Nano Empowered Nano Assisted Internet of Things (IoT) Assisted Strategic Sustainable Development Framework for Smart Cities

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In the current era, the idea of smart cities is linked to development strategies, connecting targets and dimensions of sustainable growth to the most significant advantage possible. The rapid urbanization of urban cities in developing countries brought up urban planning problems such as the demand gaps and availability of infrastructure or services, pollution, the reduction of natural-green areas, the peri-urban type of settlements, and much more. Once, in this paper, the nano assisted Nano assisted Internet of things - Integrated Strategic Sustainable Development Framework (IoT-IS SDF) for smart cities has been proposed in this paper. A crucial place to catalyse an environmentally sustainable growth process can be played with IoT and big data applications. However, the article mainly addressed the IoT and Big Data applications in smart cities to improve economic development and the quality of life, ignoring the role played by sustainable cities in enhancing environmental sustainability in smart potential. The proposed framework to be tested, validated and reviewed through an observer study would further enhance the scope of analysis for smart, sustainable urban areas. This paper will help to provide urban planners, scientists, Information, Communication and Technology (ICT) experts and stakeholders with information about the environmental benefits of smart, sustainable cities and projects based on IoT and big data.

Keywords: Sustainable development, Nano assisted Internet of things, Smart city.

1. Introduction

In a smart city, various IoT based sensors have been used to collect and use the information to execute some services for asset management and effective resources. Smart cities use data and technology for efficiency, enhancing sustainable growth, creating economic growth, improving life factors and quality for people [1]. The smart city concept has been developed based on technical policies and growth strategies for development, which needs to be carried out by linking priorities and dimensions of sustainable development to take more significant advantages of the available technological opportunities [2]. Smart cities on sustainable growth objectives based on smart industry services will support smart infrastructure [3].

The sustainable smart city is a place to live and a business environment providing for sustainable development via systematic implementation with creativity in technology, equipment, and facilities [4]. Sustainable in development, smart cities have to be desirable for both people as well as companies to be viable economically [5]. Understanding the needs of the people is essential to involve them in the city to build an active, sustainable development and an efficient urban ecosystem [32]. The term IoT [6], in general, refers to the quick-growing amount of digital equipment of such devices that can communicate and act with others through the global network, and they can be tracked and controlled remotely [7]. In this framework, environmental sustainability in smart cities improved with the Nano assisted Internet of things based on the integrated strategic sustainable development framework (IoT-IS SDF) [8]. The proposed framework addresses IoT and big data applications for improving economic development and quality of life in smart cities [9]. Big data provide a city with potential to get useful information of data collected from various sources, IoT allows the sensors to be integrated radio frequency recognition, and Bluetooth use highly networked systems in the real-world environment [33].

The introduced IoT and big data research fields have created new and fascinating challenges to solve future intelligent cities. Presently, cities face certain obstacles such as lack of physical and financial resources, environmental standards and enforcement, population rising, and many more. However, the proposed framework contributes new and intelligent ways of managing urban living complexity, problems concerning emissions, overcrowding, and urban expansion into insufficient housing and protection of the atmosphere.

The author represented a new Smart and Connected Communities ("SCC") concept whose objective is to improve living standards, maintenance, recovery, and durability, a society called smart cities [11]. The challenges and opportunities of IoT analysis and big data analytics to preserve the culture and regeneration of SCC. The smart use of IoT and big data analysis could integrate a large number of SCC [12]. In the case study, freight combining the analysis of IoT and big data intelligent tourism sustainable cultural heritage in Trento City, Italy [13]. The purpose of this paper is to convey the essence of smart cities and provides a short overview of smart cities followed by their functionalities and features, general architecture, structure, and realization of smart cities [14]. This includes the different concepts which use urban information, communication and Technology (ICTs) Digital Town, Green town, sustainable town, smart town, etc. The smart town stands out of all terms because of its overall view [10]. The features and characteristics are simply described as a way of understanding the smart city theory. The generic era architecture of a smart city is illustrated after careful examination of the smart proposed architectures of the city. Smart City is an interoperability system between different sub-systems to improve urban citizens. The author has recommended and developed a smart urban system using IoT-based big data analysis [15]. Authors proposed for the use of smart home sensors for deployment, networking of the engine, weather and the sensors of wind. The full architecture and model of implementation is planned to use the Hadoop Ecosystem in a real environment [16]. The program is applied in many steps to begin data collection and generation, adding, filtering, sorting, pre-processing, computation, and completion at making decisions. Spark over hadoop achieves high data processing efficiency [17]. The proposed architecture used smart City and urban planning through IoT and big data analyses [20]. The Hadoop ecosystem processes large data produced in the community of all intelligent systems [28]. Smart cities can benefit the usage of the knowledge big, cross-theme, sometimes in real-time, data collection, retrieval, integration, and sharing cloud-deployed inter-operative services. Such use of knowledge, however, requires adequate resources, collecting, processing, operation, equipped citizens and different municipal departments and agencies [18]. This article reported a theoretical view of the intelligent cities of an analysis service based on cloud that can to be built further to generate intelligence and policy support in smart future cities. Intelligent cities can be obtained mainly from various sensors, customer and integrated smart phones to provide analytical reasoning with city data repositories and generate information necessary for better decision-making governance of the city [19] [34]. Cloud computing provides a wider chance in large data production, research and retrieval cities created but new tools and resources are needed for processing effectively to analyse city data.

