

Smart cities survey: Based on Integrated Command and Control Center

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Abstract: as per the smart cities report out of hundred cities eleven cities had already completed the Integrated Command and Control Center (ICCC) and more than twenty-eight cities have already started working on starting ICCC and more than twenty-two is in the stage of pre-work preparation. Among all the 100 cities Agartala is one of those cities that got selected based on smart cities challenges under the Companies Act, 2013 on November 8th, 2016 which was classified under State Government Special Purpose Vehicle (SPV) and completed the Integrated Command and Control Center and declared it's Go-live on the month 24th September 2020. This paper is based on the survey response that we received from the citizens of Agartala with a few important questions like do they have heard about the platform of ICCC and what the smart element installed within the Urban Areas of Agartala City and whether are they interested to know what Integrated Command and Control are about. This paper will give us the real picture in enabling the citizens of the cities to understand the real impact of ICCC in connection with livability, city utilities, Transit Management, Traffic Management, Safety, and Security Management.

IndexTerms—Agartala, citizen, ICCC, livability, management, survey, smart city, SPV

I. INTRODUCTION

As per the record in the year 1871, the area of the Agartala Municipality was 3 sq. miles having a total population of 875 only. At present we have 20 urban local bodies with an area of 242.83 sq. km and with a total population of 8, 82,817 as per the 2022 report (<https://udd.tripura.gov.in>). The proportion of the population in Agartala city is increasing day by day. The main reason for increasing populations is due to migration and the natural growth of the local population. This will keep on increasing and we cannot stop this nature. We have to adopt and see the best way to minimize those challenges and to give them the best quality of life, high standards of education, public transport services, smart roads, health, etc. Due to this smart mission has come up with this plan to have one common platform of Information and Communication Technologies (ICTs). Technologies such as Integrated Command and Control Center (ICCC) for all the cities to have Smart Traffic signals, City Surveillance cameras, TVDS, Internet of Things (IoT), Cloud computing, Smart water, urban sustainability, mobility solution, citizen Engagement, Smart Solid waste management, and Big Data. Integrated Command and Control Center will play a major role along with respective stakeholders. The involvement of different stakeholders of the respective departments of the states has to understand the need of coming together in one platform to help the citizens of their own respective states. This Integrated Command and Control Center (ICCC) will be the "brain" of the city in day-to-day operations management, exception handling, and in managing disaster management. ICCC will help in providing useful data to the urban functions departments, and civic officials across the city and will enhance with multiple departments within and outside. It will also help in resolving civic issues and citizen grievances. The Integrated Command and Control Center will also help the local urban bodies as well as the government bodies in driving the important institutionalizing data for regular operation. This Integrated Command and Control Center (ICCC) platform will be the main decision support system (DSS) to respond to real-time events by feeding and processing the different data sets for improvement of policy making and planning. It must also be customized as per the city's requirements.

There is a major discussion that 40% of the Indian population in urban areas is expected to be accommodated and there is a high chance that it will contribute 75% of India's gross domestic product by the year 2030.

II. LITERATURE SURVEY

Abdulahman Alkandari, Meshal Alnasheet, and Imad F.T. Alshekhly in their paper " Smart cities: Survey" elaborated that there is no such proper definition of the smart city. From their survey paper, they have categorized into two phases general case study and Specific case study [1]. The Indian Government Smart Cities mission statement stated that within the next few years 100 existing cities will be converted into Smart Cities [2]. Bawany, Narmeen Zakaria, and Jawwad A. Shamsi spoke about the vision and challenges based on huge data collection, network resources, storage, and huge data collection through ICT [3]. Aithal, P. S. in their paper stated that as per the Technologies for Smart Cities. (2019) developing Smart Cities can't happen without proper planning it needs well documentation design framework and needs necessary approvals from higher authority[4] Andres M. discussed the various challenges faced by Smart Cities. The author focuses on the City assessment Project guide to understanding the urban challenges to meet the needs of the citizens [5]. Hasija, Sameer, Zuo-Jun Max Shen, and Chung-Piaw Teo explain in their paper, the recent developments and initiatives taken for Smart City Operations. The author also spoke about the various Modelling Challenges and Opportunities, by categorizing them into three different phases end-user utility, data access and collection, and economic viability of various solutions [6]. Gade, Dipak (2019); spoke about the popularity of the smart Cities concept. The author spoke that how cities are becoming smarter day by day in today's generations by using various technologies, IT infrastructures, and tools. The concept and ideas may vary as per the requirement of their cities but generally, the citizens were concerned that the designed and the technologies are operated by the latest Information Communication and Digital Technologies [7]. M. M. Rathore, A. Ahmad, A. Paul, and S. Rho,

