Visioning "smart city" across the Gulf Cooperation Council (GCC) countries

Stuti Saxena and Tariq Ali Said Mansour Al-Tamimi

Abstract

Purpose – *The study aims to underscore the initiatives taken by the Gulf Cooperation Council (GCC) countries in spearheading their drive towards creating "smart" cities.*

Design/methodology/approach – *The study uses a qualitative approach by invoking documentary analysis supplemented by responses provided by 13 interviewees from public and private sector.*

Findings – *All the six GCC countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates) are keen on building upon their infrastructure to push their "smart city" agenda which would go a long way in furthering the economic diversification objective of their region besides improving the quality of public services.*

Originality/value – *Hitherto, research has been focused on appreciating the "smart city" initiatives of developed countries; this study seeks to build upon the literature on "smart cities" by contextualizing the research setting in the developing countries. Second, the study shows that with the ongoing oil prices crisis in the GCC, the "smart city" initiatives of the countries are conceived as possible avenues of economic diversification and competitiveness.*

Keywords *Vision, GCC, Smart cities*

Paper type *Research paper*

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1. Introduction

As urbanization is growing across the globe, the number of cities is increasing and they are encountering many challenges from within and without. To counter the challenges, there is a need for laying down an IT-focused urban management of cities, thereby laying down the foundation of "smart cities" (Buckman *et al.*, 2014). This would facilitate in meeting the needs of the residents in an efficient and effective manner and would improve the quality of life of the residents. It has been underscored that with the establishment of "smart cities", the economic growth of the region improves and there are opportunities for sustainable development. Conceding that the Gulf Cooperation Council (GCC) region is facing the oil prices crisis presently, it is posited that one of the channels of economic diversification could be through digitalization of economy.

A "smart city" is one which is "intelligent" (Jussawallaa *et al.*, 1992), "sustainable" (Camagnia *et al.*, 1998; Stratigea *et al.*, 2015), "ubiquitous" (Lee *et al.*, 2008), "digital" (Hongyan *et al.*, 2012; Kourtit *et al.*, 2017), "creative" (Baylissa, 2007), "innovative" (Isaksen and Wiig, 2001) or a higher order one which may be designated as "city 2.0" (Fraoua and Bourret, 2013). It has been estimated that the "smart cities" market will witness a marked increment over the years to touch US$1.5tn by 2020 (Deloitte, 2017). Six main criteria have been identified to characterize a "smart city": "smart economy", "smart environment", "smart governance", "smart living", "smart mobility" and "smart people" (Cohen, 2012). Conceding the multi-dimensional interpretation of "smart city", it is difficult to provide a definition of the concept (Capdevila and Zarlenga, 2015; Caragliu *et al.*, 2011; de Wijs *et al.*, 2016). For furthering "smart city" initiatives, IT-enabled tools are deployed to further the

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collaboration and communication between the citizens and the government. Summing up, "smart cities (are) those innovative urban systems that strategically invest in new technologies and human capital, seeking to improve services effectiveness, quality of life, economic competitiveness, environmental sustainability, and participatory governance" (Fernandez-Guell *et al.*, 2016, p. 46; Kamel, 2013). Some of the "smart city" projects are linked with health care, public services, education, transport, climate, etc.

While extant literature on "smart city" is replete with studies set in the developed countries, research in the developing countries remains negligible. We seek to plug this research gap by investigating the "smart city" initiatives in the countries constituting the GCC: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. Our study is also relevant considering the ongoing impetus upon "economic diversification" in the GCC region as a means of extricating the region out of the plummeting oil-prices crisis.

The paper is arranged in six sections: Section 2 shall provide a review of the literature on "smart city" with a view to underline the originality of the present study. Section 3 shall provide a brief about the research method deployed to address the research question underlining the present study. Section 4 shall provide a summarization of the study. Section 5 shall underline the implications of the study. Section 6 shall provide a brief regarding the study limitations and directions for further research.

2. Related literature

Extant research has defined "smart city" from diverse perspectives. While some studies have underlined the defining features of a "smart city", others have contextualized "smart city" initiatives. For laying down the edifice of a "smart city", governments ensure that sophisticated services are provided to the citizens using state-of-the-art technologies and sustainable solutions (Ghosh *et al.*, 2016; Kendel and Lazaric, 2015; Li *et al.*, 2015; Lombardi and Vanolo, 2015). There are four fundamentals governing "smart city" definition: technology (to collect and manage new data sources, conduct analyses and use networked tools and technologies to manage cities), sustainability (adoption of a diversity of urban growth management policies where the dimensions of environmental, economic and social sustainability are being emphasized), human and social capital (knowledge exchange, creativity and innovation through collaboration among stakeholders to create "smart solutions") and governance (institutional preparation and community governance) (Chauhan *et al.*, 2016; de Wijs *et al.*, 2016; Fernandez-Guell *et al.*, 2016; Monfaredzadeh and Berardi, 2015; Tranos and Gertner, 2012). Furthermore, in a "smart city", there is emphasis upon furthering businesses and private sector besides energy and other resources (Pan *et al.*, 2011). In this section, we will review some of the major studies which have invoked the "smart city" concept to substantiate their research objectives.

