

# Conceptual Structure of Urban Infrastructure Management (UIM) in Smart Cities

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## Article Info

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## Abstract:

In this paper the conceptual structure of urban infrastructure management in smart cities is done. The main intent of this paper is to implement the urban infrastructure management to improve the quality of people's life. Hence the important task is select and ranks the projects which are included in the Smart city's infrastructure development. In this first urban infrastructure assets and values are described. Smart city planning is explained and next urban infrastructure management planning is given. The information infrastructure has increasing impact on urban process. Therefore this article presents a conceptual version of an applied urban infrastructure management solution that, on the one hand, includes objective and subjective criteria for ranking projects, on the other hand, includes management mechanisms and best practices for managing from IT-field. The complex will form the functional core of the applied solution.

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## I. INTRODUCTION

Around the globe, urban framework is maturing and populaces are flooding, compelling the present city pioneers to settle on extreme choices about foundation that will affect ages to come. These decisions will characterize the heritage they leave and whether they can situate their urban areas to flourish later on. In any case, they additionally need to settle on these decisions inside the bounds of restricted city spending plans that must all the while address the requirement for new or redesigned transport, water, vitality, IT and waste frameworks [1]. Such budgetary strains frequently lead to disappointing trade offs, and city pioneers must be prepared to protect their decisions to open and private partners, to guarantee they have purchase in for these speculations.

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By and large, "offering" these tasks to destitute citizens is a significant snag, as city pioneers attempt to persuade residents to help a costly urban venture that may upset their condition and take a long time to finish. These snags to framework improvement can appear to be unrealistic, however they should be tended to if urban communities need to be all around situated for what's to come [2].

As Michael Häupl, city hall leader of Vienna, declares, "Foundation improvement is an open door for development and intensity, yet in addition for making and safeguarding employments, particularly in testing financial occasions." Keeping these frameworks and administrations operational, and preparing them for the people to come, is a consistent test. In created country urban areas, streets, streams, sewers frameworks and vitality matrices are frequently decades old and many have since a long time ago passed their normal life cycles. These maturing frameworks were worked with obsolete innovation, and are encountering an expanding requirement for support and moves up to keep them operational.

Very much created urban communities face the test of retrofitting foundation that no longer fits the

reason," says Mark Watts, chief head of C40 Cities Climate Leadership in London, a system of pioneers from the world's megacities making a move to diminish ozone harming substance discharges. A considerable lot of these urban communities have been in response mode, fixing water mains, power lattices and streets as issues happen. "Foundation resembles the bones of the city, so you must settle on decisions in light of the long view." In developing markets, city pioneers are confronting a significantly greater test, as quick populace development drives effectively inadequate framework further past its ability. These weights bring about gigantic blockage, over-tapped water frameworks, and questionable access to vitality and IT [3].

There is an indispensable need to decrease squander; this incorporates both the wasteful utilization of framework frameworks and the measure of waste delivered by city inhabitants. "The planet is reeling from the aggregate effect of urban communities," the urban populaces keep on developing; the weight on city pioneers to manufacture reasonable high-performing framework frameworks and administrations is just going to increment. "In the event that we don't get new urban communities right, and fix the current urban areas, we're in a bad way."

As per our study, residents and business pioneers overwhelmingly accuse city pioneers for helpless foundation support, referring to absence of political will, absence of aptitudes among authorities, and poor legislative adequacy for these issues. What's more, the more terrible off a city's framework is, the less confidence residents have in their pioneers. Among the individuals who live in urban communities where foundation is seen as lacking today, the greater part refer to "debasement or abuse of assets" as a main obstruction [4-5].

Worldwide urban-framework frameworks and administrations are fit as a fiddle. Be that as it may, city pioneers can't stand to be smug. While 75% of respondents evaluated their present frameworks as satisfactory today, completely 68% state they should make generous speculations inside the following five years to keep these frameworks working and to address the issues of quickly developing populaces.