in their paper "Urban planning and building smart cities" states about the Internet of Things(IoT) technology and how it can help Smart cities to communicate and connect through the internet. The author was also concerned about the rapid growth of the population within urban cities and how we can help them with the best way to provide their needs and requirements through digital platforms[8] Al-Hader, Rodzi, Sharif, & Ahmad, refer to the decision taken by the previous government on providing smart infrastructure by using wireless infrastructure by ERP which was later replaced by the new technology to maintains smart database resources, smart interface and smart building to reduce the operational costs[9]. Naphade, Banavar, Harrison, Paraszczak, & Morris, 2011 had briefed that the percentage of the world population is more than 50% and there is a high chance that by 2050 the world population might increase to 70%[10]. Schaffers, H., Komminos, N., Pallot, M., Trousse, B., Nilsson, M., & Oliveira, A. (2011) in their paper stated that Now Technologies are an essential part of our daily life. Information and communication technology nowadays is very much essential for urban development, to give better lifestyles to the citizens. The author empathized with the need for ICT for all smart cities as well [11]. Gil-Castineira, F., Costa-Montenegro, E., Gonzalez-Castano, F. J., Lopez-Bravo, C., Ojala, T., & Bose, R. described that the Smart Cities project will still face some difficulties in providing all the features, applications and services. Does it has some advantages in promoting smart healthy life, security, and infrastructure in urban areas [12] Ferreira, J. C., & Afonso, J. L in their paper described that the communities within the Urban have many problems that need better planning to resolve those problems through better information and communication technologies? There should be a proper proposed framework and design for driving smart cities which will provide proper directions and guidance about battery charging stations, traffic maintenance, and city mobility infrastructure [13].

III. METHODOLOGY

preparing this research paper, It came to our mind that does real citizens of India knows about the Integrated Command and Control Center (ICCC) platform and do they really have an idea about the infrastructure and its advantage and whether is it really helping the citizens in mobilizing the cities in a better way and is it really important to have such Integrated Command and Control Center (ICCC) platform if the citizens don't have any idea about the ICC. Many such questions arise in the mind and came to thought to survey the Integrated Command and Control Center. This paper mainly focuses on one city to check and see the improvement of those questions after two years of services provided to the urban citizens of Agartala through the Integrated Command and Control center (ICCC) platform. After applying many, methods like public awareness programs, Stakeholders programs, Departmental Programs, Students Industrial visit programs, publishing in the local newspaper, through social media platforms, organizing training sessions, providing Internship Training, Inviting the citizens, displaying messages and awareness through variable message display, active involvement in displaying Departmental important messages through VMDs, announcement through Public Address System(PAS) about different activities, important information's, alertness announcement about weather forecasting and by monitoring the water logging through City Surveillance camera and by visiting and taking a session on the topics of flood monitoring, City Surveillance Cameras, Traffic Signal, and others smart elements in various institutes and Departmental offices and industries. To check the real impact of ICC, a few important surveys have been done through questionnaires based. This research paper is truly based on the responses received from the citizens of Agartala staying within Urban Areas. This paper will give us real pictures of the Integrated Command and Control Center in Agartala city that how far it had achieved in reaching out to the citizens of Agartala last two years of its journey till date from 0% to which percentage? After going through many survey research papers published by many authors spokes about the development of Smart Cities and the challenges and the Technology used for the betterment of the life of citizens. But there is no such research paper that speaks on the important role of the Integrated Command and Control Center (ICCC). Are the Integrated Command and Control centers playing an important role for the citizens of respective cities? How far the cities have achieved through the ICC platform? Is it the citizens who started depending on ICC in terms of their sustainability through technologies? All such questionnaires will surely arise in the coming days for all the Smart Cities. This paper will also speak about the importance of all the smart elements installed within the cities and how those smart elements impact the citizens of respective states.

IV. STATISTICS REPORT

Based on the survey and the response given by the citizens of Agartala regarding ITMS, City Surveillance, TVDS, and a few Smart Network

A. *Integrated command and control center*

Among 100 smart cities missions under Smart Mission Project, Agartala is one of the cities that had completed the Integrated Command and Control center (ICCC) project within its period. Integrated Command and Control center Agartala is the first among the Northeast States to complete and also the role model for the remaining states, especially for the Northeast states who are yet to start the ICC platform. After the Go-live declaration Integrated Command and Control Center Agartala played its major role in mobilizing the city in the time of Covid-19, Traffic jams, water logging within the city, and safety and security through City Surveillance cameras. In the year 2020, the citizens of the city hardly know about the ICC. Only 10% know about ICC, and out of that 4.3% are those who are working on the Smart city project. Only 5.7% are normal citizens.