2.1 Conceptual studies on "smart city"

A lot of research veers around the conceptual and theoretical definitions of what a "smart city" should look like. Besides, conceptual models and trends in "smart city" frames have been advanced in literature (for instance, Hoon *et al.*, 2013; Leydesdorff and Deakin, 2011; Meijer and Rodriguez-Bolivar, 2015; Neirotti *et al.*, 2014). However, a "truly holistic" model is yet to be deduced (Fernandez-Guell *et al.*, 2016). Allwinkle and Cruickshank (2011) provide a critical review of the concept where the key dimensions of a "smart city" are outlined. Being "smart" does not merely entail the use of IT in delivering public services; it also implies that information and communication technologies (ICTs) be used for furthering innovation, learning, knowledge, co-creation and problem-solving (Komninos, 2008). In another study, "smart cities" are conceptualized as "creative" and "intelligent" cities where knowledge creation happens concomitantly with wealth creation (Landry, 2008). Also, a "smart city" has been conceptualized as "creative", "progressive" and "entrepreneurial"

where IT plays a dominant role in forging ties between different stakeholders in the city's ecosystem (Hollands, 2008). The major characteristics of a "smart city" have been highlighted as:

> "a city's networked infrastructure that enables political efficiency and social and cultural development;
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> an emphasis on business-led urban development and creative activities for the promotion of urban growth;
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> social inclusion of various urban residents and social capital in urban development; and
>
> the natural environment as a strategic component for the future" (Albino *et al.*, 2015, p. 13).

From a network perspective, Hollands (2008) defines "smart city" in terms of the infrastructure network which improves economic and political efficiency and helps in furthering social, cultural and urban development (Hollands, 2008). The conceptualization of a "smart city" has been provided in a comprehensive form which involves "the creation and connection of human capital, social capital and ICT infrastructure in order to generate greater and more sustainable economic development and a better quality of life" (Giffinger *et al.*, 2007). From yet another perspective, a "smart city" has been defined in terms of the investments in human and social capital which further participatory governance (Schaffers *et al.*, 2011). In another study, a citizen-centric typology for "smart city" services is provided based on four dimensions: mode of technology (automate–informative–transformative), purpose of service (hedonic–utilitarian), service authority (voluntary–mandatory) and delivery mode (passive–interactive) (Lee and Lee, 2014). A three-stage model is proposed by Abella *et al.* (2017) which seeks to define the utility of the data released by the smart cities' online portals, and these data may be of immense use for the citizens to derive value. Specifically, the three stages are as follows: release of data by the smart city which may be re-used by different stakeholders for diverse ends, creation of innovative products and services by the stakeholders and creating impact on the society through these innovations and services. The link between ICT and sustainability is probed to ascertain the impact on promoting "smart city" elements (Bifulco *et al.*, 2016). Kourtit and Nijkamp (2012) have underlined the role and significance of digital data systems while designing public policies on "smart cities". Finally, a "smart city" has been defined in terms of the interactions between and among four layers: user, service, infrastructure and data (Anthopoulos and Vakali, 2012).

Overall, the conceptual framework surrounding the "smart city" concept is hazy and this may be attributed to the contexts and applications in which the research question is situated. Therefore, there is a need for arriving at a concrete definitional framework for the same.

2.2 Empirical studies on "smart city"

Most of the empirical studies on "smart cities" are conducted in the developed countries. For instance, in a Spanish-based context, the significance of tapping social media for furthering "smart city" initiatives were underlined (Saez-Martin *et al.*, 2014). In an empirical investigation of the "smart city" initiatives in Seoul and San Francisco, it was found that apart from collaboration between public and private sectors, the socio-cultural and developmental stages of the cities needs to be appraised while implementing the "smart city" initiatives (Lee *et al.*, 2014). Taking a case study of Dutch railway station areas, the key objectives of a "smart city" are being probed with the help of in-depth interviews (de Wijs *et al.*, 2016). Likewise, taking the case study of the Municipality of Turin which developed a participatory smart community project, "Innova.TO", three key considerations before public managers while planning "smart city" initiatives: were the role of generating awareness and

legitimation of any initiative through collaboration with external recognized communities; the significance of including all the stakeholders in the planning and execution stages; and the significance of engagement of the community in the ICT for generating feedback and interaction between the government and the citizens (Michelucci and De Marco, 2017).

