

TERRITORIAL COMPETITIVENESS AND SMART CITY: BENCHMARKING ANALYSIS OF DUBAI, ABU DHABI, RIYADH, CAIRO, AND RABAT

K. Ahouzi¹, H. Assyakh², L. Nait Haddou¹, A. Messaoudi³

¹ Research Team in Management of Social Organizations and Territorial Economy, university IBN ZOHR, FLESS, BP. 8658, DAKHLA, AGADIR-k.ahouzikhadija@gmail.com

² Research Team Studies and Research in Economics and Management, university IBN ZOHR, FLESS, BP. 8658, DAKHLA, AGADIR – assyakh.h@gmail.com

³ Research Team Studies and Research in Economics and Management, university IBN ZOHR, FLESS, BP. 8658, DAKHLA, AGADIR – a.messaoudi@uiz.ac.ma

KEY WORDS: Territorial competitiveness, Smart City, Triple-Helix, Benchmarking, Arab world.

ABSTRACT:

Recently, rapid urbanization and population growth rises complexity, problems, challenges to cities, and then cause more competition between them. The smart city, as a new emerging concept, becomes a crucial solution for many cities to increase their territorial competitiveness, which is essential for cities to success. The paper aims to prove the role of the smart city to increase the territorial competitiveness of five cities namely, Dubai, Abu Dhabi, Riyadh, Cairo, and Rabat. These cities are affected by the political disturbances in the Arab world despite that; they try to build smart cities (through many projects) to face a global challenge of cities. Dubai is the smartest territorially competitive, all the five cities increase their indicators of competitiveness with a large difference between cities that exist in Asia and Africa while all of them are still delayed in the capacity to innovate.

1. INTRODUCTION

Cities face many problems and challenges to survive due to population growth and rapid urbanization, thus, green spaces are affected by these problems in different areas of the urban environment. Smart City has reset in the 21st century to breathe the air of many large cities around the world. The concept of a smart city is even not clearly defined in the academic literature, it can make cities capable of absorbing population density and spatial expansion intelligently, and they can also be competitive territorially.

Due to the recent transformations in the Arab world contexts (political revolutions), there is an important capacity for the smart cities to rise and be competitive with other cities of the world.

The objective of the paper is to prove the role of the smart city to increase the territorial competitiveness of five Arab cities, namely, Dubai, Abu Dhabi, Riyadh, Cairo, and Rabat, which are working on many projects for building a smart city. After presenting the literature on territorial competitiveness and the smart city and the link between the two concepts, this paper shows the benchmark analysis of the five Arab smart cities included in the study.

2. TERRITORIAL COMPETITIVENESS AND SMART CITY: FRAMEWORK CONCEPTUAL

2.1 Territorial Competitiveness

Territorial competitiveness was introduced in policy and science discussions in the period of globalization. Globalization, in economic terms, is characterized by increasing complexity and density of global supply chains, internationalization of finance, market, and commerce by opening national borders, and mainly

high accumulation of wealth in large multinational corporations and elites who benefit from them (Harvey, 2001) (Nikos, Theodore and Noelle, 2011). The fundamental of competitiveness is national competitiveness than the territorial competitiveness has introduced, it can be analysed on different levels nations, regions, cities or rural areas (Atkociuniene and Petrueliene, 2014). Malecki (2007) explains the reason why the cities, region, and territory compete, for attracting the investment by companies and by governments, for skilled workers, and for tourists; in all of these competitive situations, one place or a few places are chosen and others are not.

Krugman, (1994) Proves that countries do not compete much more than companies do, for him, the country can't do business but can corporate. On other hand, Porter, (1990) looks at territorial competitiveness and insists that countries "nations" can have a competitive advantage, Porter created a "Diamond" model, and he identified four keys to explain the competitiveness of a territory, namely : 1. Company strategy, structure and rivalry. 2. Factor conditions. 3. Related industries and support institutions. 4. Demand conditions. (Harmes-Liedtke, 2007). As well Camagni, (2002), maintain that the concept of territorial competitiveness is theoretically sound because the territory plays a role in the knowledge accumulation processes and in the development of interpretative codes, models of cooperation and decisions on which the innovative progress of local companies are based.