The integration of big data and IoT played an significant role in the viability of intelligent city technology. Big data offer cities the possibility to get useful insights a wide range of data collected from different sources, and IoT enables sensors to be integrated, identification of radio frequency and the use of highly networked networks in the real world. The author described the latest technological development and smart applications used in smart cities [21]. Vision analysis of large data intelligent cities resource is addressed over emphasis the big data change substantial development in metropolitan cities. Big data analysis can play an important role in future business model and smart cities design applications. Big data can play a vital role obtaining valuable information for the purpose of decision making. The author represented a new definition of consumer big data reduction end in which operations of early data reduction are carried out to reach multiple goals, like reduced costs of service use, enhancing customer and business confidence, conservation of customer privacy enables secure sharing of data, and to delegate control of data sharing to clients [22-24]. The author proposed early data reduction framework, and reduction of end-to - end data in client application. The article reported an overview of an economic model and maps the potential areas of operation with the several optimized components [25-26]. The author proposed a hierarchical structure of smart city systems with complex levels ranging from high to low and linkage and five-dimensional cloud calculation, Nano assisted Internet of things (IoT), big data, cloud and smart enterprise [27][35]. Each core operating system resource integrates cities to encourage innovative urban operation and optimize the city for further development. The paper proposed a data flow framework for a big data platform, using data from omnipresent networking and sensor systems and big analytical data processing equipment in smart cities and identifying the advantages and obstacles. The critical customer confidentiality and information identify personal data and robust sharing. It is important to pay attention to whether precautionary measures or data sources value the standards of confidentiality or the analytical method used is appropriate. And if the results of the large data review are completely used to ensure data confidentiality and customer rights, it will enhance the concept [29-30]. Finally, under the influence of the modern creation of intelligent cities, traditional laws and regulations can be amended, depends on changes to the methods of planning on the efforts of government and large companies in the strategy and implementation leadership. The digital technologies are innovative and have intelligent urban solutions to reach the sustainable target, which must be implemented correctly of intelligent towns with low carbon, environmentally sustainable, renewable electricity, recycling and living conditions. In particular, the smart city assessment indicators that evaluate the local advantages and needs of the Taiwanese community will contribute to an established consolidation of resource using local features, efficient city planning and comfort in their lives and ultimately to better quality of life and friendliest atmosphere for sustainable growth [31]. Due to Taiwan's unique insular environment and its assets limits intelligent town people's growth needs to the ICT benefits should be used to solve local problem. The system proposed focuses primarily on sustainable development, which will boost economic growth and living standards. This approach uses IoT and big data analysis techniques to mitigate urban planning problems. The use of the proposed method IoT-ISSDF addresses issues like demand gaps and the provision of infrastructure and facilities, congestion, pollution, decrease in natural and green areas, peri-urban settlement, etc.

The proposed framework IoT-ISSDF deals with inviting residents, delivering public facilities and change in urban infrastructure. The smart city is planned to improve the quality of life of residents through the use of technology and the incorporation of various functions, including data management for people, smart transport, public safety and security. Many tools such as sensors, gateways, infrastructure for communication and servers carry the life of IoT and big data idea to shape the future cities.

2. Proposed framework of modeled IoT layered Architecture

2.1 IoT Layered Architecture in smart city

The IoT-ISSDF designed in a focus to achieve the environment sustainability in potential smart for sustainable cities. In smart cities, IoT and big-data applications improve economic development and life quality. The architecture of the IoT in smart city shows in fig 1. defines the sensors/actuators used in city, gateway network layer collects the data from the sensing device transfer to processing unit and finally processed data transferred to application. The Nano assisted Internet of things is the concept that any device can connect to the Internet and other devices associated.

