

UPGRADING PUBLIC SPACE IN INFORMAL AREAS UTILIZING ICT IN PLANNING PROCESS

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Abstract: Recently, cities are facing many challenges which negatively affect their urban fabric as well as the services provided to the population. Collecting data obstacles from public space in unplanned areas is more intricate than elsewhere. In light of absence of follow-up of informal areas distinctive features, collecting data has become a hard process. This leads to the failure of many repeated attempts to upgrade unplanned areas. Lately, information and communication technology (ICT) has provided many tools to handle city problems. However, these tools are dispersed and lack integration with action plans. This research aims to spotlight on the importance of collecting planning data related to public space in unplanned areas using information and communication technology. This can be achieved through integrated methodology in which the theoretical study of previous researches and analysis of previous experiences are combined together. Finally, this research pinpoints the challenges of data collection from public space in unplanned areas; such as variable dynamics, speed of changes and diversity of patterns of encroachment. The study concludes that smart city is not a goal, but rather a means to achieve a target. This target aims at permitting the city and public space to fulfil the purpose for which it was established; meeting the needs of the population and bridging the gap between demand and resources or services. In addition, achieving a quality of life for the residents to help public spaces to act as the nodes forming the smart city.

Key words

Data collection, Public space, Smart city, Informal area upgrading, Information and Communication technology (ICT).

Introduction

The city is the oldest social phenomenon with a history within a specific environmental context. All city systems should work together to harness all its resources to overcome its challenges. 10% of the world's population live in about 30 regions and 25% of the world's population live in 600 cities. This rapid urban growth requires sustainable and smart development.¹ Currently, cities suffer from many problems among which are urban deterioration, increase in pollution, solid wastes, high rates of energy consumption. Therefore, the need has become crucial to activate the role of information and communication technology (ICT) in collecting data to cope with the accelerating changes.

Collecting and providing sufficient data in a timely manner with the accumulation of population will lead to an improvement in the quality of life by about (10-30%)² through increasing the economic and administrative efficiency and effectiveness as well as improving levels of societal justice and achieving security. This should take place concurrently with limiting bureaucracy and preventing waste of time, effort and money. Regulating pressure on transportation means and reducing pollution would also be beneficial. Since there are multiple challenges facing urban growth, it is necessary to use technology data collection to face these challenges and to research the most important digital trends that enhance interaction with urban users and prevent randomness. Through surveying current planning projects, it is clear that their evaluation is no longer subject to area or building density only, but rather depends on measuring the efficiency of information exchange and the ability of infrastructure networks to adapt to time changes. Hence, the information infrastructure will become the backbone for cities.

¹ Nam, T., and Pardo, T. A. (2012). Understanding Smart Cities: An Integrative Framework. 45th Hawaii International Conference on System Sciences (pp. 2289-2297). Hawaii: IEEE Computer Society.

² McKinsey Global Institute (2018) SMART CITIES: DIGITAL SOLUTIONS FOR A MORE LIVABLE FUTURE.

1. Methodology:

The study adopts an approach in which literature is integrated with analytical study of references in informal and unplanned areas as well as the most prominent challenges of data collection in those places. Thus, the research methodology can be divided into two main parts. The first part discusses the theoretical approach to concepts and topics related to research such as information and communication technology (ICT), smart cities, public space, unplanned urban growth and deterioration of public space through the inductive approach to learn about global and local concepts of public space needs and criteria there. Then the research moves to another phase which describes and analyzes the tools, methodologies and experiences related to the development of public space in unplanned areas, either by traditional methods or by using (ICT) applications for public spaces upgrading in informal areas.

2. Literature Review:

Urban planning involves everything related to the physical planning of spatial space in cities including road networks, land uses and building systems according to levels that vary between regional and local scale. It is the agreement on the outlines of the form that the city's future requirements should be in terms of the infrastructure completion, public services and other population serviced. On the other hand, urban development defines the requirements for the continued survival of the population in this urbanization, the extent to which these requirements are provided, the duration of their availability, their funding sources, and the coordination between its elements to ensure the positive growth and development of the city's advance planning to achieve three basic requirements: spatial development, human development and the provision of development tools and financing to achieve them.³