2.1.1 Definitions of territorial competitiveness: Territorial competitiveness is a part of the regional economy in which local economic activity can compete with other areas (Cheshire and Gordon, 1996). How's a response to the greater mobility of economic activities and created the new forms of competition and production organisation (D'Arcy and Keogh, 1998). So, an area becomes competitive if it can face up to market competition whilst at the same time ensuring environmental, social, and cultural sustainability based on networking and inter-territorial relationships. In other words, the concept of territorial competitiveness involves, taking into account: Area resource, the role of actors and institutions, innovation and cooperating with other areas (LEADER, 1999).

Thus, territorial competitiveness is: 1) the ability of territory to attract investment, technology and employees (Nieto, 2011, Malecki, 2004, Camagni and Capello, 2005, Falco, 2014, Atkociuniene and Petruoliene, 2014); 2) the ability to create welfare (Aiginger, 2006, Nieto, 2011); 3) their capability to insert successfully in international markets as exporters (Nieto, 2011); 4) the ability to create a sustainable development (Filo, 2008, Nieto, 2011). The goal of territorial competitiveness policy, therefore, is to maintain and expand the capacities for profit-making and economic growth that are thought to be embedded within, or potentially attracted to, specific political jurisdictions (Brenner and Wachsmuth, 2017).

2.1.2 Factors and indicators of territorial competitiveness: The productivity is the first factor of territorial competitiveness for the founder of the concept (Krugman, 1994, Porter, 1990) and then comes after (Nieto, 2011, Falco, 2014, Alexandros and Theodore, 2015), the innovation, (Filo, 2006, Falco, 2014, Giaccaria, 2014, Alexandros and Theodore, 2015, Wilson, 2017), the technology level (Falco, 2014, Giaccaria, 2014), the spatial specialization (Camagni, 2002, Giaccaria, 2014), accessibility level (Filo, 2006), R&D investment (Wilson, 2017), knowledge base level (Filo, 2007, Falco, 2014, Wilson, 2017) and the local synergies among actors (Camagni, 2002). Same indicators of territorial competitiveness: Per capita Gross Domestic Product (GDP), rates of unemployment (Wilson, 2008). Rate of qualify labor (Wilson, 2008), etc.

Actually, the concept of territorial competitiveness is linked to the concept of a cluster managed and coordinated by local institutions the concept of territorial competitiveness is linked to the concept of a cluster conducted and coordinated by local institutions (Falco, 2014). Indeed, clusters and smart specialisation strategies have become popular in part due to recognition that interactions between agents with different types of knowledge are capable of generating strong innovation outcomes. (Wilson, 2017)

2.2 Smart city

Lately, the smart city vision has become a requirement of many urban problems. Even researchers have shown an interest in the future city and they concluded that the technological leap affects infrastructure in terms of urban transport, sustainable building, manageability, or environmental sustainability. These new technologies will help to face different urban challenges and current problems, which will update the "smart city" vision.

2.2.1 Smart city: Definitions: Cities need a transformation to increase knowledge, creativity, entrepreneurship, learning, and skills, etc. to mean their economy is more competitive and grows. In recent years, academics and researchers have shown an interest in the future city. They have improved that the technological leap will affect urban infrastructure, giving rise to the "smart city" vision. According to Bouskela, Casseb, Bassi, De Luca and Facchina (2016) a smart city is a city that places citizens at the center of development, integrates information and communication technologies. Smart Cities promote integration and sustainable development, become more innovative, competitive, attractive and resilient and improve people's lives. (Garriazo, 2019).

European Commission (2012) considers smart cities combine various technologies to reduce environmental impact and provide citizens with a better quality of life. However, this is not just a technical challenge. The realization of a smart city is a multidisciplinary challenge that will bring together municipal leaders, providers of innovative solutions, national and European policymakers, academics and finally civil society.

