

Smart cities in developing countries with an emphasis on GCC countries, and its impact on expatriates amidst the COVID-19 pandemic – A systematic literature review.

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Abstract

Considering the growing concern for sustainability within the development of smart cities and the pressing need for a holistic approach to new urban developments, this study presents a systematic literature review covering the past 50 years on “Smart cities within the Gulf Cooperation Council Countries (GCC)”. All relevant journal articles were analysed. Primarily, the aim was to understand the mushrooming smart cities developments within the GCC countries. The main constructs were identified from the wider literature on smart cities: challenges and drivers. These were then explored in the context of the development of smart cities within the GCC countries, and the subsequent themes and factors were mapped. Furthermore, these factors were evaluated in the context of the sizable expatriate population residing within the GCC countries and the impact of COVID-19 on them. The analysis of the articles revealed specific gaps in the literature, on smart cities within the GCC countries with respect to the expatriate population as well as the impact of COVID-19. The main findings indicated the need for further empirical studies about developing and implementing smart cities initiatives across the region, holistically, while considering the impact of COVID-19 on the expatriate population within the GCC amid this transformation.

Keywords

COVID-19, Expatriates, GCC, Smart cities.

1 Introduction

Smart cities is a network of linked systems that is meant to improve the quality of urban life (Nam 2011). Urban ecosystems or cities are complex systems with multi-levels of interactions and interdependencies (Komninos et al. 2019). Urban planning has experienced a paradigm shift due to the development of smart cities (Komninos et al. 2019). Smart cities initiatives are imperative to aid current urban deteriorating conditions such as energy shortages, scarcity of resources and poor infrastructure. Smart cities are stressed as an organic integration of systems that infuse information into the physical infrastructure. The core system is responsible for facilitating several functions efficiently by the process of collecting data, analysing it and deploying resources effectively (Nam 2011). Thus, smart cities are visualized as orchestrators of ecosystems, a larger ecosystem which consists of many smaller ecosystems. Hence to gain efficiency and sustainability especially keeping in mind, the consistently and exponentially growing population, smart cities need to integrate and govern the multiple systems through digitalization. These digital platforms are the drivers that co-create value of the ecosystems and consequently smart cities (Visnjic et al. 2016). As these smart cities are evolving to accommodate diverse and cosmopolitan populations like migrants, refugees, expatriates, international students the challenges and drivers that arise in navigating the urban infrastructure seem well-founded and overdue (Tuitjer and Müller 2021). In

this study we focus on the challenges and drivers faced by smart cities in developing countries with an emphasis on expatriates within developing countries especially the GCC countries amidst the COVID-19 crisis.

Mobility of people across international boundaries as expatriates or human capital, has increased the pace of globalization (Marina et al. 2019). With increasing economic and technological competition, multinational corporations (MNCs) are known to source intellectual and human resources irrespective of their global location to promote growth. Thus, expatriates represent a vital and now following COVID-19 they are being considered the most vulnerable human capital pool for MNCs (Hajro et al. 2017). MNC's are now considering critical issues such as the organization's role in supporting employee well-being and resilience with respect to global financial crisis, pandemic situations or similar uncertain times of stress. On the flip side even the global mobile workers who have been affected severely due to the pandemic are reconsidering and re-evaluating the costs and benefits of working abroad (Cooke et al. 2020).

Prior to COVID-19, the number of migrants worldwide was estimated at a quarter billion as it continued to rise at an exponential rate (United_Nations_Development_Program 2015). These high numbers of international mobile workers (IMWs) with varying motives and movement patterns had heightened the need for an empirical as well as theoretical study on them. The impacts of the movements have a significant effect on the host and home countries of these IMWs. Studies reveal that most of these migrations are self-initiated expatriates (SIEs) while some are of assigned expatriates (AEs) (Ong 2014). Studies show that in terms of a country's total population the highest percentage of expatriates resides in Qatar, the UAE, Kuwait, Jordan and Singapore. The expatriate population in these countries is estimated to be between 40% to 80%. Of the five countries mentioned, three countries are GCC countries (ExpatriateChild 2013, ExpatriateFocus 2016). This paper further focuses on the challenges and drivers of smart cities developments within the GCC countries and its effects on the expatriate population during the COVID-19 pandemics.

