

Smart Cities as a New Concept in Developing Countries, Evidence From Jordan

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ABSTRACT

The aim of this paper is to summarize the current state of understanding the smart city concept and to present a proposed communication platform for the development of city services particularly in developing countries/Amman city as a case study area .The paper shall present introduction to give an overview of various aspects - city services, smart infrastructure and facilities, using information and communication technologies, interconnection, feedback, and electronic and digital applications. The next part addresses individual challenges for the planning, development, and operation of cities. New solutions allow for use of different data on Amman city and meet the request for better city services. An overview of smart cities applications and services is given in the next section of the paper. An overview of some aspects related to the technological solution of services is discussed in the summary section.

KEYWORDS: Smart Cities, Sustainability, Developing Countries, Urban Planning, Jordan.

1. INTRODUCTION

"Smart city" is a Puzzling expression. Every day the world are hearing and reading that are titled and intuited under the word smart "[McClellan; Jimenez; Koutitas, 2018](#)). Ideas and projects with developing smart cities, either in the developed or in the developing counties, will help in meeting and dealings between urban agents and will result in sustainability and improvement of citizens' life quality through a long-term plan([Azharianfar;Kermani,2016](#)). Internet of things (IoTs) ([Fig2](#)), big data, and cloud computing provide new solutions to cities' governance. Innovation and the development of these new technologies build a new model for new cities' ([Lazaroiu; Roscia, 2012](#)).

Cities in the developing countries are facing severe problems such as poverty, pollution, unemployment, variation issues inside the same city, low level of living, congestion and immigration. On the other hand, smart city solutions based in new technologies can help them to improve their cities. A number of models have been suggested for launching Smart cities, which seem proper with the conditions of the developed countries. Thus, there is a necessity of organizing a framework proper with the special condition of the developing countries. This framework can assist them to deal with their specific issues.

In 2017, 84.13% percent of Jordan's total population lived in urban areas ([Statista, 2017](#)). This percentage seems to increase rabidly in Jordan from the mid of nineteenth century. Due to political circumstances .Immigration from neighbouring countries rise population statistics and most of immigrants lived in cities mainly at Amman the capital of Jordan. Consequently, many problems accompany this unplanned rapid urbanization in Jordan. Some of these problems but not all: poverty, Variation, pollution, power leakages, infrastructure degradation, Government and bureaucratic slandering, lake of public participation, and low life quality. These challenges are among the key factors to develop and implement smart city model. Accordingly Public establishments and NGOs Institutions in Jordan struggle to offer schemes to face main problems of urbanism facing the country in the framework of Smart city projects.

2. LITERATURE REVIEW

United Nations Population Fund announced 2008 the year when more than 50% of all people, about 3.3 billion, lived in urban areas ([UN, 2008](#)). By the year 2050, this rate expected to rise to 70 % ([UN, 2008](#)). Cities have enormous impact on the environment, social and economic aspects ([Mori and Christodoulou, 2012](#)).

How cities became greatest opportunity? About 75% of GDPs generated from cities. Cities are places, which have innovation, cultural, entertainment, international travel, industrial and commercial hubs .Some cities as if Tokyo is the 15th largest economy ahead of India and Mexico ([UN, 2008](#)). Gradually they have made traditional cities progress into a new structure of ecological social bodies. The traditional industrial society is

transferring to innovation modern society. A smart city affords consistent keys to this progression. Table (1) below addresses the main differences between traditional cities and smart cities from planning view, infrastructure ,system operators, ICT investment, citizen engagements and data sharing.

