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## SMART URBAN DESIGN IN EGYPT: POTENTIALS AND CHALLENGES

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### ABSTRACT

Concepts and methodologies for creating a smart city are as diverse as cities themselves. Some approaches for developing a smart urban area are technology-oriented, while others give the priority to the social aspects. These approaches put cities on a more sustainable and resilient path because smart urban design promotes social and technological innovations and link existing infrastructures taking into account the expected population growth and their new needs. Developing new forms of governance and public participation, effective and efficient use of land, resources and funds are the major objectives of smart urban design. In Egypt, the current development of information and communication technology (ICT) can enable new kinds of thinking regarding development of urban areas, allow a larger set of input data and much wider resources for assessment and can prevent or reduce central decision-making. Currently, smart solutions in urban design are not widely used in Egypt. There is a big demand for raising public awareness of smart techniques and their benefits for quality of life. The smart city agendas should have a central place in urban development projects. Although those projects need huge investments, they can contribute in making areas such as heritage areas and universities campuses more attractive and usable with focus on future generations' demands. This research paper addresses the concept of smart urban design in terms of its benefits, dimensions, and aims. Additionally, this paper investigates the available opportunities for applying smart approaches of urban design in Egypt. On the other hand, challenges such as the need for investment and expenditure to improve energy efficiency, modernize infrastructure, and create high quality living environment have been clarified. It is concluded that each area should have its smart agenda which puts the human factor at its core. Currently, there are various potentials for applying smart governance in Egypt such as; electronic gate of Egyptian government, smart cards system, new administrative capital city as a future smart city, Egypt's ICT 2030 strategy, establishment of communication and ICT corporations, establishment of smart villages, and training programs for people with disabilities. The number of high educated citizens, internet



users, mobile phone users, ICT trainers and trainees, e government users is obviously increasing which reflects a great possibility for transforming to smart community.

**Keywords:** Smart city, Smart Urban Design (SUD), Information and computer technology (ICT)

## INTRODUCTION

As our planet becomes more urban, our cities need to get smarter. By 2050, 66% of the world's population is expected to live in urban areas and the challenge will be to supply these populations with basic resources [1]. To handle this large-scale urbanization, we will need to find new ways to manage complexity, increase efficiency, reduce expenses, and improve quality of life in order to improve the economic and environmental health of the city for residents, merchants, and visitors. Smartness is a complex concept, but can be expressed as 'Green-technology'. It is important to have talented people and citizens that are receptive to achieve the goals of a smart, sustainable and resilient city.

A Smart City is more than a digital city. It is able to bring together technology, information, and political vision into a comprehensive program of urban and service improvements as shown in Fig.1. Smart economy, smart mobility, smart environment, smart people, smart living, and smart governance are the main six aspects of smart urban areas. These aspects can be translated to environment-friendly design buildings, control centers, linked smart infrastructures, solar stations, biomass fuels, car sharing, wind farms, intelligent transportation systems, next-generation vehicle centers, and battery storage systems.

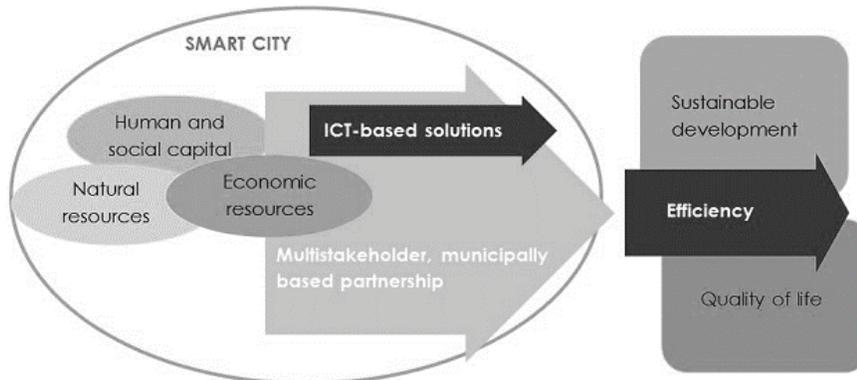


Fig. 1: The concept of smart city which is more than a digital city [2]

The number of studies which investigate the concept of smart city is growing rapidly. The term "Smart City" has been adopted for the first time in 1994 in the European Conference of Digital City. Then the project of "European Digital City" has been launched and Amsterdam City has been classified to be the oldest smart city in Europe. Then the City of Helsinki, the capital of Finland has been adopted also as a smart city [3]. Charles Landry in 2006 highlights that smart technologies, smart collaboration, highly educated population and effective institutions are needed in order to face the challenges of modern complex cities [4]. The challenges of designing, developing, facilitating,



nurturing interactions between social structure and new technology have been discussed through studies in recent years [5-7].

Many authors emphasize the possibilities that new technologies offer to strengthen the urban system [8-10]. Aurigi refers to the idea that ICT is central to the operation of the future city is at the core of all perspectives of defining smart cities [11]. Caragliu added that the aim of smart urban design is to achieve the social inclusion of urban residents in public services [12].