3. Smart city through ICT era:

By reviewing the history of implementing technology for urban upgrading and deriving the demands of the population in a smart way, it was found that since the period during 1960/1970 ICT began to support political and economic decisions to achieve social equality. As urban planning relied on the rational approach, the major sources of information were governments and universities. However, the information lacked community participation.⁴ Emergence of using geographical smart data with GIS took place during the period of 1970/1980. It allowed community participation and discussion of plans that coincided with a major revolution in new tools such as GIS Web and remote sensing systems. During 1980/1990, ICT began to combine different areas collaboratively in terms of the number of areas and participants in conjunction with the revolution Web2, PSS and social media.⁵

The year 2000 shot the start to use ICT to obtain quantitative and qualitative data for physical and moral features through leveraging simulation and incarnation systems.⁶ Nowadays Smart cities are achieving several rapid and impressive successes that led to their wide and rapid spread many counties and cities around the world are competing to build up smart cities. East Asian countries come at the top of these countries, such as (Japan / Korea / Malaysia / China ...).

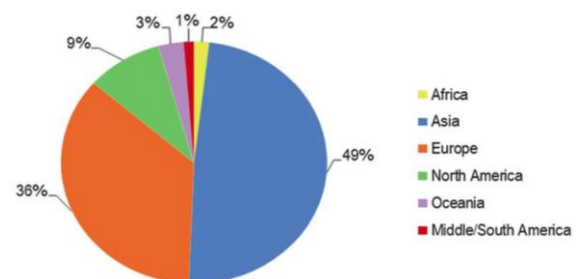


Figure 1 :Ratio of smart cities around the world

Source: <https://www.researchgate.net/figure/Smart-and-Digital-City-Geo-Location>

Smart city affords integrated developed results in high efficient urban, conforms to the environment, preserves it and achieves balanced growth rates in such a way that is neither repellent nor attractive to the population residents. Therefore, smart city becomes a necessity not a luxury, it's not an alternative to the traditional one, but rather an extension. Smart city is not a mono-sectoral city, but a multi-activity one. It consists of 6 basic smart elements: smart (life, environment, economy, people, transportation and government). Telecom infrastructure is the most important factor, however, it is insufficient for building the smart city alone. Later on, the concept of Big Data has contributed to express the huge data volume that cannot be exclusively controlled, classified or dealt-with using traditional methods or human factor. This concept has been linked to several tools that deal with big data (data mining tools & data analysis tools) as well as tools for displaying results (Dashboard). Hence, it is obvious that the necessity to start defining main goals and strategies for transformation towards smart cities has become crucial.

³ Abdulaziz A. (2012). Urban Planning and Urban Development, Al Arab International Economic Newspaper.

⁴ Klosterman, R. E. (2001). Planning Support Systems, Redlands, CA: ESRI Press.

⁵ Malczewski J. (2004). GIS-based land-use suitability analysis: a critical overview. Progress in Planning.

⁶ Sui, Daniel Z. (2008). The wikification of GIS and its consequences: Or Angelina Jolie's new tattoo and the future of GIS. Computers, Environment and Urban Systems.

4. People using Public space in informal or unplanned areas:

Inability of efficient resources use as well as the lack of public spaces have played an important role in citizens' behavior deterioration due to the increase of the population's needs at all basic and secondary levels and undermining the concept of feeling safe. The most negative impacts of the absence of public spaces role are the failure to meet such fundamental needs and the lack of affiliation and self-esteem, which threaten the survival of these communities and turn the unplanned informal area into a vast slum. Since the public space is the physical space for these urban elements gathered and it is the link between the city components which brings together different segments of the population and represents the platform for the expression of society, then the development of public space is the way to achieve urban development and create healthy and effective urbanization. It is clear that public space was always a major factor of achieving the desired development as well as the positive growth of the society. This is because, it was designed and managed to meet the five needs of the Maslow's pyramid⁷, especially the need of affiliation and participatory. This key role of the public space can only be achieved by the participation of its users to ensure that their basic needs are successfully supplied and are sufficient for their demands. In addition, the contribution of public spaces to the consolidation of their belonging loyalty to the place is also significant.

For the above mentioned demonstration, public space, urban development and smart cities highlight the essential role of ICT in achieving the nominal goal of identifying development priorities and preparing flexible plans that can cope with persistent changes. ICT also proposes a methodology that can not-only deal with public space but also meet increasing needs more efficiently within a concise period of time and with lower cost. Obstacles to the fulfilment of public spaces have been identified through several previous studies as follows:

- The prevalence of negative phenomena such as land encroachment and illegal construction, which resulted in a permanent change in public as well as the dynamics of its components.
- Failure to achieve the principles of spatial progression, absence of following up.
- Investors and stakeholders desire to achieve the greatest revenue by investing the entire area in construction, not taking public spaces into consideration.
- Difficulty of determining public space dimensions due to the spread of random growth phenomenon, the settlement of expatriates from the countryside around and in the heart of cities in high-density together with rapidly developing marginal communities.
- The disparity of relations with surrounding communities, which negatively affects the public space and causes the emergence of new complicated problems.