Table 1 Tradition city Vs smart City

	Traditional City	Smart City
Planning	<ul style="list-style-type: none"> ▪ Ad hoc and siloed ▪ Cost savings aren't realized ▪ Limited potential for investment scalability 	<ul style="list-style-type: none"> ▪ Coordinated and holistic ▪ Resources are shared ▪ Cost savings are fully realized ▪ Investments are scalable ▪ Improved city planning and forecasting
Infrastructure	<ul style="list-style-type: none"> ▪ Runs inefficiently ▪ Costs more money and resources to run 	<ul style="list-style-type: none"> ▪ Optimized with cutting-edge technology ▪ Saves money and resources ▪ Improved service-level agreements
System operators	<ul style="list-style-type: none"> ▪ Guess at infrastructure conditions ▪ React to problems ▪ Can't deploy resources efficiently to address problems 	<ul style="list-style-type: none"> ▪ Enjoy real-time reporting on infrastructure conditions ▪ Predict and prevent problems ▪ Deploy resources more efficiently ▪ Automate maintenance ▪ Save money
	Traditional City	Smart City
ICT investments	<ul style="list-style-type: none"> ▪ Piecemeal and siloed ▪ Deliver suboptimal benefit ▪ Don't realize economies of scale 	<ul style="list-style-type: none"> ▪ Centrally planned ▪ Deployed across city departments and projects ▪ Deliver optimal benefit ▪ Provide maximum value and savings
Citizen engagement	<ul style="list-style-type: none"> ▪ Limited, scattered online connection to citizens ▪ Citizens can't make optimal use of city services (or easily find them) 	<ul style="list-style-type: none"> ▪ Complete and singular online presence ▪ Citizens can easily find and use services ▪ Citizens can participate in smart city initiatives ▪ Two-way communications between government and people ▪ Specialized services focused on the individual citizen ▪ Citizens can both contribute to and access real-time intelligent city data
Sharing data	<ul style="list-style-type: none"> ▪ Departments and functions are siloed ▪ Departments rarely share data and collaborate on initiatives 	<ul style="list-style-type: none"> ▪ Departments and functions are integrated and/or shared ▪ Data is shared between departments and better correlated with other data services ▪ Results are improved ▪ Costs are cut

2.1 Smart city concept

The concept of intelligent cities has passed through several stages and these stages represent the main trends of cities. There are three trends in the concept of smart cities:

First trend: This trend based on the city's adoption of Digital Amenities through ICT as a tool to improve the city to make urban services, mobility of the city more efficient and effective. In addition to enhance the quality and performance of these services, to reduce costs and resource consumption, looking for more effectively public participation. Smart cities in this direction are concentrating in the quality Life through three indexes: Survival Index for Humanity; the Well-being Index; Human entertainment Index.

Second trend represented by the principles of intelligent growth of the city, which seeks to control the growth of the city in a smart way, through a set of principles for land use and development aimed at improving the quality of our lives and preserving the natural environment, trying to save money with time passing. The principles of smart growth emphasize financial, environmental growth and social responsibility, and recognize that interdependence between development and quality of life. Intelligent growth enhances and complements communities by prioritizing urban dictation, regeneration, and urban intensification strategies. The most important urban concepts that smart growth meets are new urbanization, growth management, new community design, sustainable development, conservation of urban land, prevention of urbanization, creation of a sense of place, development of best practices, sustainable development and sustainable transport. The trend began after the US Environmental Protection Agency (EPA) set up a general set of principles for intelligent growth ([smartgrowth, 2018](#))

Third Trend is Urban Intelligent Principles (UIP):

UIP is a set of ten principles that lead to the formation of urban planning and urban design in an integrated manner. The main objective of this trend is to achieve intelligent integration among different urban planning

concerns. The urban intelligent principles (UIP) (Based on the urban planning trends) defined by the World Council of Modernity Architecture (CIAM, 2001).

- The Ten Basic Principles of Smart Urbanism according to [Bennenger \(2001\)](#): Environmental sustainability; Balance with nature; Balance with tradition ; Technology ; Fun and entertainment; Competence; Human scale; Matrix of opportunities; Regional integration; Balanced movement; Integrity of institutions.

The two groundbreaking theories of Graham and Pomeroy in the 1990s laid the foundation for smart city theory ([Graham, 1997](#)) ;([Pomeroy, 2000](#)). Many modern theorists see smart cities as "cities that use ICTs to increase the quality of their people's lives while providing sustainable development" ([Wareham, Almirall, Bakici, 2013](#)). Working Definitions of a Smart City "A city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens". ([Giffinger and others, 2007](#)). Another definition by [Hall \(2000\)](#) "A city that monitors and integrates conditions of all of its critical infrastructures, including transportations, communications and main buildings. Its resources observe security aspects and plan its maintenance actions while exploiting services to its people". While [Harrison and others \(2010\)](#) define the smart city" A city "connecting the physical infrastructure, the IT infrastructure, the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city"(Fig1).

Smarter cities organization definition "A city motivated to make itself "smarter" which means more sustainable, equitable, efficient and lovable". In another way to define, the same term "A city merging Web 2.0 technology and ICT with other governmental and planning efforts to speed up bureaucratic processes. This shall lead to identify new innovative solutions to city organization complexity". As defined by [Toppeta, \(2010\)](#) . On the same way [Washburn and others\(2010\)](#) define it "The use of Smart Computing technologies to make the critical infrastructure components and services of a city—which include city administration, education, healthcare, public safety, real estate, transportation, and utilities—more intelligent, interconnected, and efficient".

