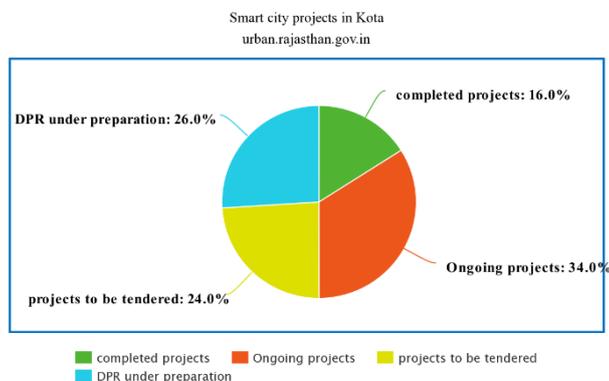


Figure 7. Total number of projects

And also, cost required for the projects of Smart city is discussed in the below figure, and cost is in Cr.

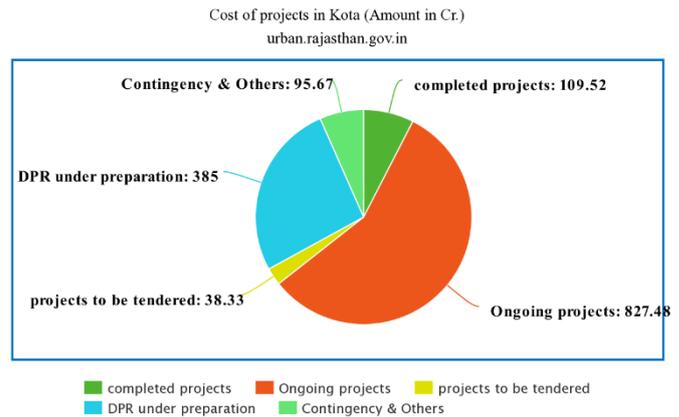


Figure 8. Cost of Projects in Kota

IX. UDAIPUR PROFILE

Udaipur also known as the “City Of Lakes”. It is situated at the southernmost part of the Rajasthan state. It has an area of 11,724 Km<sup>2</sup> with a population over 474,531+. To make Udaipur as a smart city government invest and passed the budget of Rs 1,221 cr. (Inr).

X. LITERATURE REVIEW

There are three major National Highways connected through Udaipur. This means the Toll Plaza is very busy and automation plays a vital role as toll booths of this era using RFID and GSM technology i.e. RFID is Radio Frequency Identification – It uses electromagnetic coupling in a radio frequency of the electromagnetic spectrum to identify an object, animal or Human Being.

There are 20 Power Plants in Udaipur including all big and small Power Plants and also makes it city of Power Plants, this name is given by me after the research. In which major power plants are Zinc Solar Power Plant, JK Lakshmi Power Mix Plant, Udaipur Solar and many more. There are mainly two types of technologies used in Solar Power Plants, those are:- Photovoltaic (PV) and Concentrating Solar Power (CSP). And many more technologies are used such as SCADA known as Supervisory Control and Data Acquisition. Literacy rate of Udaipur is around 90% and that means uses of IOT devices is on large scale like Smart Phones, Laptops, Smart Labs etc.

There are no such major problems faced by the government in Udaipur because people were already aware of some of the IOT devices and most of the areas are developed.





Figure 9. Above pictures represents the Zinc industries and its interior, In Udaipur.

**XII. LITERATURE REVIEW**

There are many aspects, which should be taken under consideration to declare Jaipur as smart city. In terms of industrial development Jaipur has vast network of each and almost every type of industry. For example Marble Machineries, Printings, Paints, Automobile parts, Ball bearings and many more. And all these industries run on automation i.e. Internet of Things. As discussed:

Name of Industry	Internet of things or Automation used.
Printing Industry	Digital Printing, Screen Printing Textile Printing, Offset Printing
NBC Bearings (National Bearing Corporation)	Uses latest CAD/CAM (Computer-Aided Design And Manufacturing), Calibration and testing equipment, Heat treatment facilities.