Through monitoring and history tracking of public spaces in unplanned areas, especially in developing societies, we can easily recognize the absence of many factors leading to the collapse or long-term disappearance of their existence. A sample of these factors are listed below:

- It could be regarded as disposable secondary places, with the result that they are undercounted and poorly distributed.
- Lack of services and facilities in these spaces turns them to marginalized hotbeds, areas for the collection and continuous encroachment of garbage and waste.
- Absence of environmental awareness and lack of awareness of the importance of the role of these spaces at all levels.
- Not equipped with initial lighting, furniture and shelters, lack afforestation requirements essential to ensure sustainability and lack of attraction factors to many ages and genders.

It is evident from the foregoing that there exists a remarkable deficiency in all environmental, social, economic, technical and other aspects to determine the status of public spaces in unplanned areas in general. This appears in their failure to satisfy population needs due to the inability of these public spaces to achieve balance between social, ecological, financial and technical compatibility with the population.

5. Challenges of data monitoring and collection in urbanization:

Urban development researchers and the development of unplanned and irregular areas usually face several problems and challenges in collecting planning data related to the nature of the population and the urbanization of those areas where the population's response to external data varies depending on the nature of the surroundings. Responses also vary between cities and countryside or crowded and isolated places.⁸ Overall, one of the most significant challenges facing data collectors in unplanned urbanization is dynamism and rapid data change, which requires continuous follow-up and keeping abreast of the spatial and behavior of variables of the population of these areas, in addition to the specificity and

⁷ McLeod, Saul (2021). "Maslow's Hierarchy of Needs". Simply Psychology.

⁸ Prof. Dr. Sami Mahdi Al-Azzawi, 2009, Man and Place: Mutual Interactions, Diyala Magazine, Issue 40.

precarious nature of these societies for long periods which requires continuity as well as a greater degree of accuracy in the accounting of data and their change acceleration. Here under is a brief account of some of these challenges:

- Variable dynamic and data changes: It is worth mentioning that speedy events and variables are of the characteristics of this era and that the dynamism of data and the instability of conditions in many societies, especially those where the law is largely absent caused data collectors to suffer from this phenomenon. Traditional tools cannot keep-up-with collecting data that frequent. Thus, data collected appear to be useless and unable to truly express the segment of the study and therefore, the result indicators are not related to the variables practiced on the ground approach, requiring a re-inventory of instruments that are consistent with those variables.
- Specificity and uniqueness of society: Many urban planning researchers interested in addressing the relationship between man and place emphasize the close relationship between the individual social characteristics of each society and the prevailing urbanization in order for a population to meet unplanned or unregulated within a geographical or physical range to rely on many of the human, economic and political data that have already been described and are usually linked to both population and place according to unique variables, especially each, allowing such gatherings to grow, inflate and continue without a system or law.⁹
- Difficulty in using traditional methods of data collection: The researcher encounters different and non-traditional patterns of these societies and a great diversity between social and economic levels. Atypical and uneven relationships occur, such as the prevalence in traditional models of urbanization as well as the refusal of such societies to have strangers among themselves, make statements about their daily lives or give opinions on current topics.
- Lack of data credibility: One of the most important determinations is the difficulty of achieving the element of credibility and transparency due to the difficulty of coexistence and approaching these areas within an appropriate period of time and the conflict of interest between the exploitation of their positions. Researchers have difficulty obtaining accurately compiled, efficient and accessible data under the guidance of stakeholders, especially within those communities. Recently, accurate and readily available data is one of the most important elements for measuring physical indicators to achieve the sustainable development goals and the quality of life of the population.¹⁰

6. Data collecting tools in urbanization:

Method of using tools of collecting schematic data using (ICT) will be studied by reviewing global experiences in the theoretical study in a later phase. This will contribute to selecting the appropriate tool and devising the best aids and systems to collect the quality of data required for this study of space data in unplanned areas. In this regard, the challenge is related to selecting the factors available in the local community to obtain a special quality of data and using the tool compatible with it according to the quality of this data by studying the use of one of the following alternatives:

6.1. Security cameras and observation systems:

Usage of surveillance cameras and observation systems in public areas, including those in streets which are used in the Crisis Management System or in Traffic. Unfortunately, they do not cover large areas associated with the study in addition to the privacy of data as well as requirements for obtaining legal approvals from related entities; who prevent data spreading and sharing with other parties to secure their data. However, it can contribute to the cams in forming a visual image of urban and traffic jam rates that can be used to serve urbanization practically within the scope of their availability or by linking them to a separate system.