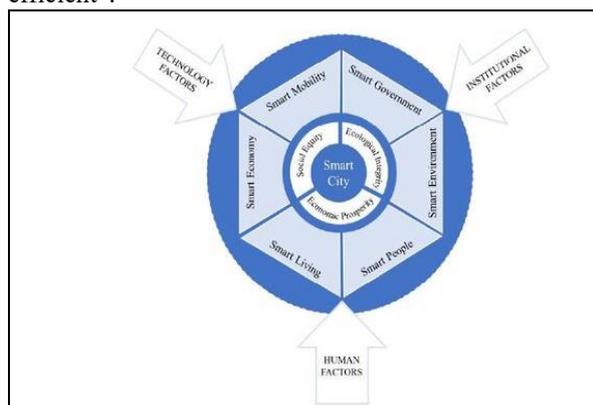


Fig 1 Summary of smart city concept



Fig 2 Internet of Things IoT for smart city

2.2 Dimensions of a Smart City

[Dirks & Keeling \(2009\)](#) stress the importance of the crude combination of cities different systems in the process of creating a smart city. [Kanter & Litow\(2009\)](#) pointed this aspect in their Manifesto for Smarter Cities, they were confirm that filling intelligence into each subsystem of a city, one by one, is inadequate to build a smart city. It needs to deal with as a whole. Nevertheless, many studies, with the purpose of illuminating what forms a smart city have detached this concept into many proportions. [Kominos \(2002, 2011\)](#) indicated that this has four possible dimensions.

The application of a wide range of electronic and digital technologies to create a cyber, digital, wired, knowledge-based city is the first dimension; the second is the use of information technology to renovate work and life; the third is to include ICT in the city infrastructure; the fourth is to bring ICT and people together to improve originality and knowledge. [Giffinger et al. \(2007\)](#) acknowledged four components of a smart city: education, participation, industry, and technical infrastructure. The list is extended in a recent project conducted by the Centre of Regional Science at Vienna University of Technology, which has identified six main components ([Giffinger and Gudrun, 2010](#)). These components are a smart: mobility, environment, economy, people, living, and governance.

These writers depend on the neoclassical and traditional theories of urban growth stressing in terms of Regional competitiveness; Transport and ICT economics; Human and social capital; Quality of life; Natural resources and Participation of society members. Particularly interesting in the previous list of components of a smart city is the insertion of the "quality of life". This factor highlights the definition of a smart city as a city that amplifies the life quality of its citizens ([Giffinger et al, 2007](#)). On the other hand, many studies disagree that quality of life may not represent a separate dimension of a smart city. [Shapiro \(2006\) & Lombardi et al. \(2012\)](#) have related the six components with different aspects of urban life, as shown:

1 Smart Governance Participation

- Participatory democratic processes for all groups and non-marginalization
- Transparency and accessibility of information
- Inter-governmental interrelationships (multi-level government)
- Organizations and departments
- Improving community access to social and public services

2 Smart Economy Competition

- Competition
- Competitiveness Regional cooperation.
- Innovation.
- Initiation of pilot projects.
- Wide range of access for all citizens and businesses to commercial opportunities
- Independence of the place, help to preserve the population in rural areas,
- Electronic means of business operations of all kinds (eg e-banking, e-shopping, and tenders)

3 Smart Mobility Connectivity

- more efficient and intelligent transport
- efficient networks
- mobility of vehicles, people and goods, to reduce stalemate
- new social behaviours "such as sharing car parking, car assembly, vehicle-bike compatibility • transport management to achieve, accessibility, and Logistics
- Multiple Models

4 Smart Environment Sustainability

- Environmental Sustainability / Energy Efficiency
- Reducing energy consumption through technological innovations
- Enhancing conservation and reuse of materials
- Networks and environmental monitoring
- Resource management and environmental protection
- Intelligent community

5 Smart People Knowledge

- Delivering learning experience consistently in both urban and rural areas
- E-learning solutions (distance learning, education and education in a collaborative manner) to be a citizen at a better learning level.
- Digital education and enabling work on communication and information technology.
- Building a community based on urban life management.