In 2015, ASCIMER team published their work about assessing smart cities initiatives for the Mediterranean Region. ASCIMER's approach refers to goals of a smart city, main actors in smart city projects and smart city dimensions. Within each dimension, different challenges have been identified for the Northern Mediterranean Cities and for the Southern and Eastern Mediterranean ones [2].

A multidisciplinary application-oriented research organization, VTT encourages the innovation activities that support the development of smarter cities. VTT team who works with technology providers as well as has the public sector published in 2015 a group of extended abstracts on recent and ongoing public research at VTT. VTT is focusing its research on three programs that work together, (Intelligent Energy Systems and Cities), TransSmart (Smart Mobility Integrated with Low Carbon Energy) and pro-IoT (Productivity Leap with Internet of Things) in addition to CITYKEYS project which provides a validated, comprehensive performance measurement framework for monitoring and comparing the implementation of smart city solutions as shown in Fig. 2. The CITYKEYS framework is defined as a smart city performance assessment system which includes city requirements, key performance indicators (KPI) ontology and calculation, and data collection methodology. The CITYKEYS framework is tested in the 5 partner cities: Tampere, Rotterdam, Vienna, Zagreb and Zaragoza.

Some researchers tried to clarify the differences between sustainable model and smart model of the contemporary city. Ahvenniemi and other authors in 2016 in their research paper entitled "What are the differences between sustainable and smart cities?" recommend to use the term sustainable smart city instead of smart city because the main aim of smart cities is to achieve sustainability with help of technologies. 16 sets of city assessment frameworks were analyzed (eight smart city and eight urban sustainability assessment frameworks) comprising 958 indicators. The most important result is that smart city frameworks lack environmental indicators while focusing on economic and social aspects [14] as shown in Fig. 2.

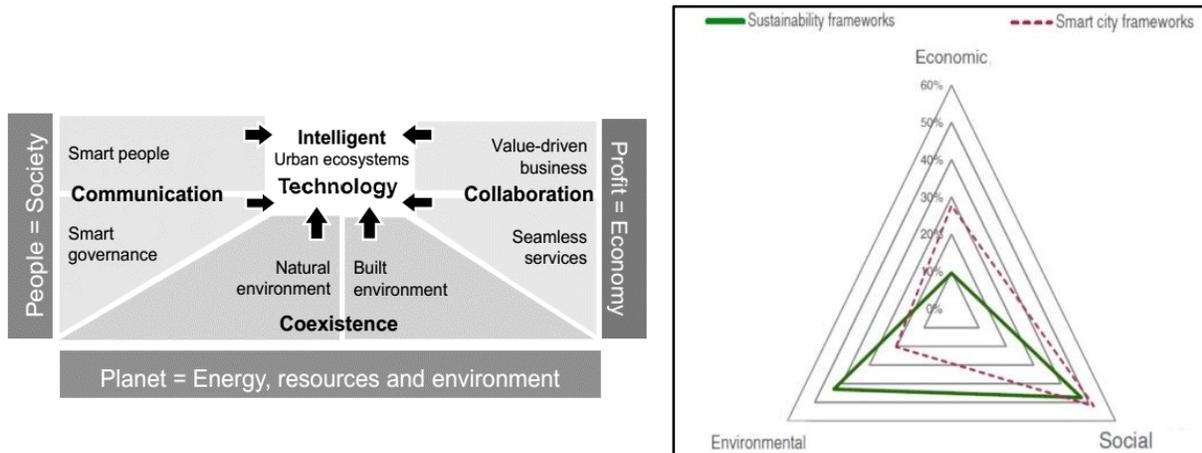


Fig. 2: Left: Classification scheme of smart city assessment framework [13]



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Right: Comparison between sustainable and smart frameworks in terms of environmental, social, and economic dimensions [14]

Damari in his important book "Smart City Implementation: Creating Economic and Public Value in Innovative Urban Systems" described and analyze the concept of the smart city from a global perspective, with a focus on its application around the world. It helps readers understand and evaluate the effectiveness of new smart city approaches. In addition to defining the concept of smart city, the role of Information and Communication Technology (ICT) as a tool for achieving smartness in cities, and the role of ICT in the interplay with smart mobility are clarified. This book analyzes examples of smart cities around the world, and focuses on two detailed case studies on Amsterdam and Genoa [15].

In 2018, Intelligent Community Forum has classified smart cities all over the world. It is observed that there are only three smart cities in Africa. Egypt as one of the most strategic countries in Africa has not any cities that can be classified as a smart city as shown in Fig. 3. From smart city to intelligent community, the list includes communities from four nations; Taiwan contributing three, Canada two communities and Australia and Finland one each which have been named as the top seven Intelligent Communities in 2018.