Day by day as the day passes from February 2021 Integrated Command and Control Center of Agartala came into many pictures in the eyes of local citizens through daily bases activities like providing them information about Red Light Violations detection through traffic signals, by tracking different vehicles which are lost and helping the citizens in finding out their lost things through City Surveillance Camera and by monitoring the major flood prone areas in the time of heavy water logging. The citizens felt the important role played by Integrated Command and Control center. Citizens started depending day by day on ICC, They believed that this platform will surely bring changes in the coming generations in terms of Technology, Jobs, and better life and it will be much easier for the citizen's life to find out their needs in their door steps. After much effort through different activities, now 67% of the citizens known's about the Integrated Command and Control Center Agartala. Citizens are taking much interest in ICC and especially the students of Agartala are taking advantage of learning the latest technologies through an Internship training program.

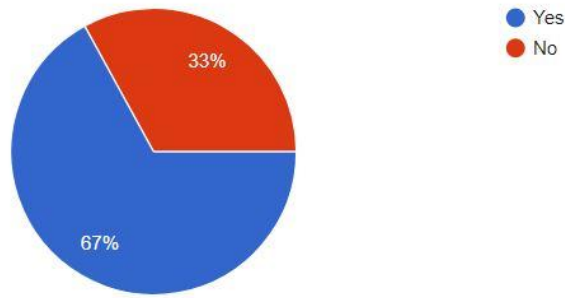


Figure 1: Percentage of ICCC known by Citizens.

B. Smart elements

1. Total CCTV Surveillance System- 496 CCTV Cameras
2. Smart Traffic Signals – 22 locations
 - 2.1 Red Light Violation Detection System- 81 Cameras/Lanes
 - 2.2 Automatic Number Plate Recognition System – 43 ANPR
 - 2.3 E-Challan System through NIC portal
3. Intelligence Pole – 6 locations
4. Variable Message Display (VMD)- 53 LED
5. Public Address System – 18 locations
6. Emergency call Box – 18 locations
7. KIOSK – 26 numbers
8. There are other smart elements installed within Agartala City as well like City Wi-Fi, Environment sensors, and an Adaptive Traffic Control System.

V. RESULTS AND DISCUSSION

Result is based on the survey done in June and July 2022. To check whether the citizens were aware of the Smart elements installed within the city. This data will surely help other smart cities to analyze and study the same way to understand and can be planned accordingly to reach out more to the citizens. Even do this data is based on one city but this data has helped the Integrated Command and Control center (ICCC) Agartala to understand the changes as shown in Table 1.

Table 1: Details percentage of Smart Elements known by citizens.

Sl.No.	Smart Elements	Total % reach out	Total % to be reached out
1.	City Surveillance cameras	59.7%	40.3%
2.	Traffic Signals	76.2%	23.8%
3.	Intelligence Pole	26.7%	73.3%
4.	Variable message Display	35.4%	64.6%
5.	Public Address System	25.2%	74.8%
6.	Emergency Call Box.	30.1%	69.9%
7.	KIOSK	16.5%	83.5%

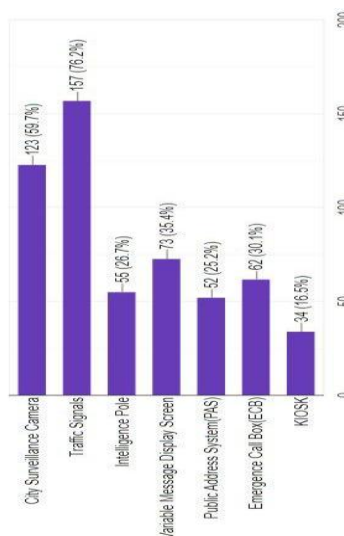


Figure 2: Smart Elements known by Citizens

From the above data survey observation, the percentage of Traffic Signals is the highest among the other smart elements. 76.2% of the citizens know about the implementation of traffic Signals within the City. The main reason why this percentage is higher was that the Traffic Signals are very much needed for the citizens to avoid accidents and to maintain Traffic Jam. Since the maximum

of the citizens has two, three, and four wheels and to control the smooth flow of the vehicles it is very much necessary for the citizens to have Traffic management in the city. This is one of the reasons why the percentage of traffic signals is known by the citizens. Another reason why the citizen knows about the traffic signals is the E-challan System. If any vehicles violate the red light signals speed, helmet, the system directly captures those violations and sends the challan to the respective register name. This system has alerted the citizens to follow traffic signals. Secondly, the City Surveillance cameras stand in second place at 59.7% next to Traffic Signals. The main reason is that day to day there are many accidents, and thieves, happening inside the city, and CCTV footage has helped the citizens in recovering their lost things on daily bases. Thirdly the Variable Message Display with 35.4% stands in the third position because of two-way interaction. This system helps the citizens to advertise their ads, business product, and important information through these VMDs with very low margin prices within their affordable. This is the main reason why the citizens were aware of those systems installed inside the city.