6 Smart Living Quality of Life

- After Healthcare Access to high-quality health care services (including e-health or health care monitoring),
- Electronic Records Management
- Home Automation, Smart Home and Smart Building Services Smart Building "
- Access to all types of social services by all categories.
- Tourism
- Urban space management.
- Culture and recreation

Challenges Facing Cities in Developing Countries in Smart City Implementation were identified from different sources and experiences and summarized in table 2

Table (2) Challenges Facing Cities in Developing Countries in Smart City Implementation

Living	People	Environment	Mobility	Economy	Governance
Affordable Housing	Unemployment	Energy Saving	Sustainable Mobility	Unemployment	Flexible Governance
Social Cohesion	Social Cohesion	Shrinking cities	Multimodal public transport systems	Shrinking cities	Shrinking cities
Health problems	Poverty	Holistic approach to environmental and energy issues	Inclusive Mobility	Economic Decline	Combination of formal and informal government
Crime Rate	Ageing Problems	Pollution	Pollution	Territorial Cohesion	Territorial Cohesion
Urban Sprawl	Social diversity as source of innovation	Urban Sprawl	Traffic Congestion	Multimodal public transport systems	Flexible Governance
			Non-car Mobility	Mono-Sector Economy	
				Sustainable local economies	

2.3 Experiences of Smart Cities

At 2013, North America had 35 projects; Asia 50; South America 10 Europe, 47; and the Middle East and Africa 10 there were approximately 143 ongoing or completed self-designated smart city projects ([Lee ET al.2014](#)). Among these initiatives in San Diego and San Francisco, ICT have been major factors in allowing these cities to claim to be a “City of the Future” for the last 15 years ([Lee et al., 2014](#)). In Canada, Ottawa’s “Smart Capital” project engages enhancing business, local government, and community using Internet resources. In the United States, California has been getting better traffic flow sewer and electric infrastructure through a tech-based transformation ([Lee et al., 2014](#)). Because of its weak industry, Quebec City was a city highly dependent upon its provincial government until the early 1990s, when the city government kicked off a public-private partnership to support a growing multimedia sector and high-tech entrepreneurship.

2.4 IDC Model for Smart Cities

International Data Corporation [IDC \(2015\)](#) suggests five stages for the development of smart cities include:

Phase 1: *Situation Based Implementation* - Smart City projects were implemented at this stage, based on prevailing conditions. The technology is to implement a specific project, the data are collected separately, and the project is sometimes not integrated with other parts of the smart city system. These types of projects help to demonstrate the value of smart city projects and help stakeholders prepare a feasibility study for the project and determine the return on investment to be used.

Phase 2: *Seize opportunities* - At this stage, cities will participate in effective cooperation between different departments and beneficiaries. Technology is an enabling factor for achieving this strategy, and beneficiaries begin to identify the types of data, communication and information technology systems that may be required to achieve the ultimate goal. Cities are developing strategies, identifying constraints and developing public plans.

"Phase 3: *Repetition* - At this stage of the maturity scale, cities have functional committees, accurate documentation of strategies, processes, communications and information technology, as well as the ability to convince key beneficiaries. The city aims to develop service delivery, expand some projects, and initiate the integration process. Data is used extensively for better results, and cities are beginning to address issues such as sustainable financing.

"Phase 4: *The City "Managed"* and therefore the city is at this stage" the appropriate application systems and technology are being implemented on a large scale. At this stage, cities will be able to anticipate the needs of

their citizens and companies and provide preventive services before problems arise. Cities are able to meet the key performance indicators identified and thus shift budgets, IT investments or governance structure.

"Phase 5: City" *Idealism* "at this stage the city has a flexible strategy and the systems are integrated and well coordinated. The city can constantly improve its operations and deliver superior results.

3. MAIN BODY

3.1 Study Problem and questions

The main problem of the study was the existence of a comprehensive lack of inclusive knowledge about how developing countries could deal with the principles of smart cities in the contemporary urban orientation of 21st century cities. In the light of the study problem, the main objective of the study was to attempt to establish a comprehensive knowledge of the principles of smart cities in the contemporary urban trends of 21st century cities especially in developing countries. To achieve this goal, the study hypothesis put forward: The reliability of the principles of the Smart City model based on the principles of the sustainable city model through interrelated indicators within urban fields. This study focuses on Jordan experiment in practising Smart city model as a developing country. Aspects of smart city are so wide and Jordan cannot cover in few years all requirements of smart cities. Jordan attempts to make a progress regarding this but it seems that it needs much more time, effort, abilities and attitudes to reach the race in the world and even in Middle East .On the other hand, Cities in gulf region seemed to achieve high levels in smart cities indicators, Dubai and Abu Dhabi are obvious examples. Generally, smart city model needs political well as serious public participation and well-done strategic plan compulsory for all parties in a country its government changes mostly every two years generally. In light of above, this study will attempt to answer the following study questions:

