IoT Based City Development: A Case Study of Patna Smart City

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Abstract- With the advent of technology, people 'everyday lives have been dramatically altered. IoT is an emerging technology which creates a vast network of things that communicate with each other. Government of India has announced for the construction of 100 Smart Cities in 2015 where people are expected to use information and communication technology with the aid of the Internet. Smart city is a significant concept to any nation's growth. It is important for India's government to give its people different services and IoT helps to achieve this aim suggestively. India, which has very limited penetration of technology at the national level, needs to develop a productive IoT based on current technical developments, skills that provide affordable and sustainable solutions, and entrepreneurial and social value. The primary aim of this study is to review the effect of IoT on Patna smart city growth, understand the Indian IoT strategy, discover key initiatives and benefits of IoT-based smart city solutions.
Respective methodologies were adopted to achieve with these objectives: a. Data collection from public opinion and interviews with smart city implementers b. presentation of survey data c. Responding to key research goals i.e. IoT's impact on Patna smart city growth, key initiatives and benefits of IoT-based smart city solutions and impact analysis in Patna Smart City.

Keywords – Internet of Things; Smart Cities; Smartphone Applications

I. INTRODUCTION

A modern buzzword, namely The Internet of Things [IoT], is now impacting our lives. Globalization has advanced forward and the globe is now linked through technology. The Internet network links components or mobile devices and produces new technologies that are creative and beneficial. IoT is basically a network where a multitude of sensors link internet to the physical world. Through 2011, the number of Internet-connected devices was 12.5 billion which actually exceeded the total number of people on the planet, that is to say 7 billion. Globally, by 2020, the number of Internet-connected devices is projected to range between 26 billion and 50 billion. Countries like the United States, South Korea, and Japan are already taking advantage of IoT. The IoT is capable of making drastic changes in India as the Smart City project is run by a centrally funded scheme and the central government proposes INR 48,000 crores in financial support.

II. LITERATURE REVIEW

Patna is the capital and largest city of the state of Bihar in India. According to Census 2011, it has a population of 1.68 million which makes it the 19th largest city in India. Patna was selected in Smart City Mission in June 2017. It was selected in 4th Round while selection of 30 smart city list. Patna Smart city came into form under Public Private Partnership mode which is done with the Municipal Corporation of Patna and Eptisa Servicios de Ingenieria, Spanish Company with expertise in infrastructure and urban planning.

IoT Policy 2015

According to the IoT Policy 2015 by Government of India, A Smart-city model will involve the deployment and display of IoT concepts for use in Smart City growth. The model will cover such concepts as, Smart Lighting, Smart Traffic Management, Smart Construction, Smart Parking, Wi-Fi Internet Access & City Surveillance, Solid Waste Management, Smart Metering, Water Quality, City Water Clogging Management, etc., and development tools to allow accessibility for disabled persons.
The IoT Policy 2015 allows smart cities to make proposals under the Pan City development and the launch of the Government's Digital India Programme, which aims to 'transform India into a digitally empowered society and a information economy,' provide the requisite impetus for IoT growth in the region.

Patna Smart City project involve an estimated expenditure of over Rs 2,700 crore in which Rs 930 crore is provided by the Centre and the State government, another Rs 982.31 crore is coming from the convergence of Government of India schemes i.e. Smart City Mission and IoT Policy, Government of Bihar schemes and urban local bodies resources. The remaining Rs 800.37 crore has been raised under the PPP model.
All the apps are controlled and maintained by the Municipal Corporation of Patna and Eptisa Servicios de Ingenieria.

Key Initiatives taken under Patna Smart City

Several initiatives have been taken under the Patna Smart City Project. Some of the important practices have been listed below

Free Wi-Fi Zone

Patna has a free Wi-Fi Zone of 20 Km from Danapur town present in western Patna to National Institute of Technology (NIT), Ashok Rajpath. This Wi-Fi provide free internet connection when come in range within the location. It is the world largest Wi-Fi zone. It was launched in the year 2014 with a total budget of Rs. 190 crores. It is the most successful implementation of IoT in Patna. From 2017, it is taken under the Smart City mission for its better performance and maintenance.