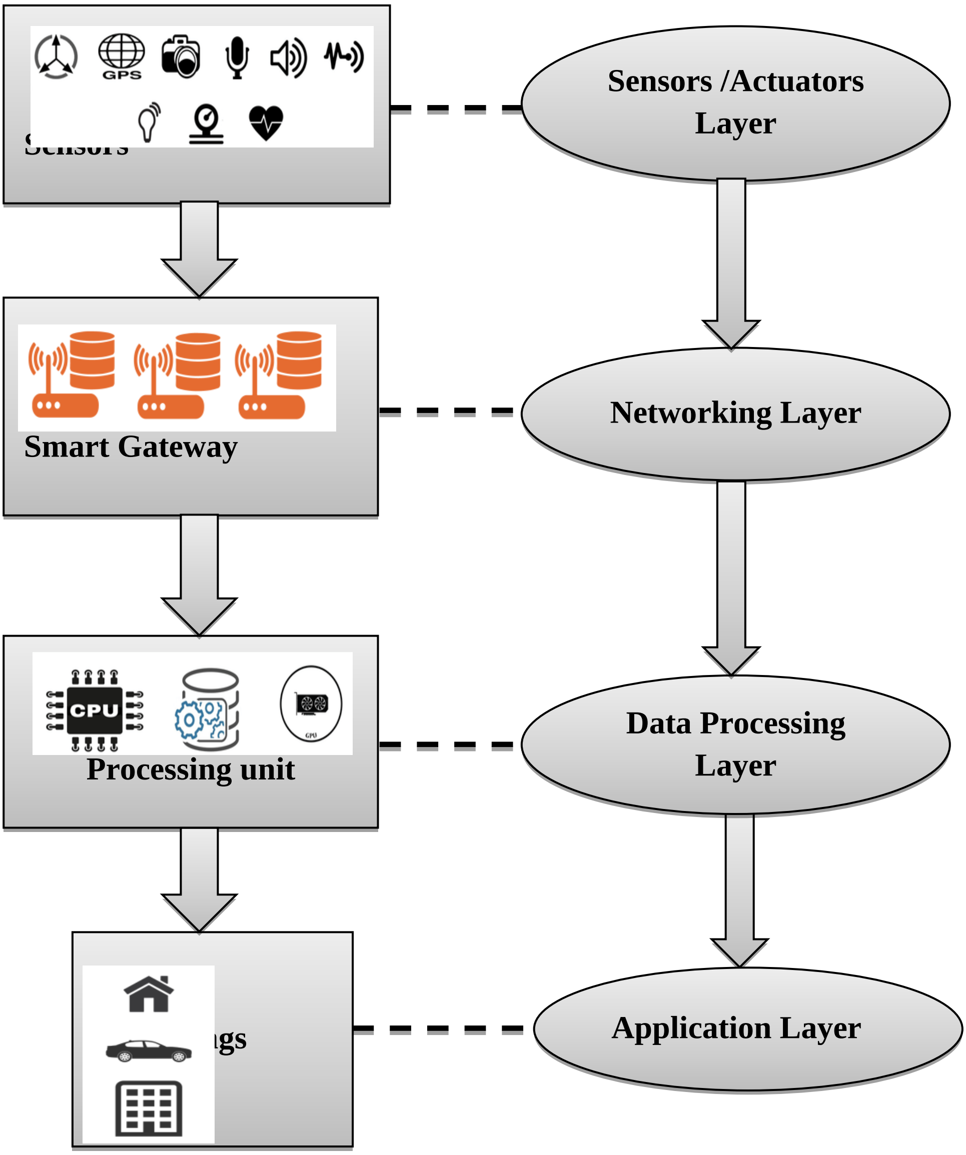

Fig 1. Application of IoT Layered Architecture in Smart City

The IoT is a massive network of people and linked all collect and share information on the way, they are used and about the natural area. The basic elements of IoT connected devices like data interpretation, Security of system, connecting network, user interface, stack of data and hardware for central control. The role of IoT is about the physical devices working with the internet, vehicles, constructions and other objects which enables the data collection and sharing of these items incorporated with electronics technology, sensors, actuators and communication network. The equipment is the most important thing for physical objects. The sensors are the communication layer components of the device's asset control systems. The environment data and data transmitted to the next level are collected continuously by smart sensors. Latest semiconductor manufacturing techniques are able to manufacture the smart micro-sensors for various applications. A control panel handles data traffic in two directions between the various protocols and networks. The other function of the control panel is to transfer several network protocols and to make interoperable connected devices and sensors. The Nano assisted Internet of things creates larger networks and users to handle effectively. IoT cloud provide real time data collection, recovery, management and storage tools. Industries and companies can easily access this information over the distance and take important decisions when it is necessary. IoT Cloud is usually high-performance network servers configured to process myriad high-speed data devices, manage traffic and analyse data accurately. Distributed management database systems are one of the key components of IoT cloud. The visible and tangible part of the IoT system is the user interfaces which are accessible by the users for minimal user effort and for additional interactions. The user's interface design is more important on today's competitive market and the consumer decides whether or not to choose a tool or equipment. In recent years, IoT has become the main trend in the explosive development of controlled, Internet-connected devices. The broad range of IoT technology applications can differ widely among devices.

The sensing layer consists of sensors and actuators that collect the data from the environmental. It defines certain physical or other intelligent environmental parameters. The network layer communicates with other intelligent devices, networking and servers. Its functions are used to transmit and process sensor data. The application layer is responsible for providing the application to special services of the user. The Nano assisted Internet of things describes a variety of applications, such as smart cities, smart homes, smart business, smart car parking, smart police stations and smart safety, etc. The transport layer transmits wireless, 3G, 4G ,5G, LAN, bluetooth, Radio Frequency identification (RFID) and Near Field Communication (NFC) sensor data to the processing layer, and vice versa. The layer of application is often called the middle layer. It stores, assesses and processes large quantities of data from the transmitter layer. It can handle and provide a wide range of facilities at the bottom levels. It uses a range of methods, including databases, cloud and data processing modules. The application layer controls the entire IoT programme, including the application, business model and privacy of users.

3. Advanced technology for communication

Smart networks are needed mostly for big data application to link their components and equipment in smart cities for residents like cars, intelligent home appliances and smartphones. The network able to transmit the collected data efficiently. Data are collected from their sources, stored and processed in big data and to transfer direct feedback to the various entities in the smart city. Performance of network service support is critical for real time smart cities big data technology. All current distributed device events for these applications in real time, it should be transferred to where it can be processed. For identifying and tracking tags attached for objects RFID uses electromagnetic fields. Electronic registered active, passive and passive information help tags found in track tags. The active type operated with battery periodically and transmit the ID signal. The passive type uses radio frequency to transmit and reads the signal. The passive type with battery has small on-board battery and transmits the signal with RFID reader. The RFID technology makes the implementation suited to smart cities. Wireless sensor Data (WSN) network consist of independent sense node distribution that use integrated low power circuit and wireless networking system to disseminate the data between two connected sensor devices. The sensor must be transmitted by a radio receiver and receive the signals, the microcontroller controls the electronic circuit with the sensors and power supply. The WSN's ability to connect low cost and large devices improved the ability to use a multiple intelligent sensor network.