As discussed in the figure below, total number of projects which are completed or on the way of completion (under tendering, DPR i.e. Detailed Project Planning).

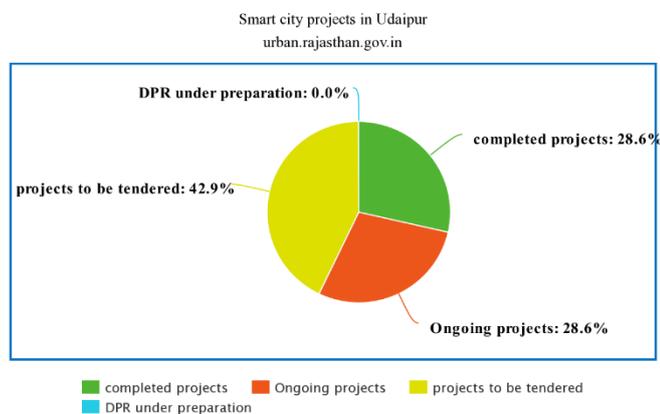


Figure 10. Smart City projects in Udaipur

And also, cost required for the projects of Smart city is discussed in the below figure, and cost is in Cr.

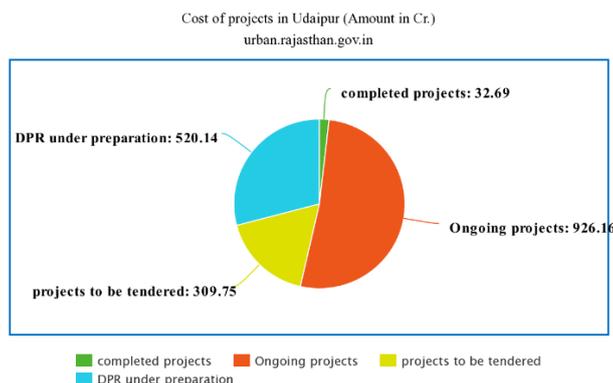


Figure 11. Cost of projects in Udaipur

**XI. JAIPUR PROFILE**

Jaipur is also known as “Pink City”. It is the capital of Rajasthan and also the largest city of the state. Area of Jaipur city is 485 Km<sup>2</sup> (approx.). The population in Jaipur is approximately 32.5 lakhs. To make Jaipur as a smart city government invest and passed the budget of Rs 2,403 cr. (Inr).



Figure 12. Different Industries in Jaipur

**XIII. IN TERMS OF ROADS AND TRANSPORTATION**

- Jaipur is one of the metro city of the country, and if we are talking about metro that means automation based, one of major use of automation is used in Metro trains. These are fully automated and are under the safe hands of Jaipur Metro Rail Corporation Ltd. abbreviated as ‘JMRC’.
- E-Rickshaws are totally dominating on the other road transports specially 3 wheelers public transport.

- There are 70,000 LED lights to be introduced to the highways connected to Jaipur as per the Jaipur Municipal Corporation (JMC) declared.



Figure 13. Metro train at Jaipur Queen's road



Figure 14. E-Rickshaws at Jaipur city



Figure 15. LED lights at Pratap Nagar, Jaipur

So these are the examples of automation or use of automation. Also **Railway Stations** of Jaipur are also now fully covered with free **Wi-Fi** service, a step towards promoting and establishing IOT. In terms of Education, Jaipur is also considered as the hub of competitive exams, so many of the students can't come to Jaipur to study for one or the other reason. So for them Internet plays a very important role, because now teachers from various institutes started online teaching which helps to a distant learner.

And many of the renowned Universities are present in Jaipur such as Malaviya National Institute of Technologies (MNIT), Manipal University, Amity University, and many more are there which are highly advance universities and contains Hi-tech labs and technologies.

#### XIV. PROBLEMS COULD BE FACED BY GOVERNMENT

Major problems could be occurred in the area like Ramganj, Handipura, BhattaBasti (Shastri Nagar) and many more areas where even police can't work freely till now so any kind of new projects will face problems to be introduced. Also because of metro train project the functioning main market or the city of Jaipur is disturbed because many people avoid shopping from city due to huge and massive traffic jam. So it affects the business of people in city.