In another study contextualized in Singapore, the notion of "smart city" has been extended to cover the entire nation, and the key features have been defined (Hoe, 2016). In another study, "smart city" initiatives have been discussed with reference to Glasgow and Dublin (Dabinett, 2005). Carvalho (2015) underlines the interactive socio-technical challenges in "smart city" initiatives in two case studies, Songdo (South Korea) and PlanIT Valley (Portugal), and concludes that technological learning and societal embedding are the two processes which define the "visions" of "smart cities". In another study based in Taiwan where 1,091 citizens were questioned about their perceptions regarding the smart city initiatives, it was found that citizens' willingness to accept and use smart city services was dependent upon factors like provision of innovative and quality services and respect of their privacy (Yeh, 2017). Including Glasgow along with five other UK cities (Bristol, London, Manchester, Milton Keynes and Peterborough), evidences were drawn regarding the extent to which the "smart city" policies take into account the socio-political dimensions of urban life (Cowley *et al.*, 2017). Again, in the context of European cities, research has found that the interaction of information technologies with the people is a function of development, planning, rules and policy (Russo *et al.*, 2016). An empirical investigation into the extent to which the Central and Eastern European countries have succeeded in terms of sustainability objectives reveals that "smart specialization" holds the key for sustainability in the region, wherein "smart specialization" may be defined as "countries and regions should identify and select a limited set of priority areas for knowledge based investments, focusing on their strengths and competitive advantages" (Serbanica and Constantin, 2017, p. 60). Using a case study approach, the "smart city" initiatives of Turin (Italy) have been explored to underline the gamut of partnerships involved in economic value generation (Rossi, 2016). In another empirical investigation focused on European countries, it was found that "smart cities" lead the rest in terms of human capital, density, industrial mix, amenities and attractiveness (Caragliu and Del Bo, 2012). Furthermore, the role of IT firms in providing solutions to the governments for launching "smart city" initiatives was underlined in a Philadelphia-based study where the contribution of international business machines corporation (IBM) as an urban consultancy firm in "smart city" policy initiative was explored (Wiig, 2015).

Overall, we may deduce that there are more of conceptual and theoretical studies related with the "smart city" concept. This may be attributed to the novelty of the concept and the fact that the "smart city" idea is in a nascent stage and is yet to pervade across the globe. Conceding that the present study seeks to appreciate the national "visions" of launching "smart city" initiatives in the six GCC countries, our study lends a significant contribution to the extant literature from the perspective of developing countries. Specifically, the present study seeks to gauge the perspectives of senior management professionals in the public and private sector manning "smart city" initiatives in the six GCC countries.

3. Research method

We use a case study approach where we probe select "smart city" initiatives across the six GCC countries. A case study seeks to investigate a phenomenon in its natural setting and helps a researcher to deploy a range of data collection methods from entities like people, groups or organizations (Yin, 1994). It helps to deepen our understanding about a phenomenon (Cavaye, 1996). As a qualitative study where the aim is to ascertain the subjective dimensions of the research objective, case study is an appropriate research methodology. In this section, we will cover the research method adopted for generating evidences to substantiate our study; in this regard, we will provide a brief sketch of documentary analysis and interview approaches followed by a brief description of the six

GCC countries. Thereafter, we will scan the "vision" statements of the GCC countries in terms of their impetus on launching "smart city" initiatives with a view to further their ongoing economic diversification strategy amidst the crisis of plummeting oil prices. Besides, we will provide perspectives of the key officials and representatives whom we contacted in line with our study's aims.

3.1 Documentary analysis and interviews

For our study, we deployed documentary analysis for drawing evidences regarding the broad aims of the GCC countries *vis-à-vis* establishing "smart cities". Documentary analysis seeks to produce evidences for substantiating the research claims. Specifically, documentary analysis is defined as "a systematic procedure for reviewing or evaluating documents-both printed and electronic (computer-based and internet-transmitted) material" (Bowen, 2009, p. 27). Furthermore, documentary analysis facilitates one to "categorize, investigate and identify [. . .] written documents, whether in the private or public domain (personal papers, commercial records, or state archives, communications or legislation)" (Payne and Payne, 2004, p. 60). For our purpose, we referred government websites and other online resources which were relevant for our research question.