6.2. Cell phone and telecom network towers infrastructure:

The availability of recorded telephone call data (CDR - Call Detail Records) provides a multitude of information that can be analyzed and used to support decision making at all levels.¹¹ These data are available through Mobile Phones and Telecommunication Network Towers. Data include the nature of telephone conversations in terms of their origin or incoming, the timing of telephone conversations and the timing of their implementation in between the two communication channels, as well as the scope of the location at which these telephone conversations are carried out.¹² It should be noted that

⁹ Mudar Khalil, 2008, Spatial Research: Its Beginnings and Directions, Publications of the Spatial Research Unit.

¹⁰ Aziz Atamanov and Nandini Krishnan Krishnan, 2016, Improving Data Collection to Improve Citizen Welfare in the Middle East, World Bank Blogs.

¹¹ Horak, Ray 2007, Telecommunications and data communications handbook, Hoboken.

¹² Petersen, Julie K., 2002, The Telecommunications Illustrated Dictionary (2nd ed.). Hoboken: CRC Press. p. 14

international and domestic laws prohibit access, circulation and use of data of telephone conversations in terms of whether they are issued or received as well as the timing of telephone conversations without the approval of the competent authorities; considering such data to be private. Therefore, leveraging mobile phone regulators and telecommunication towers is a major challenge. In addition, the specialized technical discussion and observation with those working in this field revealed a technical difficulty in the accuracy of locating one of the coordinates of mobile phone users because it is linked to a certain area that may reach a radius of 5km covered by telecommunication tower during data extraction; thus preventing the use of this mechanism in limited spaces. Moreover, the geographical distribution of communication towers conflicts with the physical and administrative boundaries of the local units; thus preventing the identification of the extent of the impact of these towers in urban terms. However, the data that mobile phone companies can monitor such as: the number of calls from the same number, the intensity of calls from different numbers, the duration of phone calls, long call rates and peak times-this data can be used to make communications in the coverage of these towers and to link them to the human behavior of the population in those areas and to the implications of the urban variables.

6.3. Applications or mobile apps on cell phones\ tablets:

The spread of modern generations of mobile cell phones, tablets and laptops, especially those which support the fourth and fifth generation of communication networks, contributed to use many applications and programs at all levels and in various fields. By integrating these applications with the infrastructure of fiber optic networks, which work to allow direct connection between the beneficiaries with their homes using these applications through technologies (FTH- Fiber to home), application of the concept of smart cities has become more realistic and feasible on the ground. Many telecommunication companies have started to implement projects and systems that rely on the infrastructure of terrestrial networks of optical fibers or communication towers, or both together, to implement services like Triple play (PPP) such as those provided by Orange. This supports enabling the operation of the Internet, telephone and television together with high efficiency, without affecting the quality and speed of Internet service.

Mobile applications provide many advantages for several reasons, among which the most important is availability and spread. Nowadays, smart phones, tablets and laptops have become a necessity to meet daily needs and not just a luxury. Besides permitting dynamic interaction with the study area easily and quickly, it is also inexpensive and does not require special financing its usage. This is obvious especially when compared to the high cost of specialized devices that various applications have replaced and performed a large part of its function. For example, these applications allow GPS monitoring without the need to invest in expensive tracking equipment. One of the main sources of strength is the ability to create KML files or compressed KMZ files that allow locations to be stored so that they can be displayed on various GIS applications and on specialized programs later. Lately, there are many attempts and ideas that call for taking advantage of the big data provided by mobile phone apps to improve urbanization and provide better services to the population, transport networks and transportation alternatives.