- 1) Can Smart city model cope with urbanization issues in developing countries?
- 2) Is there a difference between developing countries and developed countries in implementing Smart city model?
- 3) How Jordan is dealing with smart city concept?
- 4) What are the main practices of smart city model in Jordan?
- 5) What are the barriers facing Jordan in implementing smart city model?
- 6) What's the main recommendation for Jordan to enhance the establishing of Smart city model?

3.2 Study Methodology

The primary objective of this study is to realize the implementations of smart city model in developing countries taking Jordan as an Example. The study will focus on the comparisons between developed and developing countries in applying the smart city tools and fields. The study presented Jordan experiment in smart city model according to information collected from trusted sources. The study conducted a comparison with Gulf countries experiment was conducted. Since Gulf countries have a good experience in smart cities and they are already ranked in top 10 in implementing the smart cities indicators and disciplines. This will provide insight and directions for practicing planners who wish to use smart city concepts and model in developing countries in general and in Jordan as an example. The study based on a methodology that consists of a set of steps, based on theoretical bases and concepts of smart cities, their dimensions, requirements and applications, analysis of the results of theoretical studies and international experiments. Within this framework, the study adopted the analytical approach and empirical study on Jordan comparing it to neighbourhood gulf countries in order to extract conclusions and recommendation. This method of study focused on the expert side of smart city and compared to other case studies of near countries. Formal interviews with experts conducted.

4 Findings

4.1 Jordan Experiment in Smart Cities

Urbanization rate is increasing in Jordan rapidly. In 2017 the urbanization rate is almost 85% of whole population."Smart" is increasingly synonymous with urban development and urban renewal in the Jordan where cities are implementing advanced ICT solutions and services that enhance business experience and improve the quality of life of citizens and visitors. In 2006, Authorities initiated the e-government program officially. They aim to providing efficient services to Internet users and streamlining bureaucracy. Figures showed Jordan ranked 79th globally in the UN Department of Economic and Social Affairs' (UNDESA) ([E-Government Survey Report 2014](#)). This figure rise 19 places compared to 2012. Jordan ranked in eighth place at the Arab

level, preceded by Bahrain, the United Arab Emirates, Saudi Arabia, Qatar, Oman, Kuwait and Tunisia respectively in this report covering 193 countries ([E-Government Survey Report 2014](#)).

The recently launched report said that Jordan was ahead of Egypt, Morocco, Lebanon, Iraq, Syria, Yemen and Sudan. In 2014 Jordan ranked 71st internationally. While in the field of e-participation, Jordan improved by 30 places compared to 2012. The survey showed that more governments are increasing electronic involvement and using mobile and social media tools to reach people knowing that all UN member states are now online ([E-Government Survey Report 2014](#)). All 193 UN member countries using national websites for the first time this means that E-government is "entering a new episode". Governments' use of social media rose 50 % between 2012 and 2014, with 118 countries using some form of social media, including Facebook and Twitter. According to the report (2014) Government officials are now using their online presence to add public value to people's lives in a comprehensive approach. Jordan now is considered one of the tenth in Arab countries in using social media by its citizens especially Facebook. Government Institutions and municipalities are now using Social Hub Media as well increasingly. The UNDESA report for 2014 appraises the use and potential of information and communication technologies in order to renovate the public sector by enhancing transparency, accountability, efficiency, effectiveness, access to public services and resident participation in the 193 member states of the United Nations at all levels of development.

Unfortunately, Jordan has been ranked 91st out of 193 for e-government services, falling 12 places since 2014, according to the UN's 2016 E-Government Index. Jordan falls to 98th place in the index, from 71st place in 2014. Jordan's ranking for e-participation also dropped. Bahrain ranked 24th globally, followed by the UAE in 29th place, Saudi Arabia in 44th place and Qatar in 48th place comparing to other counties nearby. By 2020, the government's Economic Growth Plan (EGP) wants to computerize procedures to reach an e-government. On the other hand, the council's determining to digitalize the economic sector and to attach all sectors to each other. In order to boosting the economy and creating job opportunities Government anxious about the importance of the digitalization project in a manner to boost National Strategy for Digitalizing Economy ([Reach 2025](#)), which is based on government digitalization , innovation, business pioneering, and skills improvement. The governmental services are divided into four categories: citizen, business, residence and government.