## II. INFRASTRUCTURE ASSETS AND THEIR VALUE

Deciding whether returns are satisfactory or could or ought to be more noteworthy requires an away from of the estimation of the advantages for be overseen. Making a decision about the benefit estimation of framework is, be that as it may, a really mind boggling task with various measurements. There are social, natural, stylish, and political parts of foundation's benefit esteem, just as the more customarily comprehended monetary and budgetary perspectives. Investigating and figuring out how to manage these more extensive parts of the open's framework resources will be a significant piece of the Partnership's examination contemplates.

Numerous administration offices have information just on noteworthy uses, and regularly have just halfway records for their framework. Given the long help life of numerous components of the framework – frequently 50 to 100 years and then some – these authentic uses have just constrained uses as a reason for thinking about foundation's worth. Set in suitable setting, e.g., in contrast with patterns in populace, created land regions, or financial exercises inside a locale, even extremely old verifiable records can by and by be helpful to the present leaders.

The essential concentration for building up IBS values, be that as it may, will be evaluated current expenses for supplanting offices and giving the activities they support. These assessments should commonly be gotten from building cost models or financial approximations dependent on late information, successfully a never-ending turn of the offices stock on what the executive's bookkeepers would term a "toward the end in-first-out" premise.

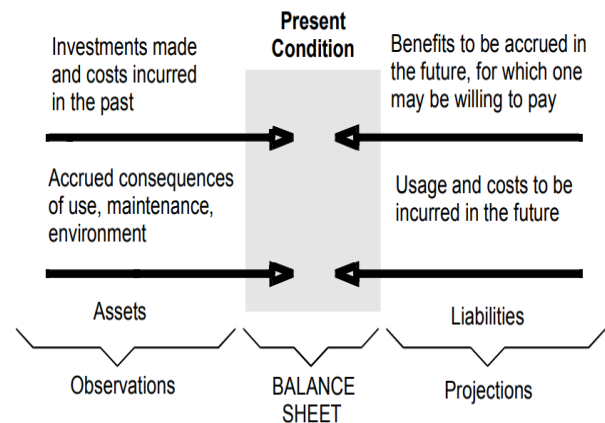
Again taking into account the long assistance life of foundation, most framework administrators perceive that the expenses of development speak to just a small amount of the general expenses of foundation. The "life-cycle cost" of foundation is then determined to speak to the presumable impact of activities, upkeep, and administration utilization all through the all-inclusive assistance life of an office. On the off chance that upkeep is ignored or utilization forces more noteworthy pressure or wear on the office than was envisioned, life cycle

expenses may increment. The aggregated impact of wear, condition, upkeep practices, and other such factors is reflected – to the degree these impacts can be assessed – in the "proportionate present worth" gauge. This worth gauge is an auxiliary focal point of the IBS data, a significant reason for making decisions about upkeep and fix strategies.

The genuine estimation of framework anyway lies in the administrations it gives, its empowering job in supporting other monetary and social exercises. Great choices about the amount to spend on framework (and how to spend it) as contrasted and the numerous different requests for open and private spending, must be made by thinking about the full advantages and antagonistic impacts of foundation. It gives a disentangled case of how the IBS may show the estimation of foundation resources in Indianapolis. How these different outcomes can be settled on generally valuable to chiefs is one of the few inquiries confronting the Partnership analysts.

Keeping up the current estimation of framework might be an important administration objective, as in the outcomes are reasonable to the overall population and there is a quantifiable measure for passing judgment on progress. Setting such a goal, as an issue of open arrangement, would be undifferentiated from setting a private target of protecting the buying force or speculation returns of one's capital, e.g., in a retirement subsidize, even with expansion and possible practical out of date quality.

Another administration target may be to augment "esteem being used," i.e., to accomplish the best conceivable contrast between the advantages of framework and the expenses of giving that foundation. Most framework arranging and structure choices are made, on a fundamental level, in view of such a goal.