The feature of WSN makes it useful in many areas, monitoring and controlling of industrial processes, monitoring of machine health, prevention of natural disasters, and monitoring of water quality. In real time, the WSN network monitors the environmental conditions such as temperature, pressure, light, moisture etc., the devices such as switches and generators to control the conditions by means of an effective wireless network or actuators. The features allow the application of WSN to smart houses, smart buildings and smart education, and smart health. Wireless Networking is an increasing versatile and mobile technology. Wireless fidelity (Wi-Fi) is a wireless service protocol supplement for traditional cable networks and permits consumer's internet connectivity at high-speed broadband connections in adhoc mode at an access Point. Ultra large band is geared to high indoor bandwidth multimedia links to low-range wireless networks. ZigBee used for wireless short range communication with battery usability provision for durability. Bluetooth technology used low range radio waves and cheap computer peripheral cables replacement kits, mices, buttons, joysticks, scanners, etc. For the majority of machines, the 4G Wireless Networks should be used traffic in the machine. Advanced Long-Term Evolution (LTE) bridges the 4G-5G gap by adding high bandwidth, carrier aggregation and produce three times higher than standard LTE network. Multiple input and multiple output (MIMO) organized the station relays and the network heterogeneous. 5G is an advanced platform-based system more than a hundred billion items to be collected and the bandwidth with a relatively low latency is provided by up to 10 Gbit/ sec.

4. Big data and sustainable growth workflows in smart cities

In this research smart cities are increasingly adopting technology such as big data, IoT and distributed sensors. By installing sensors in urban infrastructure and new data sources are generated including citizens through their mobile equipment and the big data analyses the smart city planner to monitor urban phenomena and anticipate them in new ways. Big data has tremendous potential to expand and using smart public infrastructure. In smart cities, information and communication technology plays a significant role in providing data collected by information technology components. The IoT works via communication between connected devices data exchange requiring Internet, wireless connections and other means of communication. In particular, smart cities use IoT devices to retrieve and process data efficiently in a certain area for the implementation. Intelligent city sensors and linked devices collect data from various cities installed in, smart city gateways are analysed and made better choices. The smart urban process was affected by other technologies. Cloud platforms and analytical applications offer an affordable solution means of data and solutions management for transportation; create insights for efficient delivery safer routes of traffic on existing roads. Fig 2. Shows the big data application and work plan for sustainable development in smart City.

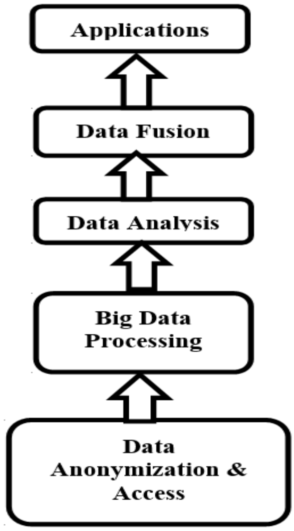

Fig 2. Big Data Application work flow for Sustainable Development in Smart City

In infrastructure development, smart cities are the new buzz word. With an increasing flow of people into towns and an ever growing need to be controlled the capital more effectively, with up to date technologies to make cities smarter. Fig 3. shows the smart city sustainable development model.

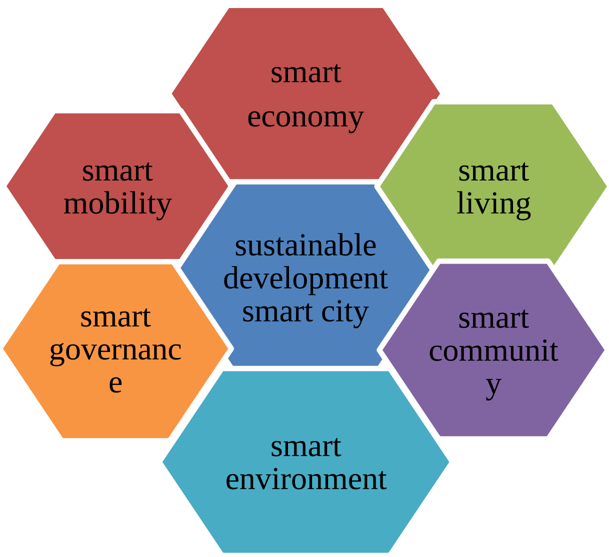

Fig 3. Model of Sustainable Development in Smart City

A. Smart mobility

With rising urban overcrowding in decongesting smart cities transportation should play a key role for future. The transport flow with big data both public and private-city-wide can be closely monitored to identify areas, high-congestion times possible to break down successful solutions.

B. Smart Living

Big data can greatly improve the public health of smart cities identify sensitive areas for disease spreading and take preventive action to build better health records, faster Diagnosis and better clinical care for the patient, diagnoses the diseases and improved patient care overall.

C. Smart governance

With a wider data stream from people, citizens and the government can build stronger bridges. Governments should resolve local issues more effectively by building a citizen-centered governance model that increases transparency between the public and the government.

D. Smart Environment

Presently, Cities use technical approaches to make cleaner environment and waste reduction. Houses have smart waste collection station where residents have trash bags available, natural and fuel isolated. The station has sensors which detect when it is full. The garbage is transmitted automatically through pressure pipes to a recycling facility directly.

E. Smart Economy

Traffic light sensors are integrated with traffic signs, vehicles for public transport, telephone stands and traffic volume scale, air quality, waste, etc. Data lake stores advanced data and analytics data from different sources are applied to pair and to develop knowledge.

F. Smart Community

More efficient work and living models with better services, and less waste, clever towns people should have better quality of life. Better planning of life, work areas, sites planning, better and faster efficient transport systems services and sufficient information availability for decision making are for smart community.