2 Smart cities within the GCC countries.

The GCC countries have been experiencing rapid urbanization over the past four decades. The Gulf Cooperation Council (GCC) countries are located in the Arabian Peninsula. They constitute six neighbouring countries of Kingdom of Bahrain, State of Kuwait, Sultanate of Oman, State of Qatar, Kingdom of Saudi Arabia (KSA) and the United Arab Emirates (UAE) (Saxena and Al-Tamimi 2018). The GCC countries host a substantial foreign population as expatriates who are key players in the rapid development of the region (Shah 2013). It is estimated that 90% of the GCC population will be residing in cities by 2050 (Asmyatullin et al. 2020).

The GCC countries have embraced several smart cities agendas in their efforts to address the acute urban challenges. Nonetheless, with the emergence of smart cities in the GCC countries, there has been a gradual paradigm shift in the job market within the region (Forstenlechner and Rutledge 2010). The advent of COVID-19 has further accelerated the digitalization process in the region. These changes due to COVID-19 have affected the lives of a multitude of workers within the region. With expatriates making circa 93% of the work force in some countries like the UAE (Forstenlechner and Rutledge 2010, Shah 2013), there has been mass scale deportation of staff while in a few sectors like the education sectors there has been a shift to remote working (Al-Youbi et al. 2020). Research has been slow in grasping the impact of smart cities initiative on the expatriates within the GCC countries amidst the COVID-19 pandemic.

3 Methods

This study adopted a systematic review of scholarly research on smart cities within developing countries, focussing on the GCC countries with emphasis on the impact of the COVID-19 pandemic on expatriates. A systematic review is a form of meta-analysis wherein the fragmented information is collected, investigated and summarized to evaluate and effectively interpret all available research relevant on a particular research question or topic area or phenomenon of interest. It was observed that each study in this rapidly developing area was limited in its scope and reflective of diverse findings posing a risk to integration of findings among researchers (Briner et al. 2009). The time span for all databases evaluated for this study was from 1970 until the present year 2021. It included all journal articles, reviewed papers, research reports, book chapters, conference proceedings and dissertations, published in the English language. As a positive assessment tool, systematic reviews are an effective exploratory methodology as they bridge the “research-practice gap” (Rousseau 2006).

3.1. Definition of research questions

A set of research questions was defined within the first stage of the systematic review. The questions were devised so as to provide the required overview of the current research on smart cities within the developing countries with an emphasis on the GCC countries.

- Q1: What are the Challenges faced by Smart cities initiatives within the GCC countries?
This question reveals the concerns of sustainably developing smart cities considering the high shuffling expatriate population. The barriers were traced from the various domains of governance, environmental, societal as well as technological.
- Q2: What are the Drivers for Smart cities initiatives in the GCC Countries?
This question was designed to gain a comprehensive overview of the main drivers in relation to the development of smart cities within the GCC countries.
- Q3: What are the effects of COVID-19 on expatriates and measures taken to curb its spread through smart cities applications within the GCC countries?
Understanding the barriers and problems that expatriates faced during the COVID-19 pandemic is beneficial in deciding where future research and development efforts should be directed. A clearer picture of the pressing challenges and risks can be obtained through an analysis of this situation.

3.2. Conducting the search

The phase two involved a data collection stage, outlining the methods used to undertake the systematic review. Since a systematic review is a collaborative effort, the process designed should reduce the researcher bias (Briner et al. 2009). The search used included prominent databases such as- SciTech Premium Collection, EBSCOhost, Web of Science, Nexis Advance UK, Taylor and Francis, Springer, Wiley, Emerald Journals, Business Source Premier amongst other search sources. The main search terms used were “smart cities” and “developing countries” as a single construct, “GCC”, “COVID-19” and “expatriate”. These terms were searched for in the title, abstract as well as entire paper.