**Fig. 1: Infrastructure as assets and liabilities**

### III. SMART CITY PLANNING

Urban communities are focuses of current social orders and human progress. They make a great deal of significant worth, however a ton of assets are expended. The city itself is a multifunctional and complex item that can be spoken to as a segment, environmental, transport, managerial regional and modern creation framework. In contrast to an ordinary city, the brilliant city really implies a "computerized" city - an idea that has so far no unambiguous definition. Specialists' perspectives, in any case, are joined in the way that a shrewd city ought not be seen in the restricted sense as a city pressed with innovation. The advances for this situation are fairly a methods for accomplishing a shared objective, to be specific the formation of an agreeable urban condition.

The traditional city is comprised of 5 fundamental subsystems. The first is urban and incorporates industry, transport, and science development. The subsequent one is a city-serving business, to which the segments of elusive creation allude, for example business, culture, utilities, the training framework, social insurance and others. The third is the socio segment, to which the expert capability structure of the populace alludes. The fourth subsystem is the administration. It incorporates administration structures and open associations that are situated in urban communities.

The last framework is the spatial one, which incorporates the normal assets, lodging, and creation, business, sterile and other practical zones of the city.

The keen city idea offers various open doors for various nations. The prompt requirement for urban communities in creating nations is to give satisfactory urban framework to meet the expanding pace of urbanization.

As indicated by urban arranging objectives, brilliant urban areas can be characterized as "urban areas of information", "computerized urban communities", "digital urban communities" or "eco-urban areas". Keen urban communities in monetary and social terms are looking to what's to come. They are continually observing the most significant foundation - streets, spans, burrows, railroads, metro, air terminals, seaports, correspondence frameworks, water gracefully, power flexibly, even significant structures - for ideal asset allotment and security.

The term 'keen city' is inadequately characterized. IBM characterizes a savvy city as "one that utilizes all the interconnected data accessible today to all the more likely comprehend and control its tasks and improve the utilization of constrained assets". Cisco characterizes savvy urban areas as the individuals who receive "versatile arrangements that exploit Information and communication technology (ICT) to build efficiencies, diminish expenses, and upgrade personal satisfaction".

The UK Department for Business, Innovation and Skills (BIS) considers savvy urban areas a procedure as opposed to a static result, wherein expanded resident commitment, hard foundation, social capital and advanced advances make urban communities more liveable, versatile and better ready to react to difficulties. The British Standards Institute (BSI) characterizes the term as "the compelling combination of physical, advanced and human frameworks in the fabricated condition to convey economical, prosperous and comprehensive future for its residents".

As indicated by the Manchester Digital Development office, "a 'keen city' signifies 'shrewd residents' – where residents have all the data they have to settle on educated options about their way of life, work and travel choices". By definition Smart Cities will be urban areas whose assets are utilized keenly and successfully. They utilize inventive advancements to:

- Saving expenses and vitality;
- Enriching the administrations advertised;
- Improving personal satisfaction.

In these urban communities, the quantity of administrations gave to the populace is continually expanding, guaranteeing a supportable domain that advances prosperity and jelly the wellbeing of residents. Every one of these administrations depends on ICT foundation. Shrewd framework gives the establishment to the entirety of the key subjects identified with a keen city, including savvy individuals, brilliant portability, savvy economy, keen living, savvy administration and keen condition. The center trademark that underlies the vast majority of these parts is that they are associated and that they create information, which might be utilized brilliantly to guarantee the ideal utilization of assets and improve execution. Fundamentally, the "brilliant" city is an arrangement of interfacing frameworks.

Such collaboration of an immense number of frameworks requires transparency and normalization, which are the essential standards of making keen urban communities. A "keen city" venture, lacking receptiveness and normalization, is before long getting ungainly and costly. A portion of the advancements in question and characterizing brilliant urban areas are fast optical, sensor, link and remote systems fundamental for the acknowledgment of the advantages accomplished gratitude to insightful vehicle frameworks, savvy electrical systems and shrewd home systems.

Various urban areas have distinctive need destinations and errands, however all astute urban areas for the most part have three most significant highlights. The first - accessibility of ICT framework. Secure and secure last age ICT foundation is basic for the effective conveyance of new administrations in savvy urban areas and for guaranteeing availability to convey new administrations later on.