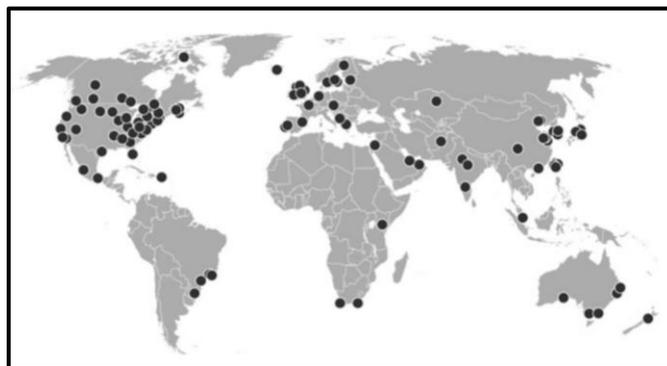


Fig. 3: Smart cities all over the world [16]

From reviewing the literature, it is concluded that a smart city is a place where the traditional networks and services are developed to be more efficient with the use of digital and telecommunication technologies. The smart city concept goes beyond the use of ICT for better use of available resources with less emission. It means smarter transport networks, improved water supply and waste disposal facilities, and more effective ways to light and cool buildings. Smartness in cities also includes a more interactive and responsive city management and safer public spaces and meeting.

Goals of smart urban design can be summarized as follows:

- **Connectivity:** Improving connections between citizens, data, and government as well as key stakeholders.
- **Quality:** Using digital technology to reduce suffering and improve the quality of life.
- **Enhancing the citizen experience by making cities more livable:** This goal focuses on issues such as engagement, public safety, mobility, social inclusion, social equity, and privacy.
- **Ensuring sustainability and resiliency:** To ensure the long term health of the city and the availability of critical resources when they are needed. This goal focuses on energy, economic development, smart water governance, and combining technology and innovation to make cities more sustainable and resilient to climate changes.



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- Helping cities to operate more efficiently: This goal focuses on, e-government, IoT, research infrastructure, community leaders, and e-creative industries.

## DISCUSSION

Smart urban design is still considered as a term associated with developed countries because it needs large investment and high quality information technology. But actually the principles of smart urban design (SUD) can be applied to any urban area because city is not a computer and ICT is not the only factor in the smart approach of urban design. Smartness in urban design should not be restricted to developing smart projects based on using the latest technology but SUD should be translated to strategies which improve the quality of life and deliver efficient services to the users in order to save their effort and time. SUD should not have specific constant smartness indicators because of the differences between areas in terms of socio-cultural and environmental properties. Each area should have its smart agenda which has human factor at the highest priority.

In Egypt, the concept of SUD is addressed through government and private companies which use smart information systems. The Egyptian government currently is focusing on delivering more efficient services to citizens through e-government but unfortunately without taking into account improving the quality of current infrastructure and creating more attractive usable urban areas. It should be taken in account that present and future generations are looking for data, services, dynamic and changing urban spaces. Although Egypt set a vision for sustainable development 2030 which gives the development of information technology a priority, smartness still represented only by technical projects such as establishment of few Smart Villages. But the systems for water, energy, garbage, and transport management are not effective enough to be smart. Although Egypt is one of the countries who has a large number of highly educated people, increasing number of internet and computers users, and many government services are currently delivered electronically, there is no Egyptian city can be considered as a smart city.

The urban expansion scheme through establishment of new cities in Egypt since 1970's has been heavily criticized by urban development experts for not developing existing cities, which suffer from congestion problems, inadequate infrastructure, and pollution. Moreover none of the new cities have met their population needs, and have been described as ghost cities, as many of the housing units there still unused. This means that we need to rethink the concepts which are used to improve the city health and the quality of life and stop looking to smart urban design as a concept which needs investment and cannot be applied in developing countries. Cities in Egypt have many opportunities to be transformed to sustainable smart cities. On the other hand, applying SUD approaches in Egypt faces various challenges. Therefore it is important to focus on the chances and cope with challenges to achieve the target of combination, connection and integration of all dimensions and systems which is fundamental for a city being smart.

## SUD IN EGYPT BETWEEN POTENTIALS AND CHALLENGES

Egypt has various chances to create smart urban areas. This part of the research paper identifies the strength points related to each of smart city dimensions which are; smart community, smart government, smart environment, smart transport, smart economy, and smart life.



### Smart Governance Potentials:

Smart governance is based on a bidirectional flow of information and services between the citizen and the government and aims at enhancing the capability of the administration to meet citizen's needs in order to improve both, public services, and confidence in the public institutions. Each of the following points represents a positive indicator or a potential for applying smart governance approaches in Egypt [2].

- The increase of services which are delivered through electronic gate of Egyptian government can be considered as a potential. Currently, there are more than 170 e-services such as issuance of birth certificates, inquiry and payment of car violations, national identity card allowance, query and payment of bills, renewal of car licenses, and services of the courts. Additionally, data on the investment portal of government are available in four languages [17]. Moreover, the establishment and linking of national databases in Egypt is being completed. Conducting competitions such as the competition of the best governmental website to encourage creativity in the field of e-governance reflects the great interest of improving the electronic services.
- Applying the smart cards system in Egypt through an Egyptian corporation "Smart Group" which was established in 2003 and it includes experts in many different fields such as; Broadband Internet services for individuals and businesses, surveillance cameras, websites, administrative and accounting programs, network services, maintenance and technical support. Smart cards have already been activated through smart card system to obtain basic services such as bread, health insurance, pensions, baby milk and payment of consumption bills as shown in Fig. 4. These e-services have started to be delivered in Egypt since 2005.