5. Big Data Layered Architecture

Big-data analysis with very wide, complex, organized data sets semi-present and unstructured data from different sources and in varying proportions from terabytes to zettabytes are used for sophisticated computing purposes. High volume, high speed, or high variability are the characteristics of big data. Big data consisting of sensors, machines, video and audio, networking, log files, trade and social media apps all in real time on a global scale are the architecture of big data. Fig 4. shows the big data layered architecture.

The foundation of architecture is a data layer organized knowledge in an Relational

Database Management System (RDBMS) at this stage, H-base, Impala or Structured Query Language (SQL) Hadoop Map Reduce unstructured data, web streaming data, operating systems, social media and sensors and limited concise analytical capabilities devices such as Hive, HBase, Storm and Spark devices. The analytical layer is below the data layer. The analytical layer includes an environment for complex and real-time research for model creation in the technical world and a local data mart which is updated periodically at the data layer next to the research engine to improve performance. The integration layer is located below the analytical layer. This is the glue that combines end-user applications with analytical engines, usually including a rule engine, and a dynamic analytic application framework that broken the application developers to communications with data scientists. The decision layer is the bottom layer. The gum meets the road and end-user applications like desktop that can include mobile interactive web apps and software for business intelligence. The degree of interaction between business analysts, c-suite managers and clients and in real time the big data analytics system.

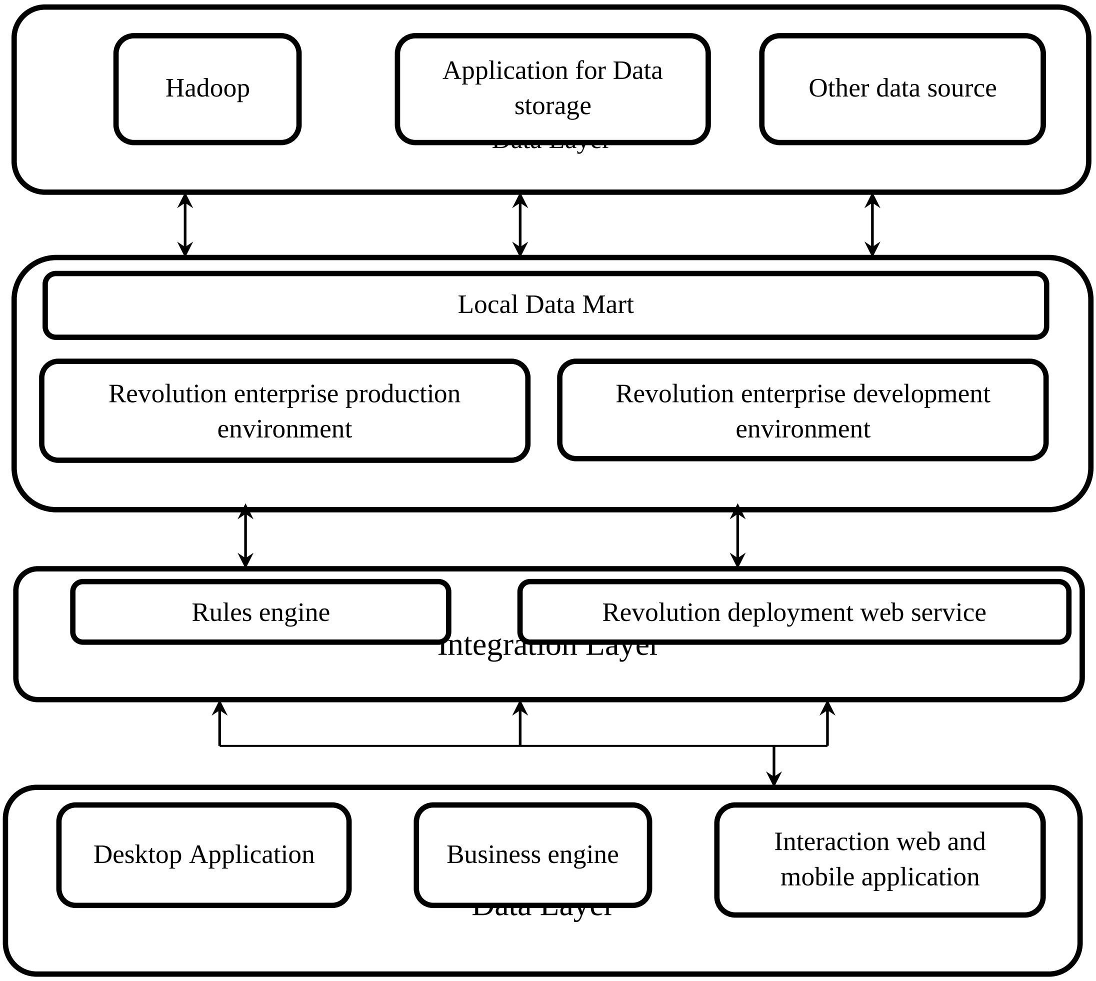

Fig 4. Big data layered architecture in real time

The big data collected generally from sensor data like surveillance camera, temperature sensor etc., that in effect can supply mixed sensing data. Random variables characterizing data mathematically disparate from various sensors distributions of probability. y_m represented as the m[th] sensor data and $y = \{y_m\}_{m=1}^{P}$ as the mixed data set, the minimal $\{y_m\}_{m=1}^{P}$ are usually distributed either non-identically or mixed data distributed. The probability density function $V(Y)$of mixed data set Y essential to get from minimal probability density function (pdf) $\{V(y_m)\}_{m=1}^{P}$, the probability theory tackles mixed data processing in IoT. It is a cumulative distribution multivariate feature the median distribution of likelihood for increasing vector is uniform. The random vector S be a m-dimensional cumulative distribution function with constant minimal as represented as $S_1, S_2, S_3, \ldots S_m$. Then a unique C-function for everyone and all $(y_1, y_2, \ldots y_m)$in $[-\infty, +\infty]$. The theory and statistics on probability, copula is the cumulative distribution multivariate function the marginal distribution of probabilities of each variable at interval is uniform. High dimensional statistical applications are common for copulas. Since they make the distribution of random vectors easy to model and to estimate the margins and copula are measured separately.

