Future and needs of Smart cities in Pakistan

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Abstract
Pakistan is a 6th largest population in the world. So the problem of overpopulation and facilitate the people of the country is a big challenge for the government. And also in this scenario that there is the trend to shift in urban areas is too high and create many problems for the government. So, there are increasing the needs to build smart cities for the better future of citizens. The main purposes of smart cities are to improve the comfort of its citizens and promote economic development while maintaining sustainability. Smart cities can enhance several services including healthcare, education, transportation, and agriculture of the country. The smart cities are focused on controlling available resources safely, sustainably, and efficiently to improve the economy and societal outcomes. We try to discuss the future of the smart cities and needs of smart cities in the country. In this paper, we present different views especially in the terms of today's Pakistani condition and needs. We also discuss future vision of the smart city and first smart city project in Pakistan and also a model of the smart city. This study is about the part of our thesis research on latest technologies for betterment of living.

Keywords: smart cities, first smart city project, future of smart cities in Pakistan, the vision of smart city projects in Pakistan. block-chain technology

1. Introduction
At present, the concept of smart cities still a novel idea in Pakistan while a comprehensive understanding of what smart cities mean also seems to be missing. Furthermore, the eco-system, the leadership, the institutional arrangement and public opinion do not seem to be fully mobilized. In the government sector, Punjab is leading and in big cities makes smart projects like "metro bus" and steps forward to make Lahore a smart city with different projects. But still, there is need more hard work with the contribution of private sector to achieve the goal. A commonly mentioned definition derives from [1] Bakici, Almirall, and Wareham (2013) who describe smart cities as "cities that utilize information and communication technologies with the aim to increase the quality of life of their inhabitants while providing sustainable development." [2] A city "connecting the physical infrastructure, the IT infrastructure, the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city" (Harrison, *et al*, 2010) In Pakistan, increasing urbanization and rising income trends indicate that by 2030, the percentage of urban population will increase from the current 45 percent to nearly 60 percent. At present, nine cities of the country have populations over 1 million and 75 cities with a population between 100, 000 to 1 million. Urban Pakistan contributes 78 percent of the GDP. So, the need to develop systems and technologies that help city governments manage urban centers better and serve the citizens are becoming vital with the passage of time. However, the safety of the citizens and their future is a big challenge for the government. Different private sector residence projects provide high-level services for a living. These schemes are provided most smart cities facilities to their customers. And now start first smart city project in Islamabad the capital of Pakistan (second beautiful capital in the world). Different future visions also present the guideline for future of smart cities in the country. In this paper first part is about smart cities information, in second part explains different technologies of smart cities, in third part present a short of future of smart cities in Pakistan. And the next 4th part is about first smart city project in Pakistan and fifth part is a basic model of the smart city. The last part is explaining about different strategies of smart cities across the world