Fig. 4: Applying smart card system to obtain basic services in Egypt [18]

- The decision to replace current capital, Cairo with a smart city 45 km from the city of Cairo with a large green space which has an area of 341 hectares and capable of housing 6.5 million people is also a potential. The 34 ministries of the Egyptian government and the presidential complex will move to the new capital by June 2019. The city will be equipped with several sensors that will signal smoke or fires to emergency services and an "intelligent traffic system". The future capital will have a mega shopping centre, residential areas, a cultural complex including an opera house, theatres and cinema, and science and technology campus as shown in Fig. 5 [19].



Fig. 5: The future sustainable and smart capital of Egypt [19]

- Egypt has a clear vision which reflects the awareness of decisions makers of the importance of transformation to smart governance in the future. The future vision 2030 for sustainable development supposes that the comprehensive urban development cannot be achieved without improving the communication and ICT sectors because data lead to right vision and right vision leads to right actions. Additionally, this sector should play an important role in the Egyptian economy. Egypt's ICT 2030 strategy includes development of ICT for education, ICT for health, ICT for government, green ICT, and legislative services [20]. The Ministry of Communications and Information Technology (MCIT) tries to promote the development of the ICT infrastructure and digital services of government entities. The main aim here is to enhance the performance of ministries and other government bodies, raise the quality and efficiency of the services they provide to the public by improving the work environment, helping decision-makers to find solutions to issues of concern to the community. These activities will boost local markets and increase demand for ICTs.
- Another potential is the current great interest of establishment of communication and ICT corporations in Egypt. Currently there are about 330 corporations in this field. Fig. 6 shows some of these corporations. There are also some corporations which help innovative startups become great companies by providing them with strategic advice, industry access and risk capital [21]. The increase of the ICT corporations' number in Egypt leads to effective participation in external markets such as Gulf Market. Fig. 7 shows the Egyptian part in Gitex Exhibition in Dubai.

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Fig. 6: Examples of communication and ICT companies in Egypt

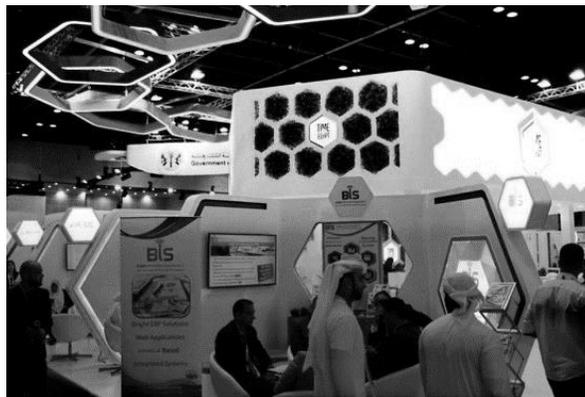


Fig.7: The Egyptian part of Gitex Exhibition 2018 for technology [22]



Training Track	2017
Civil Engineering Informatics Specialist	17
Cloud Computing	27
Computer Networks / Cyber Security / Information Security / Media Convergence	36
Data Warehousing / Database Designing / Database Administration	16
Digital IC Design	14
Game Art	12
Game Development	12
Geospatial Information Systems	16
Industrial Automation	12
Mechatronics	14
Mobile Application Development	77
Multimedia / CGFP / 3D art	54
Software Development / Software Engineer / E-Business / E-Learning	471
Systems Administration	22
Telecom Applications Development	14
Wireless Communications Engineer	15
<b>Total</b>	<b>829</b>

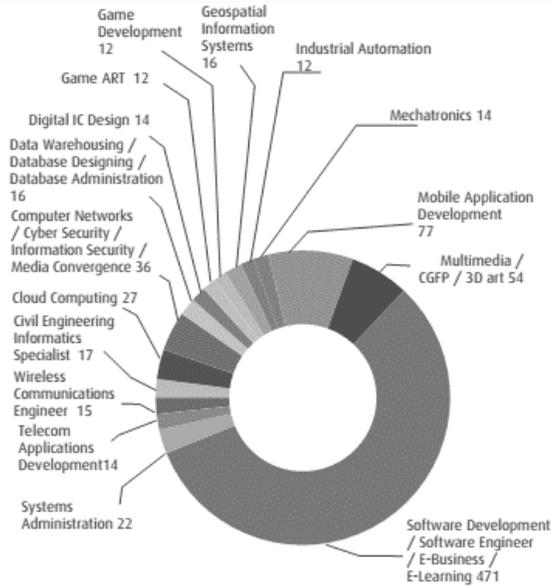


Fig.8: Capacity building programs provided by Information Technology Institute in Egypt (ITI) [23]

- Establishment of smart villages by local specialized corporations such as Silicon Waha which has been established in May 2016 [24]. Six strategic locations in the heart of new cities nearby universities, and with access to, rail networks, major national roads and international airports have been selected to establish six smart villages in Egypt as shown in Fig.9. These villages go smart in terms of services such as; independent feeders, two power station, generator back-up, UPS for public areas, lighting automation systems with built in batteries, motion detection, solar energy generation systems to provide power supply for the parks in addition to the use of Building Management Systems (BMS) that automatically controls the mechanical, electrical, and plumbing systems for all the buildings in the village [24].