$$S(y_1, y_2, \ldots y_m) = E\ (S_1(y_1), S_2(y_2) \ldots S_m(y_m)) \qquad (1)$$

The explicit appearance of the cumulative distribution two methods for statistical analysis. The analysis of the cumulative frequency is the incidence frequency of phenomenon values below the reference value. The empirical function is an official direct estimate. Cumulative function of distribution with simple statistical features can be derived and form the basis of various statistical tests for hypotheses. The pdf is possible by taking the derivative of M-order derivate for (1)

$$S(y_1, y_2, \ldots y_m) = \frac{\mu^m}{\mu_{y_1}\mu_{y_2}\cdots\mu_{y_m}}\ E(\ (S_1(y_1), S_2(y_2) \ldots S_m(y_m)) \qquad (2)$$

$$= S_f(y_1, y_2, \ldots y_m) E(\ (S_1(y_1), S_2(y_2) \ldots S_m(y_m)) \qquad (3)$$

where $S_f(y_1, y_2, \ldots y_m)$ denotes the product of minimal pdf $y = \{y_m\}_{m=1}^{P}$ and probability theory and the distribution of product properly to eliminate the random variable dependency.Small matrix regeneration with thick noise and sporadic abnormalities, assume that a large data matrix B, and know it could be broken as,

$$B = D + T \qquad (4)$$

Where D small matrix regeneration , T is the noise matrix. The small dimension column and row dimension of D, are not familiar with their dimension. To retrieve matrix D steadily from matrix B for sensing data, as the classical key component analysis, the problem of interest could be formulated,

$$min\,\{D\}\ \parallel D \parallel_* \rightarrow \parallel B - D \parallel_{E \leq \rho} \qquad (5)$$

Where ρ is the parameter related to noise, $\parallel D \parallel_*$ and $\parallel B - D \parallel_E$ denotes for sum of single value and matrix norm as inferred from the fig.4-a.

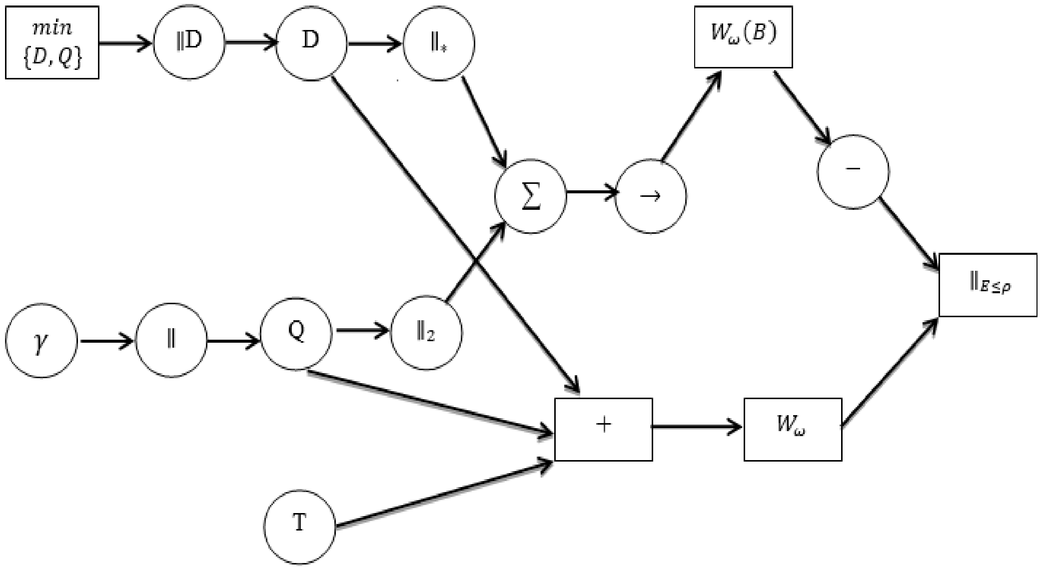

Fig. 4-a orthogonal screening of the sensing data matrix dimension using cumulative distribution function

In addition, if some abnormal data available Q injected into the sensor data matrix$B$,

$$B = D + T + Q \qquad (6)$$

where Q has a not null sparse entry, which can be of arbitrary size.