3.3. Screening and selection of relevant articles

The eligibility criteria for selection of literatures were based on their field of study, topic, publication status, publication year, research method, database and language (Lim et al. 2019, Moher et al. 2009). The authors also used the phrase searching function and the Boolean operator “And” to combine the keywords in their advance searching process. The inclusion criteria included mainly peer reviewed journals. The selected relevant articles were then further screened by examining their titles and abstracts as well as results and methodology sections to match the criteria of the study. Articles that provided insights on urban sectors such as governance, economy, mobility or technology related to smart cities initiatives were included. Theoretical, empirical, qualitative or quantitative research were also included. The search further narrowed down on mapping existing literature on smart cities within the GCC. Thus, articles from any other countries or regions were excluded. Several journal articles were excluded for the following reasons: articles without full availability, articles not available in English, duplicate articles, irrelevant to the topic and posters.

Our initial search of the databases in May 2021 yielded 1,813 peer reviewed articles with the search words “Smart cities” and “developing countries”. On further narrowing the search with the addition of the word “expatriates” the number reduced to 19 articles. These 19 articles were reviewed in depth for their relevance to the topic. It was revealed that 10 of the 19 articles were focused on the GCC countries. This led to an in-depth search of systematic literature reviews on smart cities in the GCC countries. In the next round of revisions, the search included the words “systematic literature review”, “smart cities” as one construct and the addition of the words GCC. The peer reviewed articles identified were 132 of which several were deemed irrelevant as there was a casual mention of the word GCC or “smart cities” in the reference and the main paper had no relevance to the topic. The selected articles were analysed to ensure the quality and relevance of the academic literature included in the review process then the exclusion criteria were carried out. In the final analysis 20 journal articles were found relevant. Of these, there were 2 articles that were unavailable and were excluded from the study. After further filtration of the journal articles 11 more articles were removed from the study following a detailed assessment of each article on the aforementioned inclusion and exclusion criteria. Finally, the remaining were 7 core relevant articles. The PRISMA method was adopted for the analysis of the literature exclusion and inclusion criteria at every stage.

4 Findings and Discussion

4.1 What are the Challenges faced in the development of Smart cities initiatives within the GCC countries.

4.1.1 Governance framework management

There is a concern to develop cities, sustainably that are aligned with the goals laid down by the United Nations in their SDG 2015 (Sustainable_Development_Goals 2016). The GCC countries are highly urbanized. The current growth rate is such that by 2050 it is estimated that 90 percent of their population will be living in cities as projected in Table 1.1

(Asmyatullin et al. 2020)

Considering that most of this population is migratory and expatriate it is a challenge to manage the public administration and governance of the states. A major segment of this population is represented by low-income workers, followed by middle-income technicians and professionals. The development of this region depends on this shifting population of immigrant people (Khalaf and Alkobaisi 1999). Consequently, managing this shuffling population can be a daunting task. To ensure the smooth running of the state it is essential to improve the interaction of the government with the citizens and residents. There is a responsibility to efficiently and swiftly provide services that can facilitate the smooth transition of this migratory population to adapt to the new place. This is one of the main challenges that has accelerated the transformation of several cities within the GCC countries towards smart cities initiatives. Involving ICT by way of e-government applications and technologies would be conducive to the smooth management and organization of these fast growing cities (Al-Nasrawi I 2015).

4.1.2 Technological challenges or barriers

There is the need to source the required talent to achieve the smart cities goals as it is not easily available locally. Hence the need to develop knowledge-based cities within the region. Furthermore, there needs to exist trust and openness between the private and non-state actors and the government for the smooth development of smart government. This system is a paradigm change for the prevalent traditional

Country	2015	2050
Bahrain	89%	93.2%
Kuwait	100%	100%
Oman	81.4%	94.9%
Qatar	98.9%	99.7%
Saudi Arabia	83.2%	90.4%
U.A.E.	85.7%	92.4%

governments models presently functioning within most of the GCC countries (Samad and Azar 2019). The implementation of smart governance infrastructure needs to incorporate collaboration along with communication and data exchange, service and application integration, accountability, transparency that can harness participation and partnership (Joshi 2016). Technological challenges encompass the operation cost, cyber security and privacy concerns (Ciborra and Navarra 2005).