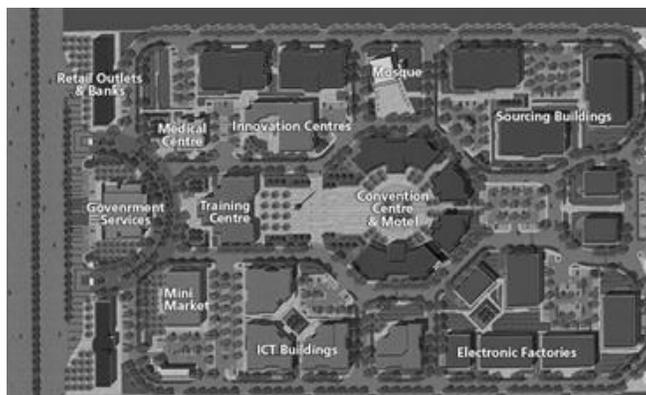
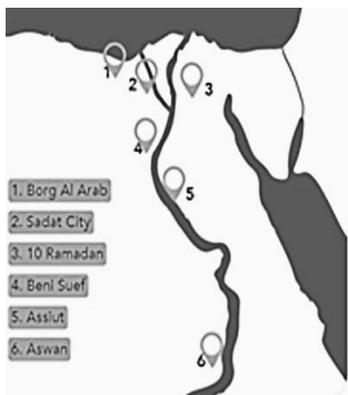




Fig.9: Six smart villages have been established in Egypt by Silicon Waha, right: The layout of Smart Village in Borg Al Arab, Alexandria with area 126 Km<sup>2</sup> [24]

- The latest governmental initiatives of integrating people with disabilities in the training programs which aim to improve skills in the field of using technology reflects the governmental interest of encouraging disabled people to be involved in the smart community. There are many initiatives that focus on improving the governmental websites to be accessible by people with disabilities. The concept of technological availability for all categories of Egyptian community is highly considered by the government since 2012 when the first competition for developing technological tools for people with disabilities (Tamkeen Competition) has been announced [25]. The outcomes of these competitions are fifty projects in fields of Internet of Things IOT, training programs for people with disabilities and developing websites for e-services that can be used by this type of people to make their life going easier [25].
- The launch of the Community Knowledge Network of the National Research Center, NRC in May 2018 can be considered as a potential for smart governance. This knowledge network includes 14 websites which enhance creativity and research projects in different fields such as health, agriculture, food, water, and natural resources and improve the knowledge and service [26].
- Ministry of Housing, Utilities and Urban Communities (MOHUUC) is the most ministries that are interested in using modern technology and the Internet in delivering the service to citizens in Egypt. For example, Allocation of a website for the services of new urban communities and restriction of booking housing units via this website only. Additionally, there is an Android application which has been launched in 2018 to facilitate communication with New Aswan City Authority in terms of getting information regarding available lands and housing units in New Aswan City as shown in Fig,10. Over 300 persons used this application from their mobile phones in the first week of its launch [27].

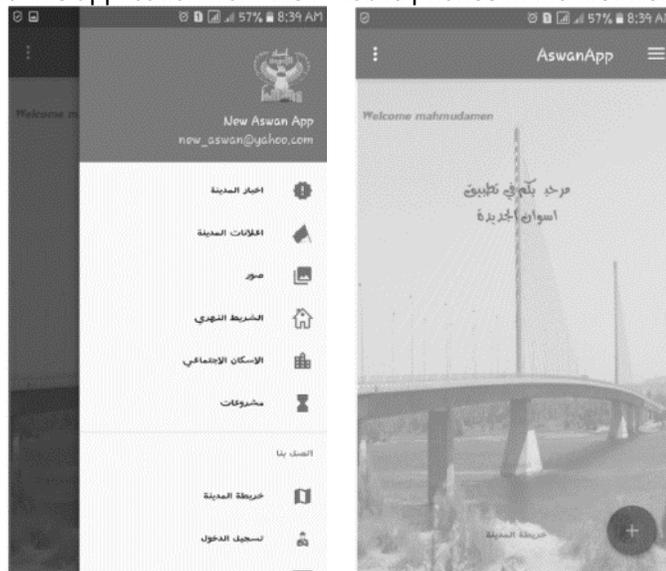


Fig.10: The launch of new android application to deliver services of housing in New Aswan City [27]

- The obvious governmental support for smart learning through organizing international conferences by governmental and private universities. These conferences aim to discuss the latest technology in the field of smart educational environment through investigation of various dimensions regarding

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smart educational content, smart infrastructure, and the use of virtual reality in the field of education, quality insurance and assessments [28].

Figure 11 summarizes all the above mentioned potentials of achieving smart governance in Egypt.