2. Smart Cities
A smart city is established, organized and sustained with the help of Internet of Things (IoT). The smart cities have become emerging phenomena with rapid urban growth and enhancement in the field of information technology. Challenges cities face today Growing population, Traffic Space – homes and public space Resource management (water and energy use) Global warming (carbon emissions) limited city budgets, Aging infrastructure, health care, sports ground, and parks, and also water crisis [3, 9]. The simplified idea is that the gathering information from a city together with its intelligent handling to achieve smart decision making and control is what constitutes a smart city. Pakistan faces all these problems today. Especially is an infrastructure problem and big cities overcrowded. The Pakistani government has not many resources to tackle the challenges of resources and need of smart cities for solving all problems.
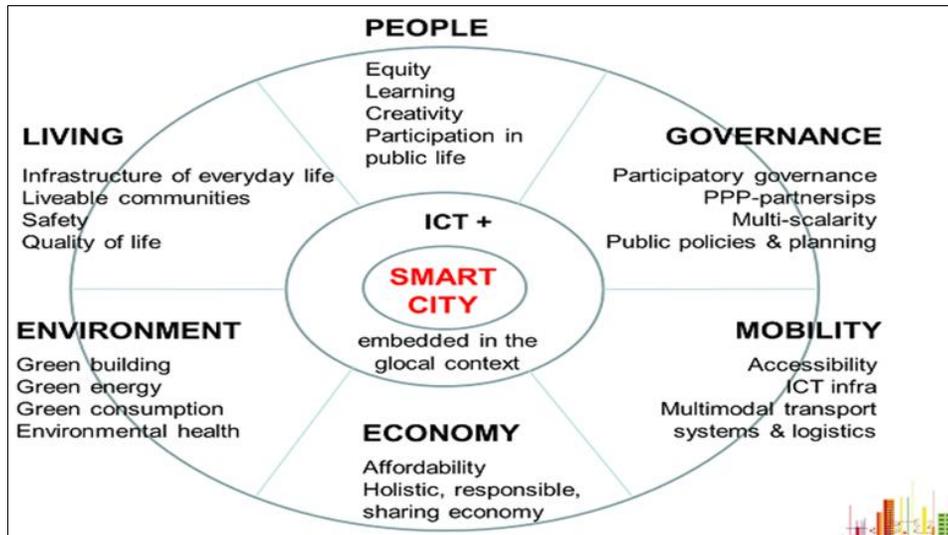
Fig 1: Characteristics of smart cities

2. Technologies Associated with Smart Cities
Many technologies are associated with the concept of smart cities. like, Intelligent lighting, Demand response, LED lighting, Solar panels, Wireless charging for automobiles, NFC, Facial recognition, Low power semiconductors, Fuel cells, Smart building controls, smart waste management, healthcare systems, Transportation sensors, Wind turbines, Intelligent Buildings, Micro and Macro GMDs, An "RF-like" fabric, Integrated transportation, A connected self-aware environment that includes but is not [5, 6]. Various attempts to conceptualize smart cities and various benchmarking methods have been developed to evaluate their impact. In specific Pakistani point of view, some basic needs are good infrastructure, transportation, healthcare systems, clean water,

security systems, sports and playgrounds, internet of things, big data, information collect together for use of different department, strong city management system, the help of private sector, guide and educate common people.

3. Future of smart cities in Pakistan
Pakistan is a 6th largest population of the world and 3rd largest population in Muslim countries. Now different researchers present their research to show the future map/ plan of smart cities in Pakistan [4]. Muhammad Aslam Mughal and Nadeem Khurshid present their future plan of smart cities in "Vision-2025". They proposed a framework for the future of smart cities in Pakistan (figure 2).
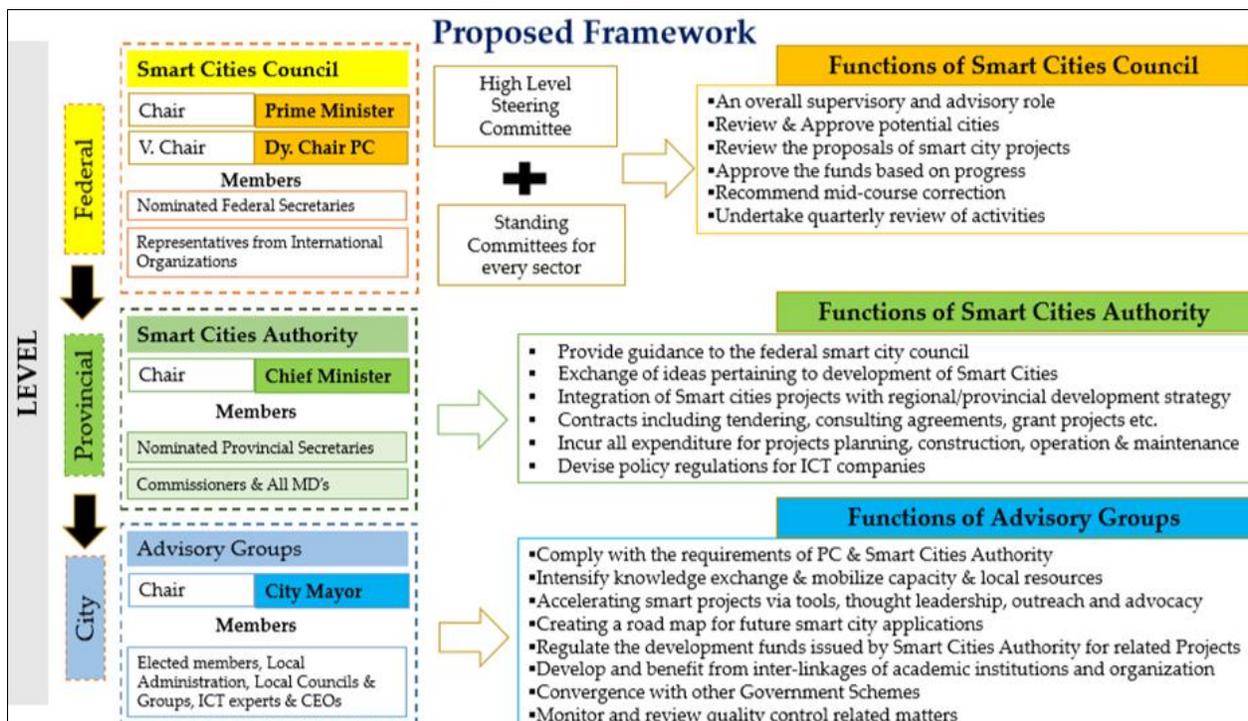