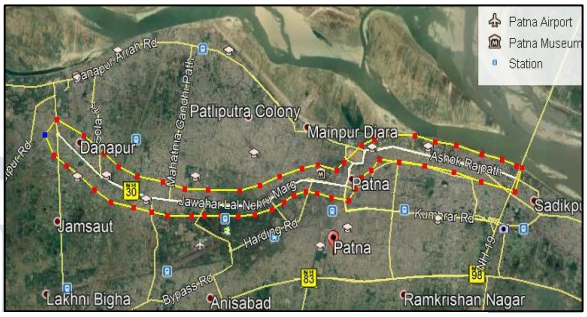

Figure 1 20 Km Wi-Fi Zone in Patna

GPS Tracking Solid Waste Management System

BUSCL is responsible for the disposal of solid waste in the State. The project cost Rs110.59 crore under the Jawaharlal Nehru National Urban Renewal Project, which is federally funded program. It also provides for the construction of an integrated solid waste treatment facility at Beriya village with a daily capacity to handle 800 to 1,500 tons of solid waste. For garbage collection, the city is divided in five zones. GPS-enabled garbage collection trucks are responsible for 1,240 wheeled containers for residential areas, 186 wheeled containers for industrial areas and 2132 small containers for business areas. Trucks are entitled to charge Rs510 for the collection of 10 tons of solid garbage from BUIDCO. The IT section of the Municipal Corporation monitors the movement of trucks.

Figure 2 Facebook Page of City of Patna

Social Media Platform: - (Instagram, Facebook and Twitter)

City of Patna is social media platform page where all the information regarding the implementation of PAN City and Area based development is shared. It is controlled by the Patna Municipal Corporation and Eptisa India Pvt. Ltd. The social media allows citizens of Patna to review the city and share their issues and complaints regarding the development. It is also enabling public participation through social media platform.

AASHA Application

The mobile application, 'AASHA' is developed (action against sexual harassment app), for safety and security. The specifications and special features of AASHA is women can seek help and counseling from legal advisers, medical practitioners and police officers through the app. The emergency button on this app, which is called SOS automatically send the location of the woman to her friends and family members. It is a one-stop platform to guide women regarding the procedures

Figure 3 AASHA App for smart phones

and legal rights if they face any sexual assault. Various acts of sexual violence and cybercrime for both minor and adults have been listed in this app in layman terms. Women can report harassment on AASHA without even disclosing their identity.

CITY OF PATNA Application

City of Patna is a mobile app which very easy way for people to file complaints. With the introduction of this app, the synergy between Patna Municipal Corporation and the people of Patna is expected to be much better. The app gives people the power to lodge complaints about trash, pollution, streetlights, intruders, dead animals and unauthorized buildings constructions. This free app is available in English and Hindi. In this app, people just need to upload their problems with a photo and the photo needs to be geo-tagged and time-stamped. People can also monitor door-to-door garbage vehicles to enhance the town's solid waste management system.

"MY CITY MY PRIDE"- QR Code for Ease of Living Survey

My City My Pride is a city rating system initiative in which people can rate the city for its development progress. Citizens just have to scan the QR Codes from their smartphone cameras and participate in the survey. This survey is helping Patna Smart City to provide better implementations in the City. The QR Codes are placed at every local shop, tourist spots, restaurants, malls, schools and colleges to encourage more participation.

Figure 4 City of Patna App for searching door to door Garbage collection Trucks

Paying of Taxes and Bills through Paytm Application

Paytm is an Indian e-commerce mobile application system and financial technology company which offers online transaction. Payment for utility bill payments, property tax, holding taxes is done with the Paytm QR code. This allows people easy paying through their smartphones and don't have to wait in the long queues outside the offices.

Figure 5 Paytm App for smartphones

Figure 6 People participating in Ease of Living Survey

AUTOMAP

AutoMAP may be used to apply for a new building plan, to revise the approved building plan, to add / modify existing buildings with prior approvals and occupancy permits from Patna Municipal Corporation and to cover the building categories listed in the Bihar Building Bylaws 2014. Obtaining a construction permit or occupancy certificate is advantageous for the Architect, Engineer, Builder, and Developer.

III PUBLIC OPINION AND SUGGESTIONS

In Patna, awareness among the people is the biggest concern for the successful implementation of IoT. As 53% of the people is not aware of apps or any platform regarding Smart City Development. Children are more aware rather than Male and Female due to the usage of social media platform.