7. Case studies:

All the past experiences of using ICT tools to collect public space data showed several points of strength as well as others of weakness from which we benefit to shape the road map that helps to formulate innovative approaches that integrate the pros and avoid the cons of each trend as much as possible in accordance with the needs and the purpose for which they are designed. The ability of each tool to achieve balance in the equation representing the relationship between time, cost and efficiency which govern the solutions for all stages of data collection creates or manages the varied public space, in addition to the extent of participation of the public space users in its formation. Foregoing experiences were reviewed in countries such as India Nepal, Brazil, Mexico, Kenya, South Africa, etc. These experiences varied between traditional models for dealing with public space in unplanned areas, or models that relied on the means of (ICT), which varied in their infancy between apps and programs on mobile phones or computers; whether they were used online or offline. A further spread occurred after the emergence of the concept of the Internet of Things (IOT).

By studying previous experiences of using information and communication technology (ICT) in developing public spaces, whether in traditional or smart cities, a set of technical tools that can be used to collect planning data in smart and innovative ways can be identified and classified, either using space users or specialists to convert that data into information that contributes to the development of public space and its optimal exploitation. These tools are classified, as shown in the following figure, according to availability, ease of usage and spread into three main types, as follows:

- **Common Tools:** These are general tools that can be used by a large segment of people with different demographic criteria, such as various electronic games like Minecraft, traffic network applications such as GPS, and others.
- **Specialized tools:** These are the programs used by specialists in all stages of urban formation, such as ARC CAD – GIS.. etc. They need more funding, specific knowledge and equipment.
- **Complicated tools:** They are more specialized and complex tools, linked to an integrated system of laboratories or work environments which allow the creation of a virtual space (VR) in equipped rooms specially built for practicing urban experiments and evaluating models before implementing them. They are less widespread than applications and programs due to the requirement of a license for their creation as well as the privacy of their use with specialists and large funding requirements.

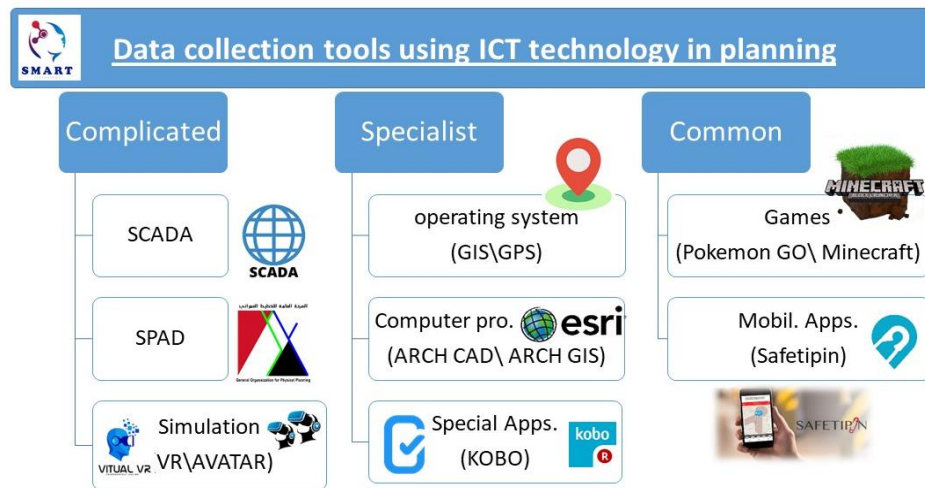


Figure 2 :Classification of ICT technology tools in planning

Source: The authors

7.1 Traditional development models in developing public spaces:

As for the traditional development models to deal with public space in unplanned areas, the urban data collection methodology requires long time and an exorbitant cost for its implementation. Economic, social and environmental variations result in the formation of hotspots which convert into informal settlements then finally into slum areas, especially in developing countries that suffer from difficulties in managing these spaces. This is clearly shown in the development of the Kibera area in Nairobi, the capital of Kenya, as follows:

Kibera is considered one of the largest slum areas in Nairobi. It is about 5 km from the center of the capital on the eastern coast of Africa. It is considered one of the largest slums in the world. Non-governmental organizations have cooperated with UNHABITAT to improve the urban, social and health conditions in the region, the most important of which is the removal and relocation plan for the residents of the region within 9 years and at a cost of \$ 1.3 billion in 2009, but it was not completed because many residents refused to share families in the same housing unit and for the long period of implementation. Subsequently, several initiatives, such as the Kounkuey Design Initiative (KDI) began implementing a set of public space development projects to transform marginalized, unplanned and informal areas into productive public spaces (PPS-Productive Public Space), providing initial and networked solutions to solve the complex problems of Kibera. KDI also undertook involving the population by requesting design proposals and relying on the local population for implementation, in addition to submitting environmental proposals to generate energy from sewage through biogas production stations needed from the methane gas produced from those wastes.