There are many variations of the smart city, size and type of population. Indeed, the Smart City concept is relatively new and constantly evolving, and there are too many concepts. Indeed, each city is unique, with its development path, as well as its current characteristics and future developments. Therefore, depending on each city's specific policies, objectives, funding and scope, the development of the Smart City concept follows a very different path (European Parliament, 2014).

Any useful definition of a smart city must take account of these very different situations, and at the same time better understand the potential of good practice and formulate and develop relevant policy frameworks. The concept also cuts across many related cities, such as "smart cities", "knowledge cities", "sustainable cities" and "digital cities". However, the concept of the smart city has become the mainstream of these variants, particularly in terms of policies and characteristics of cities that use information and communication technologies (Garriazo, 2019).

2.2.2 The characteristics and the factors of the smart city: Smart cities are associated with the economy or jobs, to describe cities in the smart industry, how used information, communication, and technology ICT, also smart cities are related to education and the relation between city and governance. They must also have modern transportation technology, besides; the term smart city refers to various other aspects of urban life, such as safety/security, green, efficient and sustainable, energy (Giffinger et al., 2007).

In summary, the literature describes several areas of activity related to smart cities: industry, education, participation, technological infrastructure, and various "soft factors". Finally, we can identify six features (see Figure 1) as the basis for further improvement of smart cities. These features should include research results, but should also include other factors.

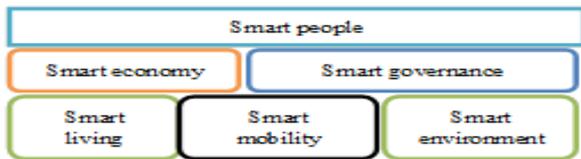


Figure 1: Characteristics of a smart city. (Kumar and Dahiya, 2017)

It is based on the “smart” combination of end empowerment and decisive, independent activities, and understanding of citizens. The six reserved dimensions are themselves subdivided into indicators and factors that allow a city profile to draw up and comparison to be made based on overall and partial scores:

- **Smart economy:** Productivity, Entrepreneurship, Innovation, Quality of human capital, Labor market, International integration.
- **Smart people:** Education, Open-mindedness, Cosmopolitanism, Participation in public life, Development skills/learning.
- **Smart environment:** Air quality, Sustainable management of resources, Energy efficiency, Attractiveness of natural.
- **Smart living:** Health conditions, Cultural facilities, Individual safety, Social cohesion, Touristic attractiveness, Housing quality, Education facilities.
- **Smart mobility:** (inter)-national accessibility, ICT and infrastructure, Sustainability of the transport system.
- **Smart governance:** Efficiency and transparency administration, Participation in decision making, Availability of public service, Innovation in service delivery. (Côme, Magne and Stayer, 2018, Zurinah and Jalaluddin, 2016)

2.3 Territorial competitiveness and smart city

Gargiulo and Tremitterra (2015) considered that the link between Smart city and territorial competitiveness is not obvious, although analysis of their features and objectives shows overlaps and relations between these two topics.

2.3.1 Definitions of territorial competitiveness and smart city: Thus, the smart city concept is built on a combination of ideas on how ICT's might contribute to improvements in the functioning of cities, improving their competitiveness, enhancing their efficiency, and finding new ways to tackle problems of poverty, social deprivation, and poor environmental management. It is not surprising that the notion of a smart city directly relates to the concept and international practice of sustainable urban development. It can, therefore, surmise that the notion of smart cities and its implementation could potentially contribute to the concept and practice of sustainable urban development that includes economic, environmental, and equity concerns (Kumar and Dahiya, 2017).

The link between territorial competitiveness and smart city: Smart cities are considered learning cities as they build a knowledge workforce that focuses on innovation. This means that cities are focusing on clusters and networks as part of their competitiveness because people learn from being in close proximity to other knowledge-based industries (Ratten, 2017). According to Zurinah and Jalaluddin (2016), a smart city should make full use of existing ICT facilities to raise the level of its

economy and competitiveness as an approach to building a successful and integrated city.