Fig 2: framework of a smart city in Pakistan

4. First smart city project in Pakistan

The need of smart cities is increasing day by day but the economic condition of the country is not so good to achieve all requirements of the smart cities like big data, IOT, big data, cloud systems, fog computing, green computing, for the government. But now private sector step forward in smart city project and the first smart city of Pakistan launched in the capital of Pakistan Islamabad "Capital Smart City Islamabad". This project has almost every basic facility of smart cities. The government also plan makes Lahore a smart city. Especially complete projects like metro bus project and orange line train but it's too far from the destination. Punjab leads on towards on smart cities concepts.

Fig 3: First smart city project of Pakistan 'digital overlook'

5. Key challenges and proposed model

Different challenges faced when a city convert to a smart city. Different researchers found many key challenges to make a city smart especially in low resources and lack of information about smart cities and their structure. So, they present different models for making a city smart and sustain. We study many models presented by different researchers for specific Pakistani condition. Here we give most simple and easy to adopt model and most suitable model for smart cities in Pakistan. This model is also given a list of challenges faced by a city convert in a smart city.

Table 1: Key challenges a proposed model

	Challenge	Proposed model
1	IT Infrastructure	**Zonal Sites of each public utility** Zone wise implementation of each public service does not require all the infrastructure at once. The proposed model streamlines step-wise implementation of smart city. Nevertheless, this does not brings down the requirement of IT infrastructure but facilitates in moving steadily towards a master city.
2	Cost	**Zonal Sites of each public utility** Zone wise implementation of each service may not require huge indolent at once. In a long run, use of the ICT to deliver public services will reform the speed and effectiveness of public service delivery and administration, in turn, providing improved service delivery, Reduced consumer costs and Social benefits.
3	Heterogeneous environment Interoperability	**Service Oriented Architecture** The proposed model is based on Service Oriented Architecture. Exposing data services as web services can make data service information accessible to a wide variety of client. Web services makes it possible for systems to integrate with each other independent of underlying platform.
4	Availability and Scalability.	**Zonal Sites of each public utility** The proposed model supports both horizontal and vertical scalability. Horizontal scalability means that more and more public services can be plugged in easily. Zone wise implementation of each public service provides vertical scalability ensuring Quality of Service (QoS) at level. Hierarchical cloud model, basically a cloud model, is characterized by high availability and scalability inherently. Furthermore, each zone can enhance its resources, as and when required, to ensure 24t7 availability to its users.
I	Security	**Service Oriented Architecture — Using Web Services** The proposed model recommends exposing data as web service. \VS-Security is particularly useful because it provides encryption-based, message-level security data