From the above three system observation, it is very clear that those systems which is very much necessary for the citizens and which are needed on daily bases either it are for personal or business purpose those system are getting much highlight in the eyes of citizens which has two-way communication between the system and the citizens. Those systems are giving impact and helping the citizens in many ways. This is the main reason why Traffic Signals, City Surveillance Camera and Variable Message Display were known by the public.

Among all the smart elements, KIOSK is showing the lowest percentage of 16.5%. Even do the system has access domain and the public can access any information through KIOSK and the access is free of course but the participates of citizens are showing less interest in the KIOSK system. The main reason may be because of less awareness of the system and most of the public doesn't know its benefit and how to use it. Secondly, the reason may be the locations where KIOSK where installed. Such things can be improved with proper planning.

VI. CONCLUSION

Continuous awareness is very important for all smart cities to reach out to the citizens of the city and Integrated Command and Control Center (ICCC) shouldn't be a restricted place for citizens to visit. 89.8% as per the survey data the citizens like to visit ICCC and want to see the latest technology. In long run, the ICCC has to build in such a way that, it has a good relationship with the citizens and respective stakeholders. Integrated Command and Control should earn the trust of citizens and should have the capability to take responsibility and resolve those problems and challenges. That trust can be gained through proper planning and management. By conducting awareness programs in different schools, Institutes, Government officials' Departments, and Stakeholders' departments and making them understand the importance of all those smart elements and how it is benefiting the citizens of the respective states. Such programs and sessions will surely build trust and the dependence will grow stronger. Integrated Command and Control Center through Internship Training program has gained much trust, especially in the heart of students. Today's generation's students are very much interested in the field of technology and they want to explore themselves deeply in the field of technology. This research paper highlights the important needs of the citizens and how these needs can be explore in a better way through this Integrated Command and Control Center.

REFERENCES

1. Alshekhly, I. F. "Smart Cities: Survey." *J. Adv. Comput. Sci. Technol. Res* 2 (2012): 79-90.
2. Smart Cities Mission Statement & Guidelines. (2015). Retrieved from <http://smartcities.gov.in/> on August 01, 2021
3. Bawany, Narmeen Zakaria, and Jawwad A. Shamsi. "Smart city architecture: Vision and challenges." *International Journal of Advanced Computer Science and Applications* 6.11 (2015).
4. Aithal, P. S. "ICT and Digital Technology based Solutions for Smart City Challenges and Opportunities." *International Journal of Applied Engineering and Management Letters (IJAEML)* 6.1 (2022): 1-21.
5. Monzon, Andres. "Smart cities concept and challenges: Bases for the assessment of smart city projects." *2015 international conference on smart cities and green ICT systems (SMARTGREENS)*. IEEE, 2015.
6. Hasija, Sameer, Zuo-Jun Max Shen, and Chung-Piaw Teo. "Smart city operations: Modeling challenges and opportunities." *Manufacturing & Service Operations Management* 22.1 (2020): 203-213.
7. Gade, Dipak. "Introduction to smart cities and selected literature review." *International Journal of Advance and Innovative Research* 6.2 (2019): 7-15.
8. Rathore, M. Mazhar, et al. "Urban planning and building smart cities based on the internet of things using big data analytics." *Computer networks* 101 (2016): 63-80. *Symposium on Computer Modeling and Simulation*. IEEE, 2009.
9. Al-Hader, Mahmoud, et al. "SOA of smart city geospatial management." *2009 Third UKSim European Symposium on Computer Modeling and Simulation*. IEEE, 2009
10. Naphade, Milind, et al. "Smarter cities and their innovation challenges." *Computer* 44.6 (2011): 32-39.
11. Schaffers, Hans, et al. "Smart cities and the future internet: Towards cooperation frameworks for open innovation." *The future internet assembly*. Springer, Berlin, Heidelberg, 2011.
12. Gil-Castineira, Felipe, et al. "Experiences inside the ubiquitous oulu smart city." *Computer* 44.6 (2011): 48-55.
13. Ferreira, João C., and João L. Afonso. "Mobi_System: A personal travel assistance for electrical vehicles in smart cities." *2011 IEEE International Symposium on Industrial Electronics*. IEEE, 2011. 2011).