For Kumar and Dahiya (2017), the economy of a smart city distinguishes the ability to overcome economic challenges, create new jobs, establish new businesses, and increase regional attractiveness and competitiveness. And for Kumar, Singh and Gupta (2017), City competitiveness is a major driver for the development of smart cities. A lot of challenges are there to transform the existing cities into smart cities. The competitiveness analysis demonstrates the areas in which a city lacks development and which areas could be improved to match the benchmark standards of smart cities.

Cities face a challenge of competitiveness, sustainability, creating new jobs, and establish a business to increase urban quality than to transform to smart cities. Thus, Territorial competitiveness is a major driver for the development of a smart city, which must have a facility ICT, innovation, and knowledge-based to raise the level of competitiveness and attracting the best people and companies.

2.3.2 Framework conceptual of territorial competitiveness and smart city: According to Gargiulo and Tremitterra (2015): Smart Cities “are territories with a high capacity for learning and innovation, which is built-in to the creativity of their population, their institutions of knowledge creation, and their digital infrastructure for communication”. Up to this point, the relationships arising between Smart Cities and territorial competitiveness support the conclusion that a "smart" city is also competitive when it invests in social and intellectual capital in order to enhance the degree of knowledge and learning capability and promote the development of innovation within the region.

Therefore, The link between territorial competitiveness and smart city according to Dirks, Gurdgiev and Keeling (2010), is derived from people and their skills, creativity and knowledge, as well as the capacity of the economy to create and absorb innovation, and cities will need to better apply advanced information technology, analytics and systems thinking to develop a more citizen-centric approach to services.

Smart cities take a challenge by integrating city service with technologies to ensure global competitiveness, smart cities have created a centre of innovation and knowledge, it has to utilize entrepreneurship and innovation, and also, they will have e-government service and reduce corruption to increase territorial competitiveness. Some smart cities specialize in specific industries such as health or technology to make them more competitive. (Ratten, 2017)

In the same line, Chourabi et al., (2012) consider global competitiveness is the major driver of a smart city; they have six main components (smart economy, smart people, smart governance, smart mobility, smart environment, and smart living). Their operational definition of a smart economy includes factors all-around economic competitiveness as innovation, entrepreneurship, trademarks, productivity, and flexibility of the labor market as well as the integration in the national and global market. Alawadhi et al., (2012) consider a smart city as a city intelligent resource to combine between best economic and social conditions, and increase their competitiveness by creating jobs and attracting a skilled workforce. Smartness indicates using the limited resource and

finding more innovative ways and solutions to budget cuts and financial recession across countries.

Even, the idea of a smart city comes from competitiveness; city competitiveness aims to attract human and financial capital, and a smart city aims to improve the quality of urban by using ICT. That means a city needs to improve its smart quotient to be more attractive and so more competitive (PAPA et al., 2014). A well-established information and communication technologies (ICT) are required to build the smart infrastructure and to set up smart services to improve the quality of life and to maintain sustainable competitive economic development. These cities could have advanced facilities for various aspects such as people-centric urban development, governance, health, administration, education, environment, energy, walk to work, improved efficiency in mobility, intelligent transportation, traffic management, automated surveillance, security systems, reduced costs and resource consumption which makes a city advanced, ready as per citizens requirement and globally competitive (Kumar, Singh and Gupta, 2017). Also, investing in intellectual and social capital promotes a sustainable economy, high quality of life, and the competitiveness of the territory (Gargiulo and Tremitterra, 2015, Matos et al., 2016).

City-ranking: Six principal criteria often have been used to characterize and rank Smart City, viz. regional economic competitiveness, mobility concerning ICT and transportation, natural resources, human and social capital, quality of life, and citizen involvement in local government (Zurinah and Jalaluddin, 2016). City-rankings are often used by the cities themselves to sharpen their profile and to improve their position in the competition of cities: a top- rank in a highly reputed of city ranking helps to improve the international image of a city and can, therefore, play a central role in marketing strategy (Giffinger et al., 2007).