7.2 Using (ICT) in developing public spaces:

Digital tools that rely on ICT technology have an advantage over similar tools because of their speed, accuracy and flexibility in all stages of planning, unlike paper and traditional means.¹³ Urban approaches that were associated with the information and communication technology (ICT) revolution can be divided into three branches (common, specialized, and complex). However, in most cases, this needs large funding and sponsorship from profit-oriented companies and developers. This is clearly evident in some development models as follows:

¹³ United Nations Human Settlements Programme (UN-Habitat) 2020, CITY-WIDE PUBLIC SPACE ASSESSMENT TOOLKIT A guide to community-led digital inventory and assessment of public spaces.

7.2.1 Common models among users of tech. tools (electronic games and applications):

They are the tools associated with the use of mobile phones or tablets, which are usually traded as either electronic games or applications due to their low cost, ease of circulation, ease of interaction and the popularity of young people and even children to use them. Many of these electronic games have achieved great success, which prompted UNHABITAT to seek behind its adoption as a tool for the development of the public space as it is an opportunity to achieve social participation and diversity in the proposals submitted and the ability to reach the real needs of the space users. For example, (Minecraft) game as well as (Pokemon) game which were used in the development of Renovation of Historic Square (Tlaxcoaque) in Mexico City, upgrading Undugu District, Kibera, Nairobi, supporting public spaces project in the lotus gardens in India, supporting Public Spaces Project in Kirtipur (Pork De Poko) in Nepal, Les Cayes, Haiti port and others.

- **Renovation of Historic Square (Tlaxcoaque) in Mexico City:**

During 2014, UNHABITAT participated with (Minecraft) in organizing a competition for young people to redesign one of the most important historical squares in Mexico, which dates back to the 17th century, through the (Alidea digital) village festival, which is one of the most important digital inclusion festivals in the world, in cooperation with several local institutions such as (Telmex) and others. Three main criteria were identified that must be fulfilled in the proposals submitted: the public space meets the security and safety requirements of its visitors, provides them with access to social communication, and includes courtyards for children to play. A group of British game experts (FyreUK) built a model for the arena to be developed using (Minecraft plugin) called (Plot me) to create models and miniature elements for the design units used in the proposals. These were made accessible to the qualified candidates for a period of 3 hours on an open platform to submit proposals directly on the network. The competition lasted for two weeks, and the results presented were impressive and unexpected. About 7.5 thousand contestants participated by submitting 1500 design ideas, including 431 integrated projects.

- **Using mobile apps for data collection to upgrade society and urban in India:**

The Indian researcher (Kalpana Viswanath), one of the most important pioneers in social business in India and the CEO of the (Safetipin) Foundation, which adopted the mobile app and website of the same name to serve the safe movement of women in urban spaces by collecting data from several sources, either the population or the government, in different regions to choose and identify the safest tracks in urban areas and advertise them for use by app holders.¹⁴ Mobile app depends on e-maps, where the network of streets and public spaces are identified according to the nature of use, whether commercial markets, parks, public transport stations, etc., then the application evaluates them according to the number of 9 determinants through which the degree of safety can be determined in those locations if available. These determinants include lighting, openness, possibility of seeing, guard personnel, pedestrian paths, public transport stations, diversity of genders in the place, feeling and general feeling in the place and linking the site to other places. During 2018, Delhi government applied the app as a confidential tool to upgrade public spaces. Perhaps one of the most prominent indicators of the success of this experience is its obtaining of international awards such as the Dubai Award in 2017 as best practices, and (Lotus Leadership) award in 2019.

7.2.2 Specialized programs and applications:

Those are the tools represented in specialized programs that experts use in the stages of urban data collection, such as (ARC CAD - GIS - Kobo Toll Box...etc.). You may initially rely on one of the simple phone applications mentioned in the previous section, however, it needs a higher degree of experience to deal with it and transform its outputs into information that serves the advanced stages of the planning and design process. For example, during 2009, in a joint initiative of the United Nations Office for Humanitarian Affairs (OCHA), the Harvard Humanitarian Initiative (HHI) and the International Rescue Committee (IRC), the Kobo Toll Box application was designed to simplify the data collection and analysis process, as it is an open field data collection platform. The resource is available for everyone with no cost and leverages many organizations dedicated to research or humanitarian efforts to be able to collect large-scale data in a reliable manner and can operate in challenging or network-constrained environments.