Usage of these apps is less because people find difficulties like for the language because most of apps in English or errors and crash while using apps. People most preferably use PAYTM app for payments for electricity, paying taxes and water bills because it is more convenient, easy and time saving and also the free Wi-Fi for better internet connection. People can easily download, watch videos and money saving.

Awareness about the new initiatives and applications is less in Female Population but the results obtained from younger generation is satisfactory

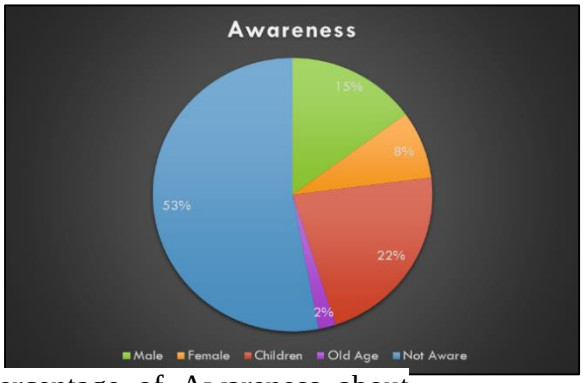

Figure 7- Percentage of Awareness about the initiatives in Patna Smart City

Is IOT in Smart Cities are successful implementation?

An overall of 23.5% people agreed and 76.5% did not agree with the implementation and also believed that IoT is new terminology and they are having very less knowledge about the things which are introduced. Children are more participatory because of the knowledge given in the schools. Old people and females have not received any kind of benefits and facilities from technological aspect. As overall IoT in Patna smart city needs a lot of improvement for its successful implementations.

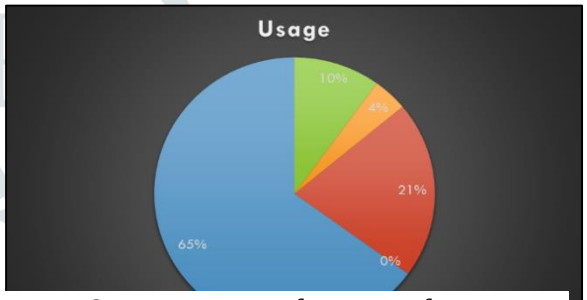

Figure 8- Percentage of Usage of initiatives by the people

People suggested that they want awareness programme so that they know how to use those apps, better advertisement of the smartphone application in the physical form so that public can know about the development, there should be maintaining of applications when it crashes in the smartphone because of this people are uninstalling the apps, newspaper should be medium to provide knowledge about the current implementation of IoT.

For the Aasha App, there should be awareness program door-to-door especially for women safety knowledge and make women learn about how to use these apps.

IV. CONCLUSION

To take advantage of the IoT based smart city solution, the citizens of Patna need to carry positive mindset and understand the impact of this emerging technology. Patna needs strong awareness about IoT, a positive government attitude, up-to-date applications, better management and better information accessibility for the citizens. Indian government and private companies should study the IoT implementations outside India in detail and customize as per the needs of its citizens. The Digital India program which aims to develop the nation's e-infrastructure will strengthen the IoT industry's establishment. With a strong emphasis on technological growth in the modern and exciting age of the IoT, it has to be well placed to expand further economically.

REFERENCES

i. IoT Policy: Department of Electronics & Information Technology [DeitY] and Ministry of Communication and Information Technology, Government of India.
ii. Smart Cities Mission Statement and Guidelines, Ministry of Urban Development, Government of India, June 2015

iii. Developing Smart Cities using Internet of Things: An Empirical Study, Gaurav Sarin, International Conference on Computing for Sustainable Global Development, 2016.
iv. Success of IoT in Smart Cities of India: An empirical analysis, Chatterjee, S., Government Information Quarterly (2018), https://doi.org/10.1016/j.giq.2018.05.002
v. Smart and Digital City: A Systematic Literature Review by Annalisa Cocchia R. P. Dameri and C. Rosenthal-Sabroux (eds.), Smart City, Progress in IS,DOI: 10.1007/978-3-319-06160-3_2, © Springer International Publishing Switzerland 2014
vi. Designing and Planning Smart Cities with IoT/ICT, A technical report, Telecommunication Engineering Centre,
vii. Department of Telecommunications, Ministry of Communications, Government of India, 2019.
viii. Developing Smart Cities using Internet of Things, Miss Dipti Sinha and Dr.A.K. Shrivas, International Journal of Recent Trends in Engineering and Research, December 2016.