Jordan needs to speed up provision of high quality e-services that should be also coupled with increased consciousness. Citizens start using them as some experts declare while meeting them in Amman Greater Municipality (GAM). The government promise to launch at least 150 E- government services but tell now it did not exceed 100 services now available in all sectors. From submitting an application or starting a transaction until completion and payment, the available services can be fully conducted online. Consequently, when smart phone penetration exceeds 70 % the launch of additional e-services in Jordan comes at a time. These services include license renewals for commercial establishments, optional subscriptions to the SSC, inquiries about and settling real estate taxes, and the payment of dues electronically. Additional services also include inquiring about and paying traffic tickets, issuing security clearance documents and other services at the Ministry of Justice, and several services at the Income and Sales Tax Department. Recently, ten E- services were launched at 2018 at the Ministries of Tourism, Labor and the Departments of Lands and Survey. The new e-services will be affiliated to the GAM, the Ministry of Interior, the Social Security Corporation, the Ministry of Education and the Civil Status and Passport Department, among other public entities.

They launch just eight E- services at (GAM). Amman is the capital of Jordan and has more than 42% of its population. Governments in the region currently talk about smart government, which is more advanced than just having e-services. There has been a delay in launching e-services over the past years. Moreover, lack of access to technology, poverty and inequality prevent people from fully taking advantage of the potential of ICT and e-government for sustainable development, according to the [UN \(2014\)](#). Governments consider that e-services will help enhance the ICT sector activate growth in several economic fields and also, which is a pioneering sector at the regional level. Government will implement several major ICT projects in the near future, underscoring that public-private partnerships are crucial to advance the sector and provide further services. ICT signed an agreement with King Abdullah II Centre for Excellence (KACE) to launch the e-Government Transition Award that aims to assess the institutional willingness to switch to electronic transactions and services ([Petra, 2017](#)). This award encourages government institutions to improve and develop their electronic services.

4.2 Jordan versus Gulf countries in smart city adaptation

Contrariwise, the Internet of Things (IoT) is a reality under the leadership of gulf countries especially Abu Dhabi and Dubai. Dubai Electricity and Water Authority (DEWA) determine to deploy 200,000,000 intelligent meters to be operational in early 2016. Smart meters allow citizens to monitor their electricity and water consumption over the Internet or through their mobile phones helping them reduce their consumption. The plan is expected to include the deployment of more than 1 million sensors by 2020. DEWA is deploying a smart grid for solar energy to build fuel stations for hybrid vehicles to demonstrate its commitment to improving sustainability. This kind of smart city model depends on IoT concept is not yet fully considered in Jordan.

On the other hand, Security is part of Dubai's ambition to "become the smartest city in the world." Dubai Police has developed smart services that allow citizens to identify the locations of the most traffic-intensive areas, report accidents, payment of fines, and other services. More importantly, Dubai Police deployed about 650 surveillance cameras to monitor commercial sites, as well as 550 mobile cameras in traffic police vehicles. The data from these cameras help to improve the efficiency of the police and reduce the time taken to resolve cases. In the case of Jordan, this needs much more time and efforts to be implemented.

In the smart buildings and neighborhoods, side Jordan still far away from this implementation except some minor and shy examples from individuals or some NGO's regarding green and smart buildings. While Dubai has established two major projects - Dubai Design District and Dubai Silicon Park - to enhance the emirate's commitment to becoming a "smart city". The two projects are new initiatives of their kind. The clusters rely on the city's smart substrates and solutions to provide a sustainable and interactive environment and enhance innovation in technology and design. The two projects rely on mobility solutions (Wi-Fi access), the infrastructure of electric vehicles, green buildings and sensors to create a truly interactive and intelligent environment.

The discussion of applying the dimensions of smart economy in Jordan leads us to compare it with the real experiment at Abu Dhabi. The Smart City plan in Abu Dhabi is largely focused on economic diversification and the emirate is far from relying on natural resources to focus more on knowledge, innovation and sustainability. Masdar City, established in 2006, aims to serve as a model for cities to effectively deal with rapid urbanization and provide a high-quality, community-friendly environment. The city uses a solar power source and employs green building standards, uses cars and electric buses, and ensures efficient energy management across commercial and residential areas. In Jordan the Economic Specialized Zones(ESZ) are new and could be good examples to implement Abu Dhabi type of Smart economy but of course they need a lot of effort to tackle this kind of smart city planning.