Triple Helix: Lombardi et al. (2012) explain: “both the main components/activities and the main actors/helices of a smart city represent. The identified clusters are smart governance (related to participation), smart human capital (related to people), smart environment (related to natural resources), smart living (related to the quality of life), and smart economy (related to competitiveness)”.

The Triple Helix adopted by Lombardi et al. (2012) to measure the smartness of a city, is a reference framework for the analysis of knowledge-based innovation systems and relates the multiple and reciprocal relationships between the three main agencies in the process of knowledge creation and capitalization: university, industry, and government. According to Leydesdorff and Deakin (2011), Triple Helix explains these differences among innovation systems at different levels in terms of possible arrangements. And they suggest to be: i) 'knowledge' stock generated by the interplay of universities and industries; ii) collective 'learning' due to the synergies deriving by the common action of universities and government in searching for efficient public management solutions; iii) the efficiency of the 'market' generated by the interplay of industries and government. According to this model, a city is smart "when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and high quality of life, with a wise management of natural resources, through participatory governance"(Giovannella, 2013).

Clusters: In adopting the triple helix model that promotes the creation of industrial clusters, how to facilitate relationships with other entities, making it easier for knowledge to spill over. This is due to clusters opening up new innovative ways to compete for cities and to contribute to regional development. Clusters have been important in establishing cultural assets that a city can use for their competitiveness. The cultural heritage of a region impacts the formation of new clusters that influence global competitiveness (Ratten, 2017). Inner-city old industrial areas may become clusters of clean ICT industries, there by promoting local economic competitiveness for the development of a smart economy in the smart cities. An approach to revitalize inner-city areas supported by Porter (Kumar and Dahiya, 2017).

3. RESEARCH METHODOLOGY

The empirical analysis based on a secondary data collection from the IMD World competitiveness Centre report of 2018 for five smart cities in the Arab world: Abu Dhabi, Dubai, Cairo, Rabat, and Riyadh, for the year 2017. And the data collected from the global competitiveness report of 2017 to four countries how all these cities exist. The objective of this study is to evaluate the territorial competitiveness of these five cities (study via benchmarking analysis) in 2017.

3.1 Indicators

The information collected from the IMD World competitiveness Centre report comprises indicators of population number, expected years of schooling, GNI per capita (PPPS), Smart City-Ranking (out of 102 cities), Rating (from AAA to D), the structure indexes, and the technology indexes.

Besides, the structure indexes contain five dimensions with different indexes: Health/ Safety (Basic sanitation meets the needs of the poorest area; Recycling services are satisfactory; Public safety is not a problem; Air pollution is not a problem and Medical services provision is satisfactory), Mobility (Traffic congestion is not a problem and Public transport is satisfactory), Activities (Green spaces are satisfactory and Cultural activities (shows, bars, and museums) are satisfactory), Opportunities (Employment finding services are available; Most children have access to a good school; Lifelong learning opportunities are provided by local institutions; Businesses are creating new jobs and Minorities feel welcome), Governance (Information on local government decisions are easily accessible; Corruption of city officials is not an issue of concern; Residents contribute to decision making of local government and Residents provide feedback on local government projects).

And, The technology indexes contain five dimensions with different indexes: Health/ Safety (Online reporting of city maintenance problems provides a speedy solution; A website or App allows to give away unwanted items to other city residents; Free public Wi-Fi has improved access to services; CCTV cameras make residents feel safer; A website or App allows effective monitoring of air pollution and Arranging medical appointments online has improved access), Mobility (Car-sharing Apps have reduced congestion; Apps that direct you to an available parking space have reduced journey time; Bicycle hiring has reduced congestion and Online scheduling and ticket sales make public transport easier to use.), Activities (Online purchasing of tickets to shows and museums has made it easier

to attend), Opportunities (Online access to job listings has made it easier to find work; IT skills are taught well in schools and Online services provided by the city has made it easier to start a new business), Governance (Online public access to city finances has reduced corruption; Online voting has increased participation; An online platform where residents can propose ideas has improved city life and Processing Identification Documents online has reduced waiting times.)