Fig.11: The current potentials of achieving smart governance in Egypt

**Smart Community Potentials:**

Smart community means the existence of citizens who are able to participate wisely in smart urban life and to adapt to new solutions. This type of communities should be able to provide creative solutions to the current problems. Therefore education is considered as the main tool to improve this dimension,

There is no doubt that Egyptian community has a great potential to transform from traditional to smart community. The number of high educated citizens, internet users, mobile phone users, ICT trainers and trainees, e government users is obviously increasing as shown in Fig.12 and Fig.13. About 33.7 Million of Egyptian populations use internet services according to 2017 statistic. Over 30% of internet



users use internet for social communication through Facebook and Twitter and 31% use internet in sending e mails and messages. About 15.7% use internet for getting information and services regarding health. 8.1% use internet for getting information about governmental organizations according to the latest statistics, October 2017 [29].

Fig.12: Statistics of using communication facilities and internet in Egypt [28]

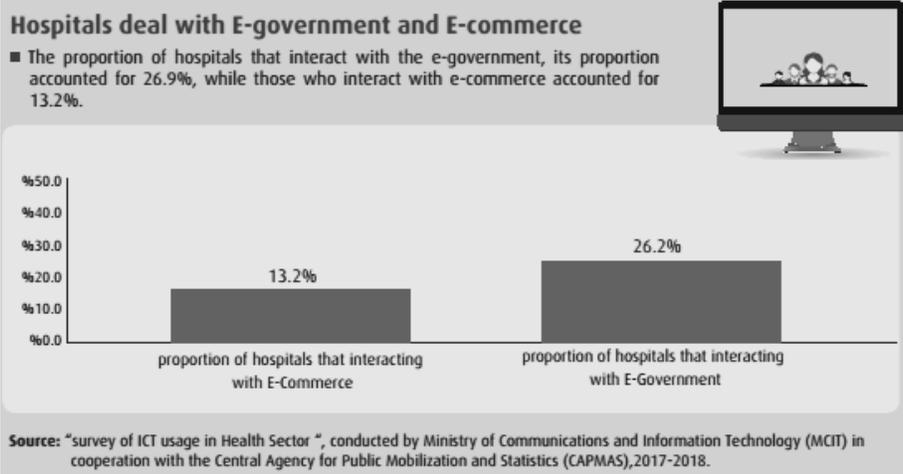
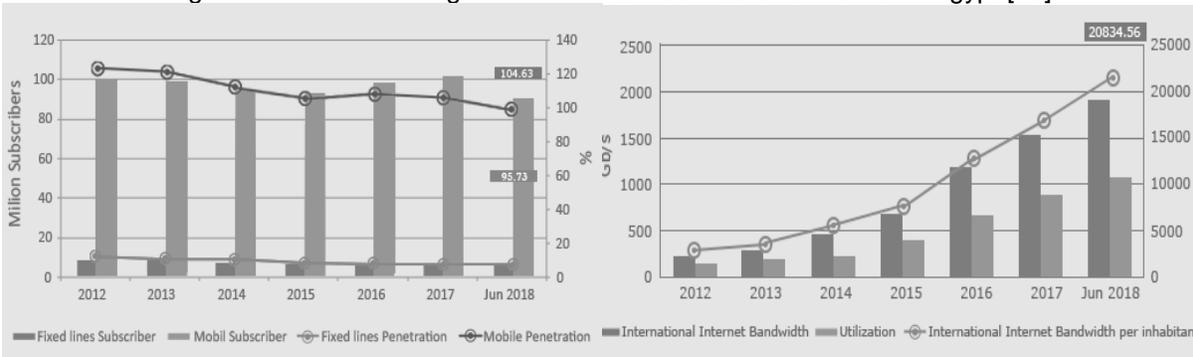


Fig. 13: The proportion of hospitals that interact with e-government and e-commerce [29]

Although it is addressed here that there are serious steps in the smart governance and smart community paths, the current situation in Egypt related to mobility, environment, economy, and quality of life still need more efforts to create potentials that can be utilized to achieve smartness in these dimensions

There is no doubt that smart urban design in Egypt currently faces a range of challenges related to economic conditions, the administrative system, infrastructure, and environmental characteristics. These challenges can be summarized in the following points.

**Smart Governance Challenges:**

The following points clarify the challenges which encounter achievement of smart governance approach in Egypt.

- The current administrative systems lack flexibility and adaptability. Most of the governmental action plans cannot adapt to changing conditions in terms of social and economic circumstance.



- Branching, complexity and multiplicity of the administrative agencies that regulate urban areas such as; Urban Coordination Commission, Ministry of Environment, New Urban Communities' Authority and other institutions affect the development process and make linkages between these organization difficult. Accordingly, most of administrative institutions work as separate entities and there is no system for exchanging data between them.
- There is a gap between the administrative system and citizens because of the absence of communication techniques required to engage citizens in making decision process.
- Weak regional cohesion leads to difficulty of regional collaboration in the fields of investment and marketing to support the infrastructure and facilities.
- The administrative system in Egypt depends mainly on personal vision more than on a clear and thoughtful strategies and action plans. Additionally, plans are not implemented according to a specific schedule therefore they lose their value and benefits.
- The current unbalanced development plans at the geographical level which means that, there are certain areas or specific governances in Egypt are usually given the priority to be improved. Accordingly, the differences between areas in terms of living conditions and the quality of infrastructure are increasing. Therefore the implementation of smart system of management will be difficult.
- Inability to provide efficient services for the elderly that meet their needs in a flexible and easy way.