As inferred from the fig.4-b, to determine random variable falling within a common set of values in comparison to any single value. The integral part of the variable pdf gives probability around the range of field in terms of density, further, above the horizontal axis between the lowest and highest range values.

$$min\,\{D, Q\} \;\|\, D \,\|_{*} + \gamma \,\|\, Q \,\|_{2} \rightarrow \|\, B - D - Q \,\|_{E\le\rho} \qquad (7)$$

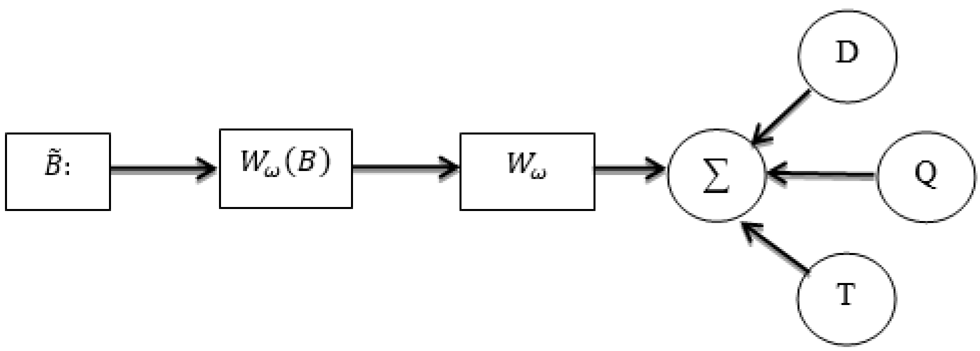

Fig. 4-b Sensing data with orthogonal screening

where γ is a positive parameter for rank-sparsely control, and $\|.\|_*$ stands for the matrix is not null entries. It is normally hard to acquire all sensing data matrix B entries, due to mainly loss of sensing data transmission from the data centre sensors, and lack of crowd sources opportunities. The sensing data matrix $\tilde{B}$: in this case, comprises rude, corrupt and incomplete comments,

$$\tilde{B} := W_\omega(B) = W_\omega(D + Q + T) \qquad (8)$$

Where $\omega \le |G|X|H|$ the collection of indicators of the entries is acquired and W_ω is the orthogonal screening on the linear matrix subspace sponsored on ω. To be stable get back the components of low and sparse rank D and Q,

$$min\,\{D, Q\}\ \| D \|_* + \gamma \| Q \|_2 \rightarrow \| W_\omega(B) - W_\omega(D + Q + T) \|_{E \le \rho} \qquad (9)$$

6. Result and Discussion

A preliminary analysis of the applicability of this work presented to achieve the environment sustainability in smart cities. The proposed IoT-ISSDF framework is designed to implement IoT and big data applications, overcoming the urban planning problem. The harmful gas with time analysis as shown in Table 1.

Table 1. The harmful gas with time analysis

Time(s)	Nitrogen oxide	Ozone	Sulfur-di-oxide	Carbon Mono-oxide	Lead	Methane	Particulate Matter
10	12	5	10	15	20	11	13
20	20	15	20	21	25	28	30
30	35	23	18	25	28	23	32
40	28	32	23	19	31	32	25
50	11	35	28	30	45	26	32
60	20	38	25	32	43	30	40
70	25	45	29	35	19	35	45
80	31	48	32	25	25	38	38
90	38	36	27	30	38	26	32

Furthermore, smart cities have adapted the big data application concept in that SCC method to improve quality of life, economic, recovery and durability formation of IoT analytics and big data analytics are generally established and preserve the civilization and SCC regeneration. The IoT-ISSDF is proposed to achieve quality of life, which mainly overlooks the role of sustainable environmental sustainability in smart cities. The Fig5. shows the overall harmful gas emission with time analysis.

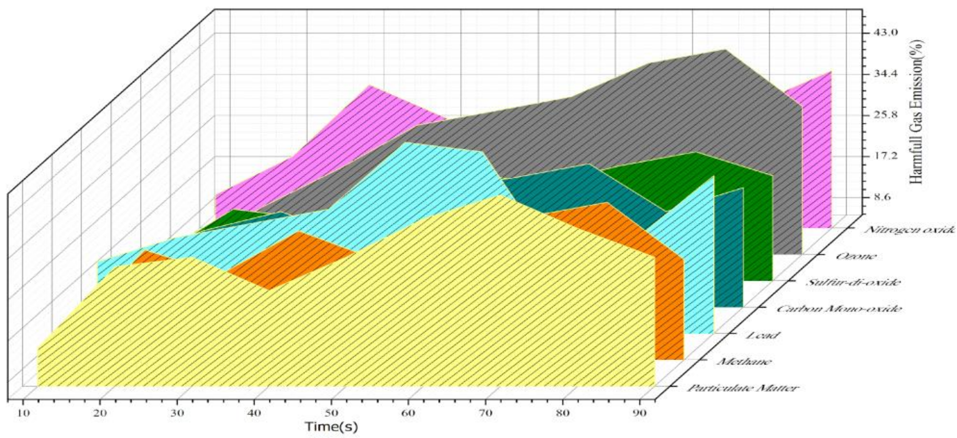

Fig 5. Harmful Gas Emission with time analysis

This approach significantly increases the data utilization of IoT and big data use in comparison with related works. The proposed method presented has to improve the environmental sustainability in smart cities. It presents a thorough IoT analytical and big data analytical analysis of a wide range of features on the recognition of several classes of SCC. To combine results, the issues of urban planning with harmful gas relation, minimum waste management and highest health care application have been compared. Fig 6 shows the data usage with time analysis.