7.2.3 Complex tools that depend on large operators and entities:

As for the more complex tools associated with an integrated system of laboratories, those which allow the creation of a virtual void in equipped rooms specially built for the practice of urban experiments, and are usually attached to educational facilities and research institutions.

¹⁴ Kalpana Viswanath, 2019, Safetipin empowers women to create safe public spaces.

- **Using virtual reality (VR) to develop the Santa Marta area in the capital, Rio de Janeiro:** Each (Baird and José)¹⁵, Cornell University, Pennsylvania, USA, introduces an educational style for students by entrusting them with VR technology (VR) to study a Brazilian slum in the capital, the Santa Marta favela region (Rio de Janeiro's Santa Marta favela). The studio assumes virtual reality as an alternative to expensive site visits, as (Baird) believes that developing countries cannot afford the costs of experts and developers due to the long distance and difficulty and danger of movement. This technology made it possible to test with the modifications of urban designs before execution, while identifying the smallest detail that the designer had the ability to indulge in, the most important of which was the difficulty of translating levels and topography clearly.

- **CASA- Centre for advanced spatial analysis:**

The Center for Advanced Spatial Analysis is a research institute at the University of London (UCL) within the Bartlett College of the Built Environment, which was established in 1995 by a group of researchers at the university interested in using GIS applications in spatial analysis, city simulation, visualization of urban problems in the city, etc. This center is distinguished by its diversity of experts from geographers, mathematicians, physicists, architects and computer experts. Among the most important projects in which the Center has contributed globally is (SIMETRI) platform, which is a global scientific platform that relies on the adoption of popular forces in immovable construction issues and construction employment, building construction that integrates data indicators, predicting the future of land and construction issues that have been developed in the Western European region, creating models to help both residents and development partners to participate In decision-making.

From the foregoing, methods of dealing with public space for the purpose of development are classified into two categories, traditional means or those which rely on ICT. The latter are divided into three main groups (common, specialized, and complex) according to the conclusions of the methodologies and classifications of the study. Each methodology included a number of strengths and weaknesses that should be taken into account, and dealt with as guiding lines for model development in order to achieve sustainability and effectiveness.

8. Comparative analysis:

Data collection and analysis tools have provided non-stereotypical solutions to urban problems in light of the data provided quickly, accurately and with high quality associated with many variables. Review of the advantages of using ICT-based electronic applications in many applications like Google Forms, Cloud Survey, ... etc. Utilization of mobile apps has various benefits that enables data collection and analysis more quickly and precisely. Moreover, data collecting challenges in unplanned areas with conventional tools cannot face dynamism data in those areas, but ICT tools can deal with this kind of data. They also offer direct access to inputs, including research data from the sample and information compiled with them using a unique description of the study's variables. Moreover, they contribute to the variety of question choices by improving the utilization of open-ended inquiries by AI to keep track of the most prevalent and significant words throw chats. In addition, users can bypass secondary questions. In addition, they support the provision of (CATI) - Computer assisted telephone interviewing, that collect and analysis data via the use of mobile phones through a range of questions and actions.

Furthermore, using applications enables to control the number of inputs according to variables and achieve better distribution of the research sample specially in randomized study methodologies. It also contributes in raising the quality of outputs. The application supports many features among which are allowing handicapped to use it, also use of any language including the use of slang language and the possibility to upload a video, a photo or a comment for evaluation.

The spread of using (ICT) and devices depends on (IOT) coincided with the radical transformation in urban planning due to the magnitude and diversity of the collected data. This enormous amount of data created the concept of big data, which is defined as "A group or groups of data of various classifications that have their unique characteristics (such as size, speed, diversity, variance, validity of data) and which cannot be efficiently processed using current and traditional data processing methods to benefit from them."¹⁶

By comparing between the two methods (traditional methods and (ICT) methods), we find many advantages and little bit disadvantages in the use of ICT which could be handled by wise governmental observation. The most prominent aspects of which can be analyzed through the following table:

¹⁵ Zach Mortice, 2017, Landscape architecture magazine.

¹⁶ Breur, Tom (2016). "Statistical Power Analysis and the contemporary "crisis" in social sciences". Journal of Marketing Analytics. London, England: Palgrave Macmillan.