The second is that there must be a clearly built and integrated management system in the city. The numerous systems of the smart city will act together

only on the basis of strict observance of uniform standards. And the third feature of the smart city is that there must be "smart" users in it. ICT is a means of ensuring the functioning of a smart city, but technology is useless in the absence of competent users who are able to interact with "smart" services.

The smart city needs not only to expand access to smart devices for all categories of the population with different income levels and from different age groups but also to provide training to work with these devices. The smartest city is the smart gaming community opens to all, and citizens want or create services that are most important and valuable to them.

Thinking about the incredible significance of normalization for the production of brilliant urban communities, various associations are working and creating activities toward this path. For instance, the International Organization for Standardization (ISO) considers Smart Cities guidelines inside a gathering managing the subject of "Savvy Infrastructure Indicators System in Society". In Telecommunication Standardization, a Task Force inside the International Telecommunication Union (ITU), which manages Smart Sustainable Cities and evaluates the requirement for normalization of urban communities that look to fortify their social, monetary and natural maintainability through reconciliation of ICT in urban foundation and exercises. All together for the more intelligent urban areas to turn into the following stage in the urbanization procedure, new norms, framework and ICT arrangements must be presented with the goal that the idea itself turns out to be genuinely changed.

The ITU Task Force on Smart Sustainable Cities is relied upon to fill in as an open stage for keen urban communities -, for example, districts, the scholarly world and examination establishments, non-legislative associations and ICT associations, just as sectoral discussions and consortia. Numerous urban areas have as of late created unequivocal procedures on the most proficient method to turn into a shrewd city, with the point of acknowledging vitality effective neighborhoods, clean versatility and mix of current infra-structures - working with nearby organizations, organizations, information foundations and residents while profiting by the

capability of urban information and ICT. Urban areas, for example, Amsterdam, Barcelona and Helsinki were heralds in creating and actualizing such systems.

There are many keen urban communities around the globe. For instance, Singapore is the principal city on the planet where street traffic is overseen by a PC. There are various sensors and cameras in the city that assist you with getting ongoing traffic data and street traffic data and people on foot over the city. That is the reason there is no unavoidable clog for all uber urban areas. All streets, even the littlest ones, are under video reconnaissance (the cameras are found each kilometer), no gatecrasher driver gets the opportunity to lie and pass the eye of the law. All information from your camcorder is moved to a solitary administration community. Along these lines, the legislature and law implementation can divert transports from open vehicle in top hours to forestall clog. There isn't likewise staff at cost stations on parkways.

#### **IV. URBAN INFRASTRUCTURE MANAGEMENT PLANNING**

In these cities, the number of services provided to the population is constantly increasing, ensuring a sustainable environment that promotes well-being and preserves the health of citizens. All these services are based on ICT infrastructure. Smart infrastructure provides the foundation for all of the key themes related to a smart city, including smart people, smart mobility, smart economy, smart living, smart governance and smart environment. The core characteristic that underlies most of these components is that they are connected and that they generate data, which may be used intelligently to ensure the optimal use of resources and improve performance. Structurally, the "smart" city is a system of interacting systems.

Such interaction of a huge number of systems requires openness and standardization, which are the basic principles of creating smart cities. A "smart city" project, lacking openness and standardization, is soon becoming clumsy and expensive. Some of the technologies involved and defining smart city is high-speed optical, sensor, cable and wireless networks necessary for the realization of the benefits

achieved thanks to intelligent transport systems, smart electrical networks and smart home networks.

Different cities have different priority objectives and tasks, but all clever cities generally have three most important features. The first - availability of ICT infrastructure Secure and secure last generation ICT infrastructure is essential for the successful delivery of new services in smart cities and for ensuring readiness to deliver new services in the future. The second is that there must be a clearly built and integrated management system in the city. The numerous systems of the smart city will act together only on the basis of strict observance of uniform standards.