The comparison in Municipality sector between Jordan and gulf countries also is tends to favor of gulf countries as well. While major municipalities at Saudi Arabia are implementing initiatives to become smart, the major cities are Makah, Medina, Riyadh and Jeddah. The initiative in Makah is to modernize the municipal infrastructure currently existing and expand its scope. With the pilgrimage to improve the integration of services so that visitors to Mecca and pilgrims can access electronic services (e-services) and mobile services (mobile services), the municipality effectively relies on information from GIS to help track Hajj and provide information to ensure pilgrims safety, In addition to expanding public transport services, Makah also implements an intelligent traffic management system to monitor traffic, prevent traffic jams, and prevent traffic congestion. The use of smart cities based on smart data, intelligent network building, and the Jeddah Information System to improve urban planning and deployment of the management system in the area of traffic, On flood and eviction solutions. whereas in Jordan Amman is the main city in Jordan and the most populated with more than 4.25 million inhabitants(2018) the City of Amman was the primary case study on the development, launch, and maintenance of a smart city implementation. The municipality of Greater Amman AGM created and launched eight digital services including Amman Mostakshef (GIS server) and digital video. AGM launched a Facebook and Tweeter page to enhance public participation. Some of its urban regulation tends to be green in the new law 2017.still it needs more efforts in early warning alarm system and resilience solutions. Other municipalities have evidence in using e- government solutions especially Aqapa and Irbid. Tafeeleh and Irbid also are good examples in Jordan in enhancing the public participation through social hub media (Qutieshat, 2017)

In the Smart Mobility, Qatar's transport sector has made significant investments in smart initiatives. Qatar Railways has implemented three major projects, the Doha Metro, the long-distance train and the Qatar Airways long-haul railway, to Lusail City. And the Qatar Technology Innovation Center (QSTP), which will use the Centre's MESARC platform, an open-source platform that provides the Integrated Logistics Management Group with solutions for intelligent transport management, road safety and public services. The platform will receive

data from various sources such as GPS, mobile phones, Wi-Fi and Bluetooth. This data will be analyzed to provide traffic management outputs. The Qatar Centre for Technological Innovation will establish a logistics coordination centre for Qatar Railways to improve traffic control to reduce traffic congestion, ensure effective public transport and provide viable alternative routes for residents and visitors of Doha. In Jordan, some projects now under construction mainly the (Rapid bus) PRT system at AGM, which has three routes and aims to decrease the dependence of relying on private cars and enhance public transportation. Government also has a long term strategic plan for transportation especially at GAM. They planned to make the Light rail between the two major cities of Amman and Zarqa as recently released by Jordan Strategy Forum. On the other hand almost half of Jordanians (48%) have never used E-government services. "Many people still prefer the traditional ways to complete transactions," ICT Minister said at an event on Thursday held by the Jordan Strategy Forum (JSF). "More efforts are needed to acquaint the public with the benefits and necessity of using e-services", the government said. Lack of promotion and the difficult procedures associated with some services was the most reasonable reasons due to Government experts. To increase the utilization of e-services, they proposed solutions such as awareness campaigns and making the use of some services mandatory, such as paying traffic tickets electronically. Stressed the importance of the e-government program for its role in saving time and efforts, and enhancing transparency the minister of ICT highlighted plans to increase the number of e-government services to 350 by 2019.

4.3 Cases analysed (Amman Greater municipality AGM)

At 2020 Amman greater Municipality clarify the content posted and feedback from fans while it plans to reach 128 E-services. Transforming Amman into a smart city requires the development of infrastructure, as well as the adoption of a range of applications according to their importance, with increasing applications over time. Below some conclusions observed from experts interviews:

- The application of smart transport systems in Amman is facing a number of challenges, including: economic challenges, high cost of installation of technical equipment required, technical challenges of difficult exchange of data, social challenges related to the inability of all users of the transport system to deal with technology
- The application of e-tourism in Amman requires activation of a set of levels, namely the level of information delivery, the level of supply, and the level of interaction.
- The application of e-tourism in Amman faces many challenges, including the effort required to prepare content for individuals, as well as the high cost of implementing the level of interaction due to the high cost of its technical requirements.
- The city of Amman can be transformed into a city with intelligent technologies through the adoption of the strategy of establishing technical zones in the city of Amman that contribute to the promotion of the knowledge economy.