4.1.3 Natural and built environmental considerations.

Another impediment faced by smart cities is the requirement of regular assessment of environmental sustainability performance (Egilmez et al. 2015). Efforts need to be made to develop strong eco-human symbiotic bonds through sufficient green spaces and sensitivity to the environment. Adverse effects which can be due to uncontrolled constructions and development along with the effects on the environment caused by uncontrolled human activity such as traffic, manufacturing, pollution of air, water, earth have to be mitigated. The smart cities implementation needs to incorporate a control on the carbon footprint generation within the cities through its design and maintenance plans (Giest 2017). Likewise, smart urban development needs to incorporate provisions for failure management. Pandemics, tornados, earthquakes and other similar natural disasters can wreak havoc with network unavailability accompanied by infrastructure breakdowns. The challenge lies in identification of recovery strategies and mechanisms that can revert normalcy to cities operations with minimal effects to operational efficiency and within controlled cost (Silva et al. 2018).

Furthermore, the surge in greenhouse -gas emissions (GHGs) due the regions high dependency on its hydrocarbon reserves (Malik et al. 2019) triggers the need to develop sustainable strategies for energy generation and distribution, urban planning and the construction of eco-friendly (green) buildings, water and transport management within the region. (Samad and Azar 2019). Moreover, setting the long-term goals of each specific city and integrating a holistic plan towards its development adds to the complexity of the task in hand (Joshi 2016, Samad and Azar 2019). For example, the Kingdom of Bahrain has implemented a number of smart cities initiatives. However, these are the efforts of the several private organizations or specific public sectors and are lacking the support of a national conceptual framework. An economic strategy at the national level is recommended so that a comprehensive framework can be agreed upon for a holistic development and smooth facilitation of the cities' transformations. This is a non-linear process requiring strong support of government policies (Samad and Azar 2019).

4.1.4 Societal challenges

The social barriers faced by the GCC countries includes inadequate collaboration between the research, development organizations and the government, poor understanding of the impact of smart technologies amongst the administration and citizens, not enough citizens' engagement, digital divide among citizens and other residents (Mansour Naser et al. 2016).

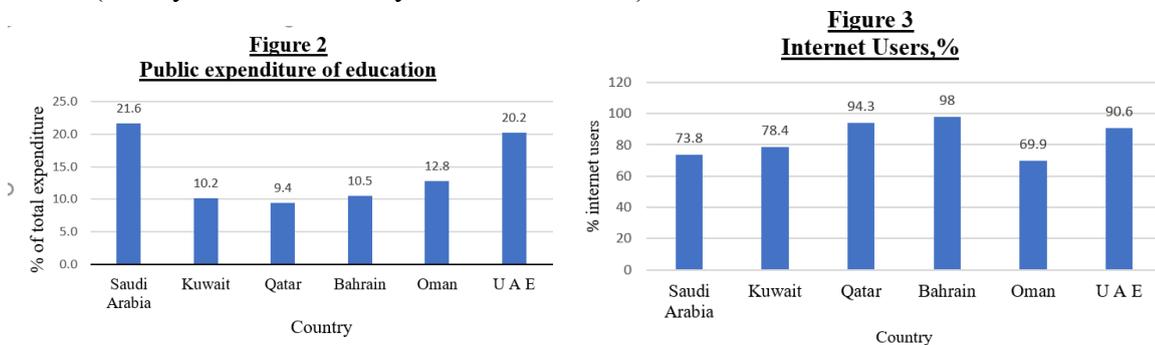
4.2 What are the Drivers for Smart cities initiatives in the GCC Countries.

4.2.1 Diminishing hydrocarbon reserves leading to growth by economic diversification.

The GCC countries geographically lie in the "global sunbelt" which is richly endowed with solar radiation and wind energy. Despite this huge potential for renewable energy, the GCC countries still depend primarily on their reserves of hydrocarbons (Alnaser and Alnaser 2011, Griffiths 2017a). Their major energy policies are driven by the bounty reserves of 52% globally proved oil and 42% of gas reserves and further accompanied by access to cheap subsidized energy to its citizens (Poudineh et al. 2018). Each member state within the GCC countries has ambitions and targets for renewable energy although deployment to date is minimal. Most of them lack the required grid infrastructure or the institutional capacity to undertake the risks and uncertainties involved in their deployment (Poudineh et al. 2018).