Table 1 : use of ICT advantages and disadvantages.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Better managing and distributing city resources through viewing and evaluating analytical data at the city level. • Refining knowledge-based society that ensure better resources management. • Ease of use for a large segment of the population especially young people, which is a comparative advantage for nations with plenty of this age group. • Accurate measuring of resources and ensuring the validity of data received from various entities that affect investment, production and industries. • Collected data throw ICT tools contributes in the process of forecasting and future prediction, and future expansion. • Managing crises in a systematic manner which allows keeping space with the scale of the event, and reducing side effects and consequences, especially disasters. • Achieving comprehensive knowledge and integration between the volume of demand and supply in all production aspects helps in the distribution of facilities and services. • Improving public participation and simplifying the stages of communication between citizen and decision makers. • Encouraging public-private partnerships to develop welfare for the general public, such as the Dublin Government's "City Possible" initiative in cooperation with Master Card. • Rapid responses to public issues and swift formation of public opinion for issues related to city and urban. • Allowing urban planners to collect data quickly which offers practical perspective. • Integration of big data in urban planning allows fair distribution and improves asset management for the city's infrastructure, which leads to reduce risks and cost. 	<ul style="list-style-type: none"> • Some of the elderly population face difficulties in dealing with technology applications to meet the needs. • Entrenching the idea of centralization, creating room for unfair exploitation and creating a gap of inequality between service providers, which prevents many from continuing. • Cybersecurity or online security and related data breaches are still a threat and a great danger to the population. • The dominance of some companies over the circulating data results in an imbalance of power and the provision of ineffective solutions. • Some companies dealing with technology applications are trying to dominate related system services, which weakens competitiveness. • Tech-infrastructure connectivity is a major concern for most big data operating systems that depend on a permanent source of electricity. • Widespread social isolation and increasing inequality in countries with a large number of people deprived of technology and reducing the opportunity for low-income people to participate in the digitization.

Source: The authors

9. Conclusion:

The most important challenges in data collection from public space in the unplanned areas like variable dynamics, speed of changes and the diversity of patterns of encroachment are the most important features of data in such societies. Besides, the absence of the law, lack of continues follow-up and the conflict of interests between real estate developers and users of this urbanization, especially in public spaces that represent the ambition of a large segment of brokers. Perhaps lack of tools dealing with urban planning processes to exploit or even to improve public spaces in unplanned areas contributed to widen the gap between the size of the population's needs compared to the supply of services in those areas. The weakness of the databases, which are usually collected in traditional and random ways, also resulted in the absence of the ability to prioritize dealing with population demands.

On the other hand, becoming a smart city is not a goal, but rather a mean to allow the city and the public space to achieve its purpose. Services available through ICT tools provided variety of services, which have recently spread to take part in solving daily problems. Therefore, using huge databases resulting from the (ICT) revolution can contribute to solve many urban problems in unplanned areas and can adapt to the unique and ever-changing nature of data in order to put these areas in a disciplined urban context and bridge the gap between the volume of demand and the available resources.

10.Recommendation:

1. Effective results can be achieved in the public space after identifying the problem by collecting relevant data accurately, quickly and at the lowest costs.
2. The importance of scrutinizing data collected from public space as well as its users and selecting sources that clearly express them to contribute to provide practical and realistic solutions to ensure the upgrading elements and features of the public space.
3. Public spaces in the unplanned and informal areas are a strong opportunity to provide services to the residents of these areas and to improve these communities.
4. Community participation and applying citizen's points of view plays an important role in the development of both public space and city. However, demographic, cultural, social, economic and other differences must be taken into consideration.
5. It is necessary to avoid traditional solutions to disrupt the complex problems of cities resulting from the lack of public spaces and their inability to perform their effective role towards the population.
6. Dealing with stereotyped methods in urban planning has proven in many experiments and over successive periods of time that the solutions presented are not sustainable and collapse rapidly.
7. Better urban results can be achieved by focusing on saving time, effort and money during the process of collecting data from the public space with the help of using innovative and modern tools.
8. More user-friendly applications should be directed more to address the difficulties that some elderly people face in dealing with (ICT) applications to meet their life needs.
9. Governments must pay attention to address the imbalance as a result of the dominance of some companies based on circulating data to maintain the balance of power and societal stability.
10. Sustainable energy sources must be provided because the technology is connected to the infrastructure on optical cables and overhead networks linked to a permanent source of electricity.
11. Attention must be paid to cybersecurity and social isolation and increasing inequality in countries with a large number of people deprived from technology, as the integration of big data in urban planning reduces the opportunity for low-income people to participate in the digital scene.

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