#### **Smart Economy Challenges:**

Applying smart economy in Egypt is affected by; productive capacity of the different urban areas, the extent of dependence on a multispectral economy, and ability of urban areas to attract investors. Current infrastructure networks such as road networks, railway systems, and energy systems lack maintenance and use of information and communication technology "ICT". The local production capacity of urban areas is not considered in the economic development plans and there is no enough support to local crafts and small industries areas far from big cities. This leads to increase the poverty level in some areas. Moreover, unavailability of information about the potentials and resources of each region is considered as a big challenge. Therefore, it is difficult for some areas to attract business and entrepreneurs in addition to the gap between stakeholders and citizens.

#### **Smart Mobility Challenges;**

Achieving an effective mobility system for citizens and goods is the biggest challenge in designing smart urban areas. Smart transport concept focuses on reducing congestion and pollution, improving communication between vehicles, roads and users, encouraging mobility alternatives, and making public transport available to all citizens. The challenges of implementing smart mobility in Egypt can be summarized as follows:

Congestion is one of the most dominant transport problems in large urban areas. The lack of flexible and effective public transport system, inability of infrastructures to keep up with the growth of mobility, the demand for parking spaces, high cost of infrastructure maintenance, shortage of public transit systems in low density and scattered urban areas, and the environmental impact of traditional transport are the main challenges of transport in Egypt.

Automobile ownership continues to grow in Egypt because of a variety of advantages related to the use of private cars such as on demand mobility, comfort, status, speed, and convenience. Additionally, the current infrastructure is inadequate for walking and cycling. Cycling is often given a low priority as non-motorized transportation and is often perceived as not modern and slow mean.



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### Smart Environment Challenges:

There are different challenges related to the built and natural environment in terms of requirements of reducing energy consumption, pollution and carbon dioxide "CO<sub>2</sub>" emissions. These requirements are difficult to be met due to the absence of dependence on smart systems that allow better monitoring of energy distribution and efficiency in addition to lack of innovation in the infrastructure of energy production and supply. Intensive and accelerated urban expansion in most Egyptian cities is one of the obstacles of achieving smartness because urban sprawl leads to increase the consumption of natural resources, the cost of infrastructure, the demand of public transport, and production of wastes. Although climate change is a challenge for all urban areas in the world and not only at the local level, the effects of this problem are worsened in Egypt with the expectation of higher temperatures rates and problems of water shortages, desertification, and drought [30].

### Smart Community Challenges

Education, awareness, culture, innovation, and encouragement of participation are the main tools to enhance the human dimension of smart urban design. In Egypt, there are many problems related to the human dimension such as unemployment, high poverty rates, great social differences between various areas, digital illiteracy or the inability to use information and communication technologies to find, evaluate, create, and communicate information. The economic crisis and demographic changes has led to increase the Egyptian community demands of innovative initiatives which support equity and diversity [31].

The Central Agency for Public Mobilization and Statistics showed that the number of illiterates in Egypt is about 14.3 million [29]. In addition to the shortage of activities which raise awareness of children and youth regarding the importance of living in smart areas. Moreover, the majority of users believe that smart urban design may affect the cultural identity, heritage conservation, local privacy, and traditional and local economic activities.

### Smart Life Challenges

The wise management of facilities, public spaces, services using ICT and the focus on improving the access of these services and the flexibility of their use are the most important elements of smart life, in which different services are integrated to improve quality of life.

There are various challenges regarding the ability of providing better living conditions for citizens in Egypt. The spread of slums due to rural-urban migration and the consequent spread of Informal settlements reduce the possibility of achieving smart life criteria on the level of work or living. The spread of electronic crimes make the use of information unsafe. The main challenges in this field are related to the ability of providing housing, health care, and safety with taking into consideration all citizens independently of their age, gender, culture or social condition. The demographic movements and mix of population in urban areas make it difficult to achieve smart life.

Figure 14 summarizes the challenges that face applying the smart approach of urban design in Egypt