The hydrocarbon reserves that the GCC countries strongly depend on, are diminishing. Hence there is a need for economic diversification into other resources for growth. The GCC countries lack a consolidated policy framework to advance their development. Therefore, there is a need for a well-articulated policy for utilization of renewable energy in each member state (Malik et al. 2019). There are concerns of sustainability of the environment, long-term uncertainty of fossil fuel markets, unstable price of hydrocarbon reserves and fears of fiscal instability which are amongst the major drivers to implement smart measures of sustainability (Mohandes et al. 2019, Poudineh et al. 2018). Due to the increasing population, there is sharp increase in the demand for clean portable drinking water. The desalination of water in the region is heavily dependent on energy consumption, further pushing the need to find alternative renewable energy technologies. There is a huge demand for commercially viable alternative sources of energy such as solar or wind energies within the MENA region (Gazze and Abubakar 2018). Furthermore, there is the global pressure to initiate a low-carbon economy to demonstrate the commitment of the GCC countries to the 2015 Paris agreement (Baruch-Mordo et al. 2019, Kern and Rogge 2016). All the above in addition to environmental concerns and the need to achieve significant self-sufficiency within the renewable energy sectors are the major drivers for developing smart cities initiatives in the region (Griffiths 2017b)..

The development of smart cities is also associated with the creation of a knowledge-based economy. It is crucial to increase the public expenditure of education, which is reflected in the graph in figure 2, that projects the expenditure of UAE and Saudi Arabia on education is significantly high. Statistics show that this investment is more than 20 % higher than developed countries such as UK, Germany and the United States (Alateyah S 2013, Asmyatullin et al. 2020).



(Asmyatullin et al. 2020).

Similarly, along with education, the public expenditure on R & D is another critical driver for smart cities development especially in sectors such as Business, government and Universities. Within the GCC countries the expenditures on R& D are less than 1% of the GDP as compared to countries like South Korea which spent 4.7% on R&D in 2018 (Asmyatullin et al. 2020, Tim Callen 2014). The use of internet by the citizens along with the individual level of computer skills of its citizens is again a determining factor in the smart cities planning. The GCC countries score high, with more than 90% of population active internet users. As shown in figure 3 in Qatar, UAE and Bahrain. Saudi Arabia, Oman and Kuwait have an increased percentage of internet users which is estimated 1.75 times higher than the world average (Asmyatullin et al. 2020, Alateyah S 2013). All these are the contributing drivers for smart cities developments within the region.

4.3 The Impact of COVID-19 on expatriates in the GCC

4.3.1 The effects of COVID-19 on the GCC countries

The World Health Organization (WHO) declared the outbreak of the infectious disease COVID-19 on the 11 March 2020 (World_Health_Organization 2020). Amongst the GCC countries, the first cases to be reported, were in the last week of Jan 2020. All six GCC states synchronized their policies on enacting travel bans between March 14 and March 18. They were cohesive in following similar rules to curb the

COVID-19 pandemic such as controlling the smart mobility of foreigners, cancellations of work visas and a fungibility policy for foreign workers to regulate the size and status of the expatriate population (Young 2021).

4.3.2 Measures taken to curb COVID-19 through smart cities applications.

To cope up with the challenges of the pandemic, businesses witnessed an escalating growth in the use of digital technologies in various sectors of health, finance, education and retail (Zulqarnain et al. 2020). This digital transformation facilitated the generalization of online payments and online medical consultations as well as the implementation of several government policies and decisions (Ben Hassen et al. 2020, Zulqarnain et al. 2020). Provision was made for free-of-charge healthcare to patients and the launching of COVID-19 active screening. Thus, proactive, quick and stringent measures were systematically adopted by the health and government officials within the GCC. The smart cities initiatives played an important role in successfully curbing the spread of the disease. There were numerous awareness campaigns launched in multiple languages and through various forms of media to increase the public awareness of the COVID-19 infections and provide up-to-date information, catering to the various nationalities and multilingual expatriates residing within the GCC countries (Thamir et al. 2020).

Due to the COVID-19 outbreak, millions of expatriate workers within the GCC, were quarantined (Ajami 2020). There were significant implications on economic growth, oil prices fell, international cooperation, government policies as well as the investments suffered, due to the various lockdowns across the globe (Elliott et al. 2020). Transport and travel restrictions were adversely affected. Numerous industries such as aviation, retail, hospitality, tourism in addition to crucial sectors with complex value chain linkages such as electronics and automotive products suffered huge losses (WTO 2020).