6	Privacy	**Service Oriented Architecture — Using Web Services** The proposed model defines user as the owner of data. However, policies and rules can be defined by the egovernance layer. Data is only provided to 'mown an authentic party. It is recommended that anonymized data is exposed via web services after the consent of user.
	Efficiency	**Hierarchical Cloud Model** As data zone level queries will be entertained by zonal data center, the proposed model is expected to perform better. The domain from domains in Various departments cross services can process queries multiple real time. can co- ordinate and cooperate instantly and share their data via web services. Resource planning at central data management system (CDMS), and at each utility center results in efficient planning and utilization of resources as real data is available for analysis.
S	Big data Management	**Hierarchical Cloud Model** **Zonal Site of each public utility** Zone wise distribution of data helps in storing and analyzing data efficiently. For example, city transport system will have zonal data centers across city. The data generated from each zone will be collected, stored and analyzed at zone level. Nonetheless, aggregated data of each zone will be sent to main city transport system. This division, helps in efficient management of big data.
9	Social Adoption and app development	Open data model—Smart city App store

Smart City Architecture [11]

5. Smart city strategies from smart cities across the world [7]
- **It starts with having a realistic plan:** Must have some original plans are with ground realities.
- **Smart cities require extensive experimentation:** Check the possibility of the project with some experiments before starting the project.
- **A smart city vision should energize the private sector:** There should need some private sector contribution in smart city projects with the government. Because it's a tough job for any government to maintain many projects of smart cities continue at the same time especially the country like Pakistan where the government has fewer resources.
- **Smart cities demand smart data:** Use smart data for successfulness of smart city projects. Cloud computing and big data used and also open data for persons.
- **Get creative when re-thinking transportation:** Use creative ideas for transport systems in smart cities.
- **Don't downplay digital security:** Make sure user data secure from any cyber threat. Not any misuse of using digital data and information [8].
- **Smart city initiatives should complement low-tech initiatives:** Cities ambitious to become "smart" run the risk of becoming so motivated by technology that they lose sight of promising initiatives that don't require connected sensors or any other type of Widget.

Securing smart cities using block-chain technology
Propose is a security framework that integrates the block-chain technology with smart devices to provide a secure communication platform in a smart city. Which is allows communicating the entities in a smart city without compromising privacy and security? Internet of things is to use blockchain technology for secure data from cyber-attack and other security laps [12].

6. Search strategy
We have done a systematic search for our paper on renowned digital libraries for our review paper. We also use many review papers to enhance our results and find. We match our main quires for selecting any paper also check the paper worth and used latest papers for the betterment of our review.

i) Google scholar
https://scholar.google.com.pk/
This is a most common digital library for searching data. We used some research papers from this library for our review and results.

ii) Science direct
https://www.sciencedirect.com/
This is a well-known digital library for searching scientific papers. We used most of the time science direct articles for our research work. Our most of the search question selected from this library.

iii) Ieee xplore
http://ieeexplore.ieee.org/Xplore/home.jsp
We also used this library for our research work. Most of the papers we used, not only search papers but also follow the paper pattern for our work from there.

iv) Springer
http://www.springer.com/in/
We search many articles from this database. We find some unique information from this digital library for our search. This library is very useful for us.

v) Acm
https://www.acm.org/
This is the last library we used for our work. This is also a big online library for different research work although we are not add use much papers of this library.

7. Future work/results
Smart cities is a very progressive topic in today research and as well as for future research project and third world countries needs to be use technology for overcome their problems. Our work is about the basic study of smart city projects possibilities in Pakistan and information about first smart city

project in Pakistan. This is actually a private sector project and some efforts to make the smart city of Lahore. Present a study on smart city project vision. For the future, there is need to complete a feasibility study of smart cities project in Pakistan and Comparison with other smart city projects in the region.

8. Acknowledgment

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