Figure 16. Above two pictures are the main markets of Jaipur city affected by metro train project.

And the metro train project till now in Jaipur is kind of fail because, the route it is taken from ->Mansarovar – New Aatish Market – VivekVihar – Shyam Nagar – Ram Nagar – Civil Lines – Railway Station – Sindhi Camp – Chand Pole – ChotiChaupar – BadiChaupar<- it is the route through which people doesn't up down, i.e. many of the work places and institutions are not present on this route so the government have to bring metro to the route involving work places and institutions like Sitapura, Vishwakarma Industrial Area etc.

As discussed in the figure below, total number of projects which are completed or on the way of completion (under tendering, DPR i.e. Detailed Project Planning).

## XVI. REFERENCES

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- [4] Mr. Praveen Dadhich (citizen of Ajmer)
- [5] Mr. Ravi Prakash Sharma (citizen of Jaipur)
- [6] Mr. MukeshBhutia (citizen of Jaipur & educated in Kota)

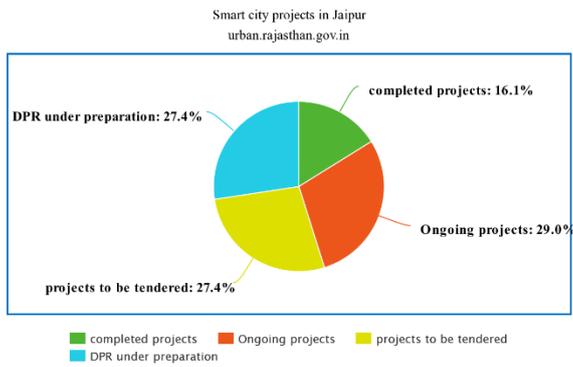


Figure 17. Smart City projects in Jaipur

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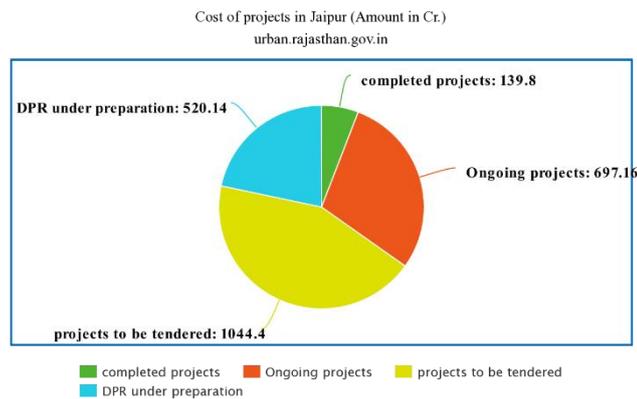


Figure 18. Cost of projects in Jaipur

## XV. CONCLUSION

As we have discussed above, that the role of internet of things in making city as smart city, so the conclusion is automation is the heart of every developed city specially smart city, Also as discussed above many of the projects are ongoing and many of them are going to be tendered so according to us by 2022 maximum of the projects will be on going and some of them will be completed. As government of Rajasthan is putting its all effort and as I 1<sup>st</sup> author got a chance to have words with Mr. Arun Chaturvedi one of the cabinet minister of Rajasthan, so he told that it is a time taking process government cannot give tenders to anyone because if any casualty occurs than the government will be responsible, whether it is a small or big the government will first analyze the information about the companies and then distribute the remaining tenders and most of the projects are totally depended upon automation i.e. internet of things. Also as mentioned above Jodhpur was not considered as smart city in any rounds of smart city selection, and in terms of technological, educational, industrial development Jodhpur is not less than any of the above mentioned cities.

But due to political reasons Jodhpur was not considered as the smart city or may be in future it should be considered that is my opinion. At last we will say that without IOT devices survival is as impossible as life without food because we all are so much in use of IOT devices from mobile phones to GPS device cars.

So this was our small research about role of Internet of things in shaping cities of Rajasthan as smart city.