Besides documentary analysis, we conducted 13 interviews. Interviews are regarded as the primary tools of data collection in a qualitative research (Denzin and Lincoln, 1998). Given the human idiosyncrasies associated with humans, interviews are a good means of soliciting perspectives regarding a particular phenomenon. In our study, we conducted semi-structured interviews with public officials and private sector representatives linked with "smart city" initiatives in the GCC region. Interviewees were contacted via telephone calls and e-mails and all the interviewees were informed about the study's rationale. While some of the interviewees were contacted directly (as in the case of Bahrain, the UAE, Oman and Saudi Arabia), the others were contacted via snowball sampling method (i.e. through indirect referrals). Snowball sampling is defined as a technique for gathering research subjects through the identification of an initial subject who is used to provide the names of other actors (Lewis-Beck *et al.*, 2004). Interviews were conducted between April 2, 2016 and August 13, 2017. The language of communication with the respondents was English and Arabic. Two research assistants were helpful in recording and translating the responses. Overall, we solicited inputs from nine respondents across the six GCC countries by contacting them through email, telephone and business visits.

3.2 Gulf Cooperation Council: a background

GCC was set up in 1981. It is a regional intergovernmental political and economic union which seeks to further regional cooperation in different spheres. There are six member countries of the GCC: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. Bahrain is a Kingdom which is located on an archipelago on the shores of Persian Gulf. Kuwait is bordered by Iraq, and it has remained an important country in terms of its international relations. Oman is located in the south-eastern coast of the Arabian Peninsula and the country shares borders with the United Arab Emirates, Saudi Arabia and Yemen. Qatar shares borders with Saudi Arabia and is a leading investment hub. Saudi Arabia is located in western Asia and it is bordered by Jordan, Iraq, Kuwait, Qatar, Bahrain, United Arab Emirates, Oman and Yemen. Saudi Arabia is a significant destination for oil reserves besides holding religious significance. Finally, the United Arab Emirates (UAE) is situated at the south-east corner of Arabian Peninsula and shares borders with Oman and Saudi Arabia.

Table I summarizes key indicators for the GCC region in line with the Global Competitiveness Report (2016-2017) where the GCC countries are pitched along 138 global economies. These indicators are reflective of the fact that the GCC countries need to

bolster their efforts in institutionalizing a robust infrastructure for propelling the region towards growth and development.

3.3 "Smart city" across the Gulf Cooperation Council: How do the Gulf Cooperation Council countries project the "smart city" in their "vision" statements?

For a systematic "smart city" initiative, it is important that following aspects be borne in mind: "participatory vision building"; "planning for sustainable 'smart' future urban development"; "co-designing and co-designing the future image of the 'smart city'" and a "policy framework enabling city- and citizen-specific innovations and city- and citizen-specific communication platforms" (Stratigea *et al.*, 2015). Therefore, governments adopt a vision-oriented approach to implement "smart city" initiatives by forging ties with stakeholders like multinational companies, research institutions and other interested partners (Hoe, 2016). However, at present, the development of "smart cities" is focused on select cities only. Implicitly, the homogeneity of "smart cities" development may not be vindicated across the six GCC countries. All the six GCC countries have outlined their "vision" statements to pull themselves out of the ongoing oil prices crisis and to diversify their economy into non-oil sectors like tourism, education, mining and the like. Also, these "vision" statements are a testimony of the proposed initiatives of the GCC countries to improvise the public services by tapping ICT. Whereas the "smart city" initiatives are in an evolving stage in the GCC, the strategy for the same seems to have been developed.

3.3.1 Bahrain. "Vision 2030" of Bahrain lays emphasis upon "a cutting-edge infrastructure", "a world-class infrastructure" and "increasing levels of sophistication and innovation" (Economic Vision, 2030). Further, the "Vision 2030" provides that the government would improve the quality of public services and cut down expenses. Certain sectors would be outsourced which would help the government to focus on the maintenance of "required infrastructure and services", creating a "safe and secure environment" and "adopting the latest technologies (besides) modernization of [...] services". Bahrain has envisaged the setting up of ten "smart cities" in due course of time. Manama would be investing heavily on developing the "smart city" initiatives. At present, however, Manama is yet to chalk out a proper strategy for launching itself as a "smart city". However, the e-government initiatives and the open data portal are active in running the IT-enabled public services.