And the third feature of the smart city is that there must be "smart" users in it. ICT is a means of ensuring the functioning of a smart city, but technology is useless in the absence of competent users who are able to interact with "smart" services. The smart city needs not only to expand access to smart devices for all categories of the population with different income levels and from different age groups but also to provide training to work with these devices. The smartest city is the smart gaming community opens to all, and citizens want or create services that are most important and valuable to them.

Considering the great importance of standardization for the creation of smart cities, a number of organizations are working and developing initiatives in this direction. For example, the International Organization for Standardization (ISO) considers Smart Cities standards within a group dealing with the theme of "Smart Infrastructure Indicators System in Society". In Telecommunication Standardization, a Task Force within the International Telecommunication Union (ITU), which deals with Smart Sustainable Cities and assesses the need for standardization of cities that seek to strengthen their social, economic and environmental sustainability through integration of ICT in urban infrastructure and activities.

In order for the smarter cities to become the next stage in the urbanization process, new standards, infrastructure and ICT solutions have to be introduced so that the concept itself becomes truly

transformed. The ITU Task Force on Smart Sustainable Cities is expected to serve as an open platform for smart cities - such as municipalities, academia and research institutions, non-governmental organizations and ICT organizations, as well as sectoral forums and consortia. Many cities have recently developed explicit strategies on how to become a smart city, with the aim of realizing energy efficient neighborhoods, clean mobility and integration of current infra-structures - working with local administrations, businesses, knowledge institutes and citizens while capitalizing on the potential of urban data and ICT.

There are many smart cities around the world. For example, Singapore is the first city in the world where road traffic is managed by a computer. There are a number of sensors and cameras in the city that help you get real-time traffic information and road traffic information and pedestrians across the city. That's why there is no unavoidable congestion for all mega-cities. All roads, even the smallest ones, are under video surveillance (the cameras are located every kilometer), no intruder driver has the chance to lie and pass the eye of the law. All data from your camcorder is transferred to a single management center. In this way, the government and law enforcement can redirect buses from public transport in peak hours to prevent congestion.

There isn't also staff at toll stations on highways. Systems can also predict the effect of building new buildings, namely how they will affect communication signals and pollution. Authorities are also planning to implement household sensors to track home appliances and devices. They will detect a number of indicators, and their goal is to offer better energy efficiency. Interesting is the example of a smart London building.

After the reconstruction of the it becomes an essential element of the smart city. When we talk about smart cities, we are also talking about sustainable urban development. Although intelligent cities save resources, energy and time, they also have a big drawback - personal data protection will be problematic due to camera monitoring, sensors and GPS that will always know our location. The costs associated with initiatives to create intelligent urban infrastructure amount to 80 billion dollars in

2018 and 19 billion euros in Europe. The speed of investments will increase and by 2021 investment in this area will reach 135 billion dollars, IDC predicts. Turning a city into "smart" is most often based on the application of urban innovation in three main areas:

- Transport - to improve the mobility of residents and reduce congestion by offering alternative means of transport Urban Studies
- Environment including water, energy, air quality and waste management
- Overall improvement of the lives of people living in the city. The main difference in the smart city from the traditional city is in the nature of relations with citizens.

In the ordinary city, ICT-based services cannot respond as quickly to changing economic, cultural and social conditions as services in the intelligent city. In this way, the intelligent city, primarily aimed at the human being, is based on the ICT infrastructure and the continuous development of the city, taking into account the requirements of ecological and economic sustainability. Smart cities can be the new cities that are already designed as such, or those cities that are based on a particular purpose (such as industrial cities or techno parks), or who become "smart" step by step. Urban areas must manage their development, support economic competitiveness, and while enhancing social cohesion, environmental sustainability and improving the quality of life of their citizens. For smart cities to take place, local government needs to be an innovator. It should also stimulate innovation.

## V. CONCLUSION

As a result of the application, a part of the projects can be rejected by functional core as inconsistent with the objectives of a Smart city and the corresponding requirements. The approved projects can be considered as corresponding not only to the objective requirements of regulatory documents, but also to the subjective needs and values of the citizens.

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