3.2 Brief descriptions of cases

The cities studies have many projects and initiatives to build a smart that can be competitive:

Smart city Dubai: Dubai is a city from the United Arab Emirates (UEA) integer the project to transform all city of UEA as Smart city, the city with 2,415,000 people in 2017 (represent 8% population of all cases), about Smart City-ranking classed 45 with a Rating B B (IMD World Competitiveness Centre, 2018). Thus, Dubai's vision is to make her the happiest city on the earth, using technology and innovation to create happiness (Noori, Hoppe, and Jong, 2020).

Smart city Abu Dhabi: Abu Dhabi as the capital of the UEA integer the project to transform all city of UEA as a smart city, the city with 1,145,000 people in 2017 (represent 4% population of all cases) about Smart City-ranking, classed 56 with a Rating B (IMD World Competitiveness Centre, 2018). Abu Dhabi city launches Masdar city to develop the most sustainable city, referring to knowledge, clean technology, and renewable energy (Noori, Hoppe and Jong, 2020). Also, Abu Dhabi launches Zayed city project to develop a smart city and artificially intelligent.

Smart city Riyadh: Riyadh is Arabia Saudi's capital, supports the initiative of smart city, the city with 6,370,000 people in 2017 (represent 21% population of all cases), about Smart City-ranking, classed 71 with a Rating C C C (IMD World Competitiveness Centre, 2018). Riyadh launched a project of NEOM as a smart city to make the city a hub of trade, innovation, and knowledge (Doheim, Farag, and Badawi, 2019).

Smart city Cairo: Cairo is Egypt's capital, its over-population, over densification, deteriorated urbanism, and pollution put them in obligation to make the smart cities, the city with 18,772,000 people in 2017 (represent 61% population of all cases), about Smart City-ranking, classed 99 with a Rating D (IMD World Competitiveness Centre, 2018). Cairo launched two projects of a smart city; the first is El-Rehab city, which has its own transportation system and infrastructures, and its own facilities including educational, medical, commercial, sports club, recreational, and maintenance facilities. And the second is Madinaty city, pivoted on the existence of educational institutions, the city includes hospitals, business centers, hotels, sports, and social clubs, household services, and entertainment facilities (ELdeen, 2014).

Smart city Rabat: Rabat is Morocco's capital, integer the initiative to make the large city in morocco as the smart city, the city with 1,967,000people in 2017 (represent 6% population of all cases), about Smart City-ranking classed a 101 with Rating D (IMD World Competitiveness Center, 2018). Rabat city launched a project of Madinat Al Irfane as a smart city, has promoted a connectivity initiative, a physical and virtual notion

that promotes human connection using smart city ideas is lacking between the students, faculty, and staff of the separate institutions (Elice, Graveline, and Stahl, 2019).

4. RESULTS AND DISCUSSIONS

4.1 Results

Global competitiveness indexes of the countries how exist in the five cities:

	GDP (PPP) %	Unemployment rate %	competitiveness rank
UAE	0,56	1,7	17
Saudi Arabia	1,46	5,5	30
Egypt	0,95	12,1	100
Morocco	0,24	9,3	71

Table 1: GDP, Unemployment rate, and competitiveness rank

The UEA records the biggest rank of global competitiveness (out of 137 countries) and the unemployment rate with a large difference with other countries, and Saudi Arabia records the highest GDP. The last rank of competitiveness and unemployment rate cut by Egypt and the lowest GDP records by Morocco.

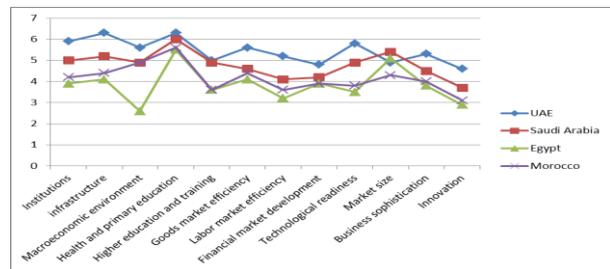


Figure 2: global competitiveness index in four countries.