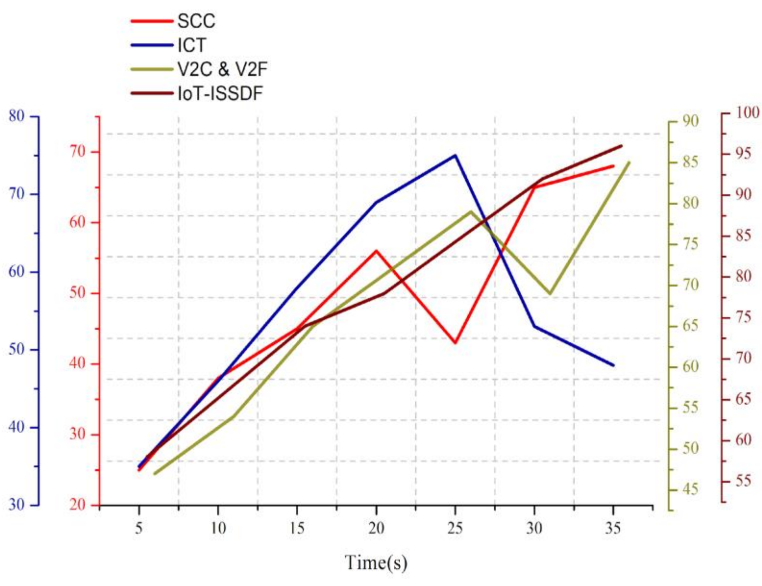

Fig 6. IoT-ISSDF data usage with time analysis

The proposed method tackles some key urban planning issues in particularly, pollution, reduction in natural-green areas, congestion, health care etc., to achieve the environment sustainability in smart cities. The IoT and big data application reduce urban planning issues significantly at the expense of the high positive false rate, however. The following steps include an additional in this framework to improve the sustainable growth in smart cities.

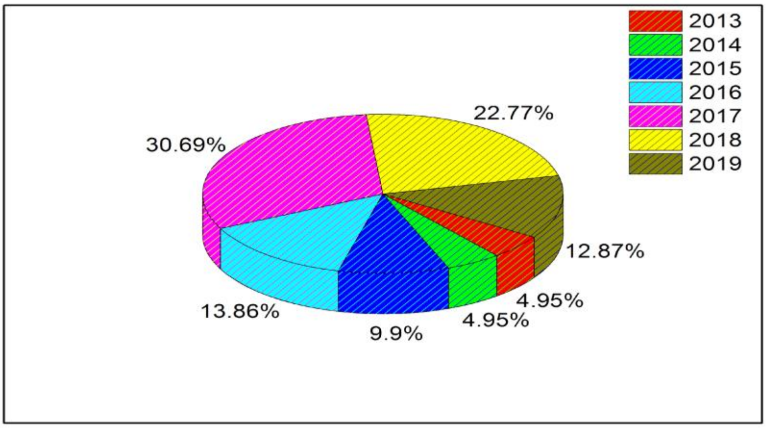

Fig 7. Waste Management for various year

Fig 7 shows the waste management for various years. The proposed IoT-ISSDF is implemented in the smart city with IoT and big data field. Various sensors installed in urban infrastructure and new data sources are generated including citizens through their mobile equipment and the big data analyses the smart city planner to be monitor urban phenomena and anticipate them in new ways. IoT and big data and have tremendous potential to expand and using smart public infrastructure for sustainable environment.

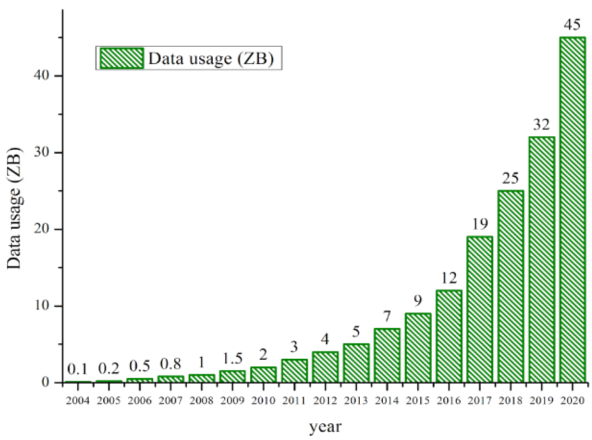

Fig 8. Big data explosion in congestion and urban planning

Fig 8 shows the health care for various years. The best effects from extracted features from the IoT-ISSDF are respectively decreased by traffic congestion, pollution, a reduction in natural-green areas and reduce urban planning issues. It can be understood that big data provide a city with potential to get useful information of data collected from various sources, and IoT allows sensors to be integrated radio frequency recognition and Bluetooth use highly networked systems in the real-world environment. The big data collected generally from sensor data like surveillance camera, temperature sensor etc., that in effect can supply mixed sensing data. Random variables characterizing data mathematically disparate from various sensors distributions of probability. It is observed that the technologies continuously improved from the past decades and implementations of developed technology in urban cities are sufficiently lesser. The proposed technique is mainly to implement the developed technology to overcome the urban planning issues to shape the future city in smarter.

7. Summary of the Research

The proposed framework is designed to achieve urban complexity, emissions issues, overcrowding and urban expansion into insufficient housing and atmospheric protection in conjunction with IoT and big data application. Fig 9. shows the technological advancement in smart cities, enhancement of the quality of life and economic growth through the use of technology and incorporation of multiple functions such as data management for people, smart transportation, public health and safety. The proposed scheme can achieve a better solution for urban planning issues and shape the future smart cities.

8. Conclusion and future Scope

The IoT-ISSDF for Smart Cities has been proposed in this manuscript, which aims to improve economic development and quality of life for sustainable development in smart cities. The introduced framework inherits the benefits of using IoT analytical and big data analytical analysis method for improving the environmental sustainability in potential smart, sustainable cities. Rapid urbanisation has occurred in urban city centres in developing countries, which raise urban planning problems such as demand gaps and access to infrastructures and services, congestion of traffic, pollution, reduction of natural and green areas is controlled by IoT and the use of big data. The urban city issues will be reduced and improved in smarter way to achieve sustainable development. In future, the framework planned for the implementation of smart e-waste system, smart power system, smart community and smart health management with the block chain application.

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