4.3.4 Effects of COVID-19 on Expatriates

The COVID-19 triggered a series of policy shifts with more “nationalization” of jobs, flexible visas, new taxes and fees for foreign workers and vast purges of workers from the construction, aviation and hospitality industries. Several expatriates were left stranded and unemployed. Approximately 700,000 expatriates from Saudi Arabia had been laid off, to go back to their homes in the neighbouring Arab countries and South Asia. The unemployed foreign workers were expected to return to their home countries within a 30-day period to ease the burden on the governments. The legal responsibilities of firms and organizations towards expatriates also had been changing during the pandemic period, making it easier to lay off foreign workers, reduce their salaries or force employees to take paid or unpaid annual leave. The government had been providing minimal support to sustain small and medium-sized businesses, although they were extending basic health care to expatriates. The losses sustained by the major employers in the region were the state-owned airlines, logistics and major contracting firms, many needing major recapitalization to survive. It was difficult to continue functioning with the same number of employees as business was fast dwindling to minimal capacities. The social impact of the pandemic on the transmigratory expatriates was calamitous as they were stranded without jobs, borders were closed, and flights cancelled for months. Furthermore, they were quarantining in a foreign country away from family support (Young 2020). The job layoffs did not affect the national citizen as majority of them worked in the public sector where there were no job losses (Young 2021). There was a decline in GDP growth rates and economy resulting from these unstable oil prices, suspended flights, shutdown of tourism and hospitality and uncertainty regarding the healthcare after effects of COVID-19 (Ajami 2020). Economic recovery from the COVID-19 pandemic within the GCC countries, now, relied on government social support, public health, foreign direct investments, access to international debt capital markets and serious fiscal consolidation. They are faced with a situation of plentiful oil supply versus less oil demand, presence of competitive renewable energy options and investors who are discerning consumers of carbon-intensive products (Young 2020). The COVID-19 situation has increased the uncertainty regarding expatriate jobs in the GCC countries. Simultaneously, there have been several protective measures by the

governments, numerous individuals, communities and charities who have been involved in helping the staggering numbers of less privileged people in the GCC countries, those that were disrupted socially and financially (Saeed et al. 2020)

5 Conclusions and Further Research

The purpose of this paper is to provide a systematic analysis of the literature that addresses smart cities from the perspective of expatriates and the impact of COVID-19 in the GCC countries. Such an effort has not, to date, been undertaken. The topic of expatriates within the GCC countries as well as that of smart cities developments within the GCC have been receiving growing attention as illustrated in the increasing number of papers every year. However, the literature could not find any research linking smart cities and expatriates in the GCC countries. Furthermore, there is no empirical data on the impact of smart cities initiative on the expatriate population during the COVID-19 pandemic. Therefore, the objective of this study was to understand the literature covering the topics of smart cities, expatriates and COVID-19 within the context of the GCC countries. and offer suggestions regarding the best directions for future research.

The main conclusions of this study indicated that further research is needed to evaluate the impact of the smart cities' initiatives on expatriates in the GCC with an emphasis on the transformation into green economy. It is worth noting that a significant percentage of the expats in the GCC region are labourers in the construction sector and other service sectors. Future research should investigate empirically the impact of smart technologies as well as the ability of those humble expatriates in adapting amid this transformation. Furthermore, the field would benefit from more in-depth studies and data on the provisions of smart initiative for failure management, network unavailability or infrastructures breakdowns during desert storms, dire weather condition or pandemics. There is a need for the identification of recovery strategies with minimal impact on operational efficiency yet within controlled cost with emphasis on the low-wages expatriate communities.

Indeed, it is quite exhaustive to examine a topic such as smart cities developments which covers a plethora of research areas. This research can help practitioners to better understand the smart cities initiatives with respect to expatriate population in times of emergency such as the COVID-19 pandemic in the context of the GCC countries and assist researchers to orient their efforts in a manner that is coherent with past developments and future perspectives. This paper contributes to evaluating a gap in research on the smart cities within the GCC countries and the impact on its expatriate population amidst the COVID-19 pandemic.

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