UEA is in the top with the good performance for all the index of global competitiveness compared to other countries, Egypt records the lowest performance, each of these countries still the innovation capacity the lowest index and comes higher education and training, labor market efficiency. The ranking of these countries like 1.UEA records the best performance in health and primary education institutions index and the worst in innovation and financial market, 2.Saudia Arabia records the best performance in health and primary education and market size index, and the worst index in innovation and labor market efficiency, 3.Morocco records the best performance in health and primary education and macroeconomic environment, the worst index in innovation and labor market efficiency, 4.Egypt records best performance in health and primary education and market size, and the worst record in the macroeconomic environment.

4.1.1 UN HDI: human development index

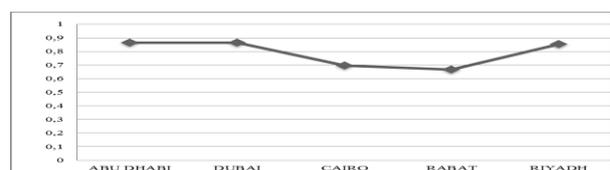


Figure 3: UN HDI

The UN HDI (development human index) compound of these indexes (expected years of Schooling, mean years of schooling, life expectancy at birth, and GNI per). Abu Dhabi, Dubai, and Riyadh record the highest performance of this index, while Rabat and Cairo record the lowest. Riyadh has the highest record in the expected years of schooling, and lowest in Mean years of schooling, Abu Dhabi and Dubai record the best performance of index GNI per capita, while Rabat and Cairo record the lowest.

4.1.2 Structure indexes

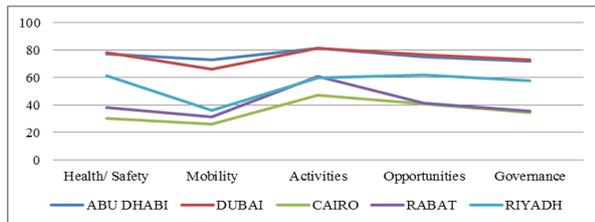


Figure 4: Structures indexes

Structure indexes are the highest in cities Abu Dhabi and Dubai; these cities had expressed a competitive advantage over other cities. The indexes of mobility (public transport, traffic congestion) consist of the worst in all cities, and the index of Activities (green space and culture activities) was the best in all cities. While, Rabat city and Cairo City record the lowest indexes of Governance (Information on local government decisions are easily accessible, Corruption of city officials is not an issue of concern, Residents contribute to decision making of local government, Residents provide feedback on local government projects) and Opportunity (Employment finding services are available, Most children have access to a good school, Lifelong learning opportunities are provided by local institutions, businesses are creating new jobs, Minorities feel welcome) for Cairo city, the lowest indexes are (Corruption of city officials is not an issue of concern and Residents contribute to decision making of local government).

4.1.3 Technology indexes:

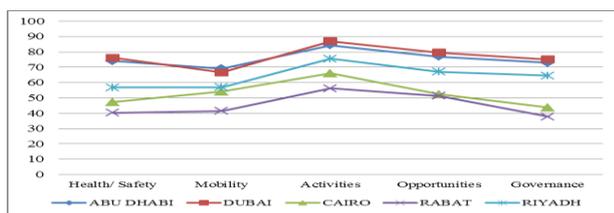


Figure 5: technologies indexes.

The technology indexes are the highest in cities Abu Dhabi and Dubai; these cities had expressed a competitive advantage over other cities. The indexes of mobility (Car-sharing Apps have reduced congestion, Apps that direct you to an available parking space have reduced journey time, Bicycle hiring has reduced congestion, Online scheduling and ticket sales make public transport easier to use) consists the worst indexes in all these cities, and the indexes of Activities (Online purchasing of tickets to shows and museums has made it easier to attend) was the best in all cities. The lowest indexes are recorded in Rabat city, especially, the Mobility, Health/ Safety, and Governance. And also, Cairo city has record lowest indexes of Governance.