3.3.2 Kuwait. In its "Vision 2015", the government had announced measures to facilitate economic diversification on account of oil prices crisis and to boost finance, trade and tourism in the country. In line with its "Vision", the country has sought to modernize itself by using digital technology. In the "Vision 2035", it has been clearly laid down that besides "restructuring the administrative machinery and improving the delivery of public services including electronic means", the government would further its initiatives of "modernizing the collection and dissemination of data and information and supporting the development of information society" (Vision, 2035). Saad Al-Abdullah is conceived as the first "smart city" in Kuwait which is spread over 59 km^2 to accommodate 400,000 people. For furthering its "smart city" planning, the country has forged ties with public and private sector partners in South Korea. Basically, the "smart city" of Saad Al-Abdullah will be modeled on the

Table I Rankings of GCC region across key indicators for GCC

Country	*Bahrain*	*Kuwait*	*Oman*	*Qatar*	*Saudi Arabia*	*UAE*
Infrastructure ranking	32	52	38	18	31	4
Macroeconomic environment ranking	113	6	81	2	68	38
Health and primary education ranking	34	76	69	27	51	40
Technological readiness ranking	37	60	57	33	41	18
Innovation ranking	45	110	76	18	42	25

Source: Global Competitiveness Report, 2016-2017

South Korean city of Bundang. It has been stipulated that the city would be connected by solar cells and measures shall be adopted to tackle pollution with innovative and affordable construction solutions (Kuwait Times, 2017). Apart from Saad Al-Abdullah, eight more "smart cities" would be launched in due course of time.

3.3.3 Oman. Oman has laid down its "Vision 2020" where the need to further innovation and investment in infrastructure has been mentioned. Besides, in the "Vision 2040", the country aims at achieving digital transformation of the country by deploying ICT and other enablers of "technological progress" (Times of Oman, 2017). Presently, Oman has commenced its "smart government" initiatives under the egis of the Information Technology Authority (ITA) where "Digital Oman Strategy" and other initiatives ("e-transformation plans"; "e-payment gateway"; "National Unified Addressing System"; "Smart eCensus 2020"; "e-Health portal"; "Educational portal" and "Open Data initiatives") are being furthered. Apart from the ITA, the National Center for Statistics and Information is involved in developing an "Oman National Spatial Data Infrastructure (ONSDI)" with the purpose of providing standardized and easily accessible information to all. Oman has launched "smart technology" initiatives by tying up with the private sector for providing affordable and sustainable solutions.

3.3.4 Qatar. Qatar's "National Vision 2030" rests upon ensuring better living standards for the people by building upon its infrastructure and meeting "other requirements of a rapidly growing, diversifying and technologically sophisticated economy" (National Vision, 2030, 2017). Qatar launched its "Qatar Smart Program" (TASMU) in 2017 with the aim to further the progress of the country as a "digital economy", and in this regard, the government is committed to invest QR 6bn over the next five years for establishing the requisite technological infrastructure (The Peninsula, 2017). For instance, the establishment of Qatar Digital Oasis is on the cards where the stakeholders from public and private sector would collaborate to identify key initiatives. Another "smart city" project relates to Msheireb Downtown Doha which is targeted to be completed by 2018 and would be symbolic of a networked ICT infrastructure which would support the "smart city" initiatives.

Further, the country seeks to place emphasis upon the manpower trained with sophisticated software and hardware knowledge to spearhead the Qatar Smart Program. Qatar envisages the "smart city vision" which "enhances people's lifestyle and empowers businesses through efficient and sustainable services delivered by an integrated ICT infrastructure" (Smart City Vision, 2017). In this vein, the country positions Lusail as the model "smart city" where advanced services shall be provided to the residents and visitors by tapping a high-technology environment. It has been projected that the Lusail Command and Control Centre shall be set up for overall management and monitoring of the "smart city" initiatives besides handling crisis and disaster situations. Conceding that the World Cup 2022 is approaching, the country has been strategizing investments in infrastructure as a part of "smart" initiatives. For instance, Qatar Rail Development Programme is being promoted and the Qatar Tourism Authority has been pushing ahead with its tourism projects.

3.3.5 Saudi Arabia. Saudi Arabia has put it comprehensively that its "Vision 2030" is aligned to provide public services by instituting "a sophisticated digital infrastructure (which) enhances the fundamental competitiveness of the Saudi economy [...] (Therefore, the government) will partner with the private sector to develop the telecommunications and information technology infrastructure, especially high-speed broadband, expanding its coverage and capacity within and around cities and improving its quality" (Vision, 2030, 2017). Also, the "Vision 2030" lays down that the country would aim at self-transformation to emerge as a pioneering and global model of excellence on all fronts and rampant urbanization would be matched by sustainability initiatives.