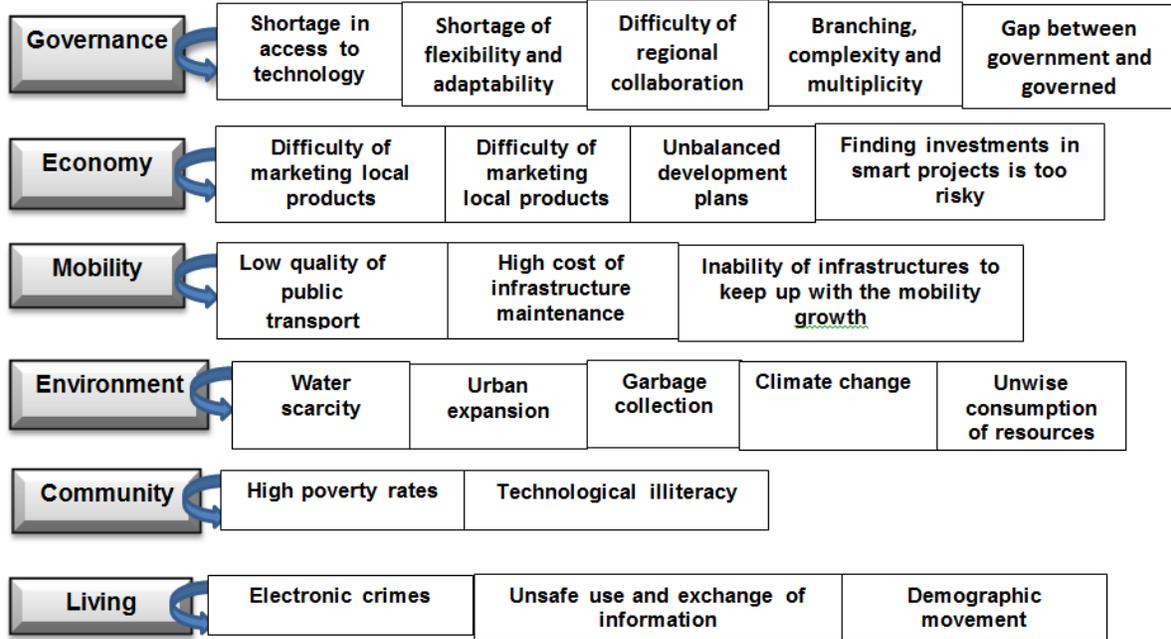


Fig.14: Challenges and obstacles facing smart urban design in Egypt

## CONCLUSION AND RECOMMENDATIONS

The wealth of urban data, the increased connectivity of urban objects through the Internet-of-Things and advanced energy and mobility technologies have opened up new paths for the application of smart solutions in urban design [32]. Focus on human capital and territorial excellences is very crucial in developing cities in Egypt. Although many e-services are offered currently in Egypt through governmental websites, lack of inter-departmental coordination and communication form silos which obstacle the achievement of goals of smart governance. Successful smart projects are based on collaboration and integration between all actors as shown in Fig.15. Legislative instability and perception of innovative solutions as too risky in Egypt are also challenges which should be overcome. The current situation in Egypt shows the big interest to use and learn about the available technological applications and services. The number of high educated citizens, internet users, mobile phone users, ICT trainers is rapidly increasing which supports the idea of transition to smart community. The current governmental trend to achieve environmental quality through the best use of natural resources and the focus on the utilization of solar energy as a great potential for living in clean environments is also a strength point in the context of transformation to smart and green life. Some goals related to reduction of congestion and air pollution, improvement of energy efficiency, use of clean mobility, secure use of information and encouragement of public-private investments still need more efforts to be achieved. The following points suggest certain recommendations for developing urban areas in Egypt based on the principals of smart urban design.



Fig.15: The main actors in smart management [32]

- For decision makers, the focus should to develop the already existing areas in terms of infrastructure and services to improve their quality instead of establishment of new smart villages in new cities. For designers of smart areas, the efforts should not focus on developing smart buildings only but also to achieve smartness in open spaces in terms of smart lightning, smart transport, smart environment and smart system for garbage collection.
- The development of urban areas should focus on the users to apply the most suitable interventions which do not concentrate on using the latest technology but to use what can fit in the social and environmental context.
- It is suggested here to create a rating system for smart buildings and open spaces to be used locally so they can be classified according to certain criteria and indicators.
- Obviously, there are serious steps on the road of achieving smart government in Egypt but smart economy and smart transport need to be more considered. The investments should be oriented to the poor and vulnerable areas which have not economic resources but have human capital, small industries, and creative crafts. New markets for investors should be opened outside the main sectors; tourism, agriculture and real sate because smart economy depends more on increasing productivity of urban areas and to develop their attractiveness for investors. In addition, economic development plans should ensure balance between the diverse geographic regions to reduce differences between them in terms of services quality and availability of work opportunities.
- Public transport system should be improved as the first step to achieve smart transport which aims to decrease the use of private cars. Public transportations means should be more available, affordable and safe. Traffic laws also should be developed to ensure safety. The quality of streets should be monitored electronically through operational systems which make the communication between vehicles, users and transportation management very easy. These systems should be produced locally by high professional Egyptian experts in the field of ICT.



- Establishment of more schools and institutes which offer educational subjects related to the information and computer technology ICT and internet of things (IOT) in order to prepare new generations of experts who will be able to develop the current urban systems and to eliminate digital illiteracy in Egypt.
- It is suggested here to improve the performance of internet services to be more available, fast, affordable and efficient. In addition to make internet available for free in all governmental organizations such as schools, universities, hospitals and railway stations to encourage people to use e-services and communication tools and to boost exchange of data between different governmental organizations.
- Integration of all categories of Egyptian society in the smart development process by conducting workshops, competitions, conferences, and cultural activities to raise the public awareness of the importance of transforming to smart life.
- The heritage areas should be given priority for smart development as an important step to attract internal and external tourism. Applying smart urban design techniques in heritage areas can help these areas to be more usable, accessible, and attractive to youth visitors.
- It is important to benefit from models of smart cities in Gulf area and Europe to learn from their strategies and action plans.

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