4.2 Discussion

All these indicators measure territorial and global competitiveness of five smart cities in Arab world, there is a big margin between two categories of cities: on one side Dubai, Abu Dhabi, and Riyadh, on the other side Cairo and Rabat. The first group of cities are more competitive than others, and they have more possibilities to compete with other smart cities in the world. In the following, we highlight what makes Dubai, Abu Dhabi, and Riyadh good competitive cities in the Arab world? And what needs Cairo and Rabat to be more competitive?

Dubai: is a more competitive smart city then others, it's has developed learning, knowledge-base, technology, governance, entrepreneurship, IT skills, health and safety, quality of living, and environment. But it needs to develop much more innovation capacity and mobility.

Abu Dhabi: is in the second position after Dubai, it has developed learning, knowledge-base, technology, governance, entrepreneurship, health and safety, IT skills, quality of living, and environment. But it needs to develop much more technology, innovation capacity, and mobility.

Riyadh: it has a competitive advantage in the GDP of his country, and they have developed learning, knowledge-base, market size, technology, quality of living, IT skills, health and safety, and governance. But it needs to develop innovation capacity, mobility, entrepreneurship, and environment.

Cairo: is the biggest city in these smart city with few smart city projects, and the country have a constraint of political instability, affect the macroeconomic environment, innovation level, quality of living, Health and safety, ICT, and mobility, even it has great performance in learning, entrepreneurship, and market size.

Rabat: the less competitive in all of these cities, it has developed learning, knowledge, entrepreneurship and Health/safety. But it needs to develop innovation capacity, IT skills, quality of living, technology, and communication, governance and mobility.

	Smart economy	Smart mobility	Smart environment	Smart living	Smart governance	Smart people
Dubai	+	-	+	+	+	+
Abu Dhabi	+	-	+	+	+	+
Riyadh	+	-	-	+	+	+
Cairo	+/-	-	-	-	-	+
Rabat	+/-	-	-	-	-	+

Table 2: dimensions of smart city (in five cities)

This table shows how the cities: Dubai, Abu Dhabi, and Riyadh are cross to be a smart city, very competitive, and these cities are the smartest city competitive in world Arabic. UEA is working on many projects to get Dubai as a global metropolis and a smart city competitive. And, Morocco after 2016 is working for Casablanca city to be a smart city because this city is a metropolis of the economy Morocco.

In looking for a model of the three first competitive smart city in the world, Singapore, Zurich, and Oslo (IMD World Competitiveness Centre, 2018), Singapore has a higher score in HDI indexes (0, 9) and technology indexes, Zurich and Oslo had a higher score in HDI indexes and structures indexes. That means a smart city needs to develop and give importance to HDI indexes to increase territorial competitiveness.

The analysis of the triple helix model in all cities show the link between the triple helix (industry, university, and governance) is weak because of the innovation capacity level and knowledge-based in all these cities, the link is also very weak in Cairo and Rabat because of the innovation level, learning, and governance.

5. CONCLUSIONS AND FUTURE WORK

Related to the literature researches, the link between territorial competitiveness and smart city is nearly related. Therefore, the political strategy that increases territorial competitiveness is through the implementation of a smart city. As more cities around the world are adopting the smart city project, as more they can ease the many problems of urbanization, and that can be achieved when cities strike to improve their competitiveness in the six-dimensional smart city namely: smart economy, smart people, smart living, smart environment, and smart governance. Or, the triple helix model measures the smartness of a city, and the synergy between industry, university, and governance, and promotes the economic development of a territory, that means if a smart city would increase their territorial competitiveness, then it should develop: innovation, knowledge, and governance.

In our case, the benchmarking analysis between the five Arab cities (Dubai, Abu Dhabi, Riyadh, Cairo, and Rabat) work for different projects of a smart city in 2017 shows that Dubai is the smartest territorially competitive city. Then came Abu Dhabi and Riyadh, then came Cairo and Rabat with a big difference, these latter cities are still not involved in the smart city projects, and they could not compete with other smart cities in the Arab world. Hence, in the future study, it would take about the evolution of the integration rate in the transformation of Arab cities in line with the objective set on their smart city projects.

REFERENCES