King Abdullah Economic City has been hailed as the key pillar of Saudi Arabia's "smart city" roadmap. Apart from King Abdullah Economic City, three more "intelligent" cities would be rolled out in due course. With the help of a private partner, CISCO, King Abdullah Economic City would benefit from connected city services resting upon a robust network

infrastructure. The entire project of King Abdullah Economic City commenced in 2006 and is anticipated to be completed by 2020. The city would be patterned along technology, esthetics and sustainability and provide a decent standard of living for all. There would be four key focus areas in the city: home automation platforms, smart lighting, security and intelligent energy consumption. In this vein, the government has partnered with private sector to set up a "smart city" innovation center for providing training to personnel involved in implementing "smart city" initiatives. It is anticipated that the innovation center would commence in 2017 and facilitate the Saudi Arabia 2020 transformation agenda based on a "digital economy" platform.

3.3.6 United Arab Emirates. The "2021 Vision" of the UAE underscores the need for a sophisticated infrastructure besides projecting the country as "a forerunner in the provision of smart services" (Vision, 2021, 2017). In the UAE, "Mohammed bin Rashid Smart Majlis (Council)" was formed in 2015 to spearhead the "smart" government initiatives in the country. Masdar (Abu Dhabi) has already been promoted as a major "Smart City". Likewise, "Smart Dubai" initiative was launched in 2014 and the initiative has been envisaged to "empower, deliver and promote an efficient, seamless, safe and impactful city experience for residents and visitors" (Smart Dubai, 2017). In line with the Dubai Plan 2021, Dubai has been conceived as a "smart city" by 2021. The main emphasis lies upon ensuring collaboration between private sector and the government. For instance, Procter & Gamble has collaborated with the "Smart Dubai" office for furthering training, research and development initiatives in the country. Also, IBM has collaborated with the "Smart Dubai" office to implement "Blockchain technology" in public services in line with Dubai Blockchain Strategy 2020. As tourism sector needs to be promoted as a part of the economic diversification strategy of the country, a "Smart Dubai Index" is being conceived to assess the "smart" performance trajectory of the city. Likewise, the need for a robust artificial intelligence infrastructure is being envisaged under the "Saad" initiative. For instance, Dubai Silicon Oasis (DSO) was set up as a part of the "smart city" initiatives to install a charging station for electric vehicles within its premises (DSOA, 2017). In another case, the telecommunication company, DU, has announced its "WiFi UAE" initiative to provide wi-fi services in public places across UAE (UAE Today, 2017).

3.4 Key insights from interviews

We derived significant perspectives from the interviewees holding responsible positions in the public and private sector and the respondents were directly involved in the "smart city" initiatives across the GCC countries.

We conducted one interview with a Bahrain respondent working in the IT department of a public sector body. The interviewee responded saying that-"[. . .] We believe that as Bahrain has ushered in the new era of development, it is important to integrate ICT in all the aspects [. . .] Our government is very particular about the 'smart city agenda' and we are sure that in the coming times, we will be able to develop a solid infrastructure [. . ..] Indeed, our 'smart cities' will change the way of living [. . .] We have to chalk out policies which are citizen-centric and we will use social media to foster e-participation too." Our interviewee averred that "smart city" is an intriguing concept and it is important that different sectors forge a united front to achieve the "smart city" objectives.

We contacted one respondent from Kuwait who held a prominent position in the private sector and was directly involved in the "smart" initiatives in the country. The interviewee was quick to point out that: "Kuwait is growing day by day and our challenges are also increasing [. . ..] We aim to use smart technologies in different sectors of the economy [. . .] It is a long way but the first step has been taken [. . .] The point to be driven home is that we must steer the country ahead in an innovation ecosystem where digitalization is the main pillar". It was opined by the interviewee that better services by the government could be provided with the "smart city" initiatives in the country.

For the purpose of our study, we solicited views from three public officials in Oman. Oman's "smart city" initiatives are intertwined with its e-government initiatives. Therefore, the "e-Oman" strategy – an e-government initiative of the government – was slated as "a progressive step towards developing the country into a 'smart nation'" (interviewee 1). Besides, "the aim is to make the public services accessible and affordable to our citizens [. . .] Even the businesses should be at ease with our tech-savvy practices." Likewise, there is a need for a "dialogue among the policy makers, strategists and think tanks" for developing applications which are aligned with "smart nation" policies (interviewee 2). The third interviewee cautioned about the need for instituting a proper human resource planning to attract talent which may handle the IT domain of the public sector given that suitable expertise is important for providing efficacious "smart" solutions. The third interviewee also laid emphasis upon the need to strike a balance between the economic growth and development witnessed in Muscat as a capital city *vis-à-vis* the other parts of the country which require government support. Hitherto, most of the "smart" solutions are being limited to the capital city and in this regard, the government must ensure that "the sustainable development of the country as a whole is being brought about".

We were able to secure two interviews from Qatar where the interviewee pointed out the need for using "advanced technologies" to facilitate "smart city" initiatives. The interviewee also pointed out that-"[. . .] We are looking even beyond the World Cup Games [. . .] We want to transform the country into a complete digital society [. . .] After all, it's the question of the welfare of the people [. . .] So, we have to apply smart technologies in different areas by effective knowledge management and knowledge sharing among the stakeholders". Further, the interviewee pointed out that the government was keen on collaboration with different authorities apart from participation of key stakeholders from the private sector to provide an IT-enabled infrastructure. The second interviewee was contacted post-commencement of the Qatar crisis when the country was shunned by other GCC members on political grounds (Al Jazeera, 2017). The interviewee expressed concern over the ongoing events and hinted that "[. . .] I hope that the blockade ends soon because it is impacting our long-term vision of attaining a fast-growing country. This implies that until the blockade issue is resolved, any government innovation-be it 'smart city' initiative or the 'open government' initiative-will not be able to achieve its desired results [. . .] For now, we have relaxed visa policy norms and we anticipate that with the boosting of tourism, we will be able to procure funds for furthering our 'smart' initiatives. We want to present the best face to the tourists and we have no other alternative than to cut down expenses on other sectors and direct them towards improvising upon 'smart' solutions".

Three interviews were conducted with the public officials based in Saudi Arabia. The first respondent based in Saudi Arabia opined that-"Our government believes in providing customized and unique solutions to all the concerned stakeholders by using ICT [. . .] It is time when we provided solutions for future and 'smart city' concept is one of these media for attaining such solutions [. . .] We believe in a digital culture for Saudi Arabia [. . .] and a better living experience [. . .] King Abdullah city is a major step in our smart city planning model for the country [. . .] Our country's 'smart city' planning is meant to transfer power from the government to the citizen." Although the interviewee expressed concerns over the cost of technology for the country, he averred that it is a short-term "headache" which would reap huge benefits in the coming times. Finally, the interviewee asserted that global standards shall inform all the "smart city" initiatives in the country. The second interviewee averred that: "One of the major emphases in the 'smart city' initiatives shall remain on adoption of eco-friendly measures [. . .] We are aiming at competitiveness for the cities and we hope to launch contests for Saudi cities in terms of their competitiveness in near future to drive home the significance of consistently generating public value by providing 'smart' solutions to the citizens". The third interviewee also pointed out at the need for "institutionalizing the "smart" initiatives in the country. Besides, the interviewee underlined the need to promote transparency in administration and promote citizen engagement while

providing "smart" solutions. "[. . .] Our government is emphatic upon cooperation among the government departments so that all the 'smart' solutions are better integrated via IT infrastructure-especially in this Big Data era", averred the third interviewee.

Three interviews were conducted with the UAE-based respondents. Regarding the initiatives of the UAE government, the interviewee pointed out that "[. . .] The main purpose of the smart city projects is to boost the quality and performance of the government services [. . ..] We can see that there would be a major reduction of costs as far as the government services are concerned." The same respondent pointed out that he was optimistic about the fact that "[. . .] With the latest IT hardware solutions, we will be able to support the e-government services in a big way [. . .] With time, the number of these services will see a major increment and for meeting the challenge, smart solutions are required". Further on, another interviewee responded that as far as Dubai's emergence as a "Smart City" is concerned, "[. . .] This is the vision of His Highness Sheikh Mohammed bin Rashid Al Makhtoum and we hope to leverage the capabilities of the country for providing a better quality of life to all." In the opinion of the third interviewee, "utilization of technology is important for our country and we have laid emphasis on innovation throughout [. . .] We have chalked out more than a thousand smart services which need to be implemented in Dubai alone". The same interviewee also pointed out that "[. . .] With Dubai Expo 2020, we have to be agile and integrate ICT in the development process of the country as a whole". Overall, the interviewees were optimistic about the "smart city" initiatives in the country and rested hope on the ICT initiatives for spearheading the country's development.

4. Conclusion

Our study shows that with the ongoing oil prices crisis and the increased impetus on economic diversification into non-hydrocarbon sectors, the GCC countries have been initiating plans of developing "smart cities" where digital tools and technologies are being liberally used for providing better public services and boosting trade and tourism in the region. Further, our study corroborates the assertion that the notion of "smart city" is catching up in the GCC, but in an "unevenly" manner with "different manifestations" (Wiig, 2015, p. 258). Conceding that participatory governance is important for improvising public services, our study shows that while deploying IT-led "smart city" initiatives, a roadmap should be clearly drawn to include the concerns of relevant stakeholders for ensuring sustainable results. All the interviewees averred the role of the private sector in boosting the "smart city" initiatives, for instance. Finally, it is commendable that the GCC region is spearheading its ICT initiatives to institute a digital economy which would open up new economic sectors and facilitate the economic diversification moves of the six countries. The key insights from the interviews are summarized in Table II.

5. Study implications

There are six clear lessons for GCC countries for ensuring that their "smart city" initiatives lead to improved quality of life of the citizens: first, all the "smart city" plans and policies should adopt a systematic approach for their implementation with their institutionalization; second, they should ensure that a robust IT infrastructure is in place wherein the hardware and software requirements are fully met; third, that all "smart" initiatives should be "sustainable" and "competitive" wherein the social, economic and environment dimensions are adequately taken care of during implementation of innovative "smart city" solutions; fourth, that "smart city" initiatives must take into account the local factors which might impact the outcomes of implementing these initiatives; fifth, there should be inclusion of relevant stakeholders in the policy-making and policy-implementation processes *vis-à-vis* "smart city" initiatives; and sixth, benchmarks should be laid down for assessing the degree to which the initiatives meet the desired objectives of these initiatives. In sum, the lessons for the "smart city" initiatives of the GCC countries are as follows: "A Smart City should

Table II Key insights from interviews

Interviewee	*Perspectives shared*
Bahrain	Need to integrate ICT in all sectors
	Need for infrastructure development
	Social media to play a major role
	Citizen-centric initiatives to sustain the "smart city" initiative
	Different government departments should integrate the "smart city" initiative
Kuwait	Use of "smart technologies" in different economic sectors
	Need for an innovation ecosystem
	Emphasis upon digitalization
Oman	Aim to develop the country into a "smart nation"
	Enhancing accessibility and availability of e-government services
	Need for a dialogue among key stakeholders for initiating "smart" initiatives
	Human resource planning to support "smart" initiatives
Qatar	Need for "advanced technologies" to facilitate "smart city" initiatives
	Developing the country as a digital society
	Tapping knowledge management and knowledge sharing for furthering "smart city" initiatives
	Channelizing funds towards "smart city" initiatives
Saudi Arabia	Tapping ICT for providing customized solutions to all stakeholders
	Instituting a digital culture
	Adoption of global standards for instituting "smart city" initiatives
	Ensuring cooperation among all government departments
UAE	Boosting the government performance and efficiency via "smart city" initiatives
	Tapping latest hardware IT solutions
	Innovation to be the plank for the "smart city" solutions
	Government to be "agile" while conceiving of "smart city" solutions

consider the human dimension of the city by respecting its complexity and diversity; it should assume its unpredictable behavior by learning to manage uncertainty; it should enhance traditional and well-tested solutions by urban planners; and it should promote an advanced governance model by involving as many stakeholders and citizens as possible" (Fernandez-Guell, *et al.*, 2016, p. 48). Given the emphasis upon digitally innovative and sustainable solutions in "smart city" framework, it is important that value creation is attained at every stage of the implementation of a "smart city" solution. To sum up, an assessment metric is required for gauging the implementation of "smart city" initiatives across the GCC.

6. Study limitations and directions for further research

As a case study veering around six GCC countries, generalizability is wanting in our study. Therefore, the socio-cultural and economic context of the countries is important while conceiving of "smart city" applications. Furthermore, our study requires replication using an empirical method soliciting views from different stakeholders, including citizens, to attain triangulation. As a multi-faceted concept, "smart city" research should encompass the different dimensions which may underline the manner in which public value may be created in the long run. Furthermore, a broad-based comparative perspective is required wherein the GCC countries may derive lessons from those developed countries which have succeeded in implementing "smart city" initiatives. Also, the extent of readiness for furthering "smart city" initiatives in the GCC countries is required. Implicitly, further research is required to ascertain the role of human and social capital besides tapping the socio-technical dimensions in the GCC context. Further research is called for to assess the extent to which "smart cities" in the GCC are successful in networking with international cities and shaping their policies accordingly to secure competitiveness and economic success. Finally, further research is required to develop a metric for assessing the "smart city" initiatives in the GCC

countries. It is important that with the ongoing economic diversification moves of the GCC countries, the role of pushing forth the "smart city" agenda be appraised and improvised, wherever required.

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