5. DISCUSSION

5.1 Review of Study Questions

This section is dedicated to reviewing the questions and drawing conclusions based on the findings.

In literature review the study tried to give some answers to question one (How Can smart city model cope with urbanism issues in developing countries?)(How developing countries mainly Jordan is dealing with smart city concept?) And two while the second part of the study concentrate on question three addressed (What are the main practices of smart city model in Jordan?)

Smart city is a relatively new tool for many of the cities interviewed, yet all have obtained the goals they set out initially. Cities were able to launch and operate a few ICT services with little resources

While table 2 answer the fourth question (Is there a difference between developing countries and developed countries in implementing Smart city model?).

For the fifth question: What are the barriers facing Jordan in implementing smart city model?

According to experts interviewed, they answered that complexity and elected people needed to champion smart city vision and cities need to shrinking tax revenues, for business they need to integrate services across departments and finally public private partnership is essential infusing ICT. Table 3 represents barriers of implementing Smart city model according to expert opinions.

Table3 Barrie's of implementing Smart City Model

Complexity	▪ Multiple departments, stakeholders, processes
Leadership	▪ Elected official/business leader needed to champion smart city vision
Finance	▪ Shrinking tax revenues, budget cuts, austerity measures
Business	▪ Integrated services across departments, single citizen portal
Technology	▪ Public-private partnerships in infusing ICT

5.2 Recommendations

This section presents guidance to planners and beneficiaries within the smart city system on the key aspects they need to become flexible and integrated, skilled of delivering a superior practices to citizens.

- 1- *Building Data plan*: Meet the requirements of citizens on the ability to provide targeted responses, which results from inputs of dwellers. Ensuring the quality and transparency of data for citizens and for those who wish to use data in launching new e-services.
- 2- *Occupying flexible strategies*: Cities need to formulate a comprehensive strategy that includes all beneficiaries to achieve superior results. In addition, cities must avoid strategies that enable them to respond effectively.
- 3- *Encourage innovation*: Smart city also play a critical role in the empowerment procedure. To achieve this goal, governments will have to build an "open" system by providing data and platforms on open source platforms that are easy to use and promote development.
- 4- *The implementation of supportive innovation*: establishing relationships with the beneficiaries to bring together public-private partnerships this shall make smart cities much more flexible.
- 5- *Embracing of convergence*: separate units of technology should be avoided instead the trend towards convergence in techniques and data, cities can use a platform model that provides access to both data and technology to different departments and agencies by implementation of convergence.

6 CONCLUSIONS

This paper tries to clarify the concept of Smart cities that is getting gradually more popular. On the other hand, this paper shed a light on the fact that planners should differentiate in implementation of smart city from developing countries than developed countries. An in-depth analysis of the literature revealed that the meaning of a smart city is complicated and has a lot of faces. Descriptions of smart cities are now including qualities of people and communities as well as ICTs. Results show how complicated the measurement of a smart city.

GAM is currently in the "seize opportunities" phase, seeking to develop formal strategies, identifying all beneficiaries and decides on the type of technology to be used. Many cities in Jordan are still learning how to take advantage of technologies, decide on the type of governance framework and assess their ability to ensure sustainable financing. This leads to some delay in terms of defining the integrated strategic feasibility of smart cities. While Jordan cities still in the first phase Stage 1: Based Implementation - Smart City projects were implemented at this stage, based on prevailing conditions. These types of projects help to demonstrate the value of smart city projects and help stakeholders prepare a feasibility study for the project and determine the return on investment to be used. The technology is to implement a specific project, the data are collected separately, and the project is sometimes not integrated with other parts of the smart city system.

Clearly, Jordan has to take commercial hubs to provide smart, open and flexible city platforms that provide technical infrastructure as virtual services on the Internet, based on data analysis while ensuring security. This smart Hub has Information Infrastructure platform, VMware, Pivotal, Virtualized Computing Environment (VCE), RSA and Virtu-stream. Smart cities Hub platform is based on three open and scalable pillars, and is closely aligned with the IDC framework as described in the "Cities and Smart Cities ICT Pillars" section of this paper. It can offer Smart Cities as a solution for proven success, benefiting from the best corporate solutions that make up the Union. The infrastructure base is based on the Cloud Hybrid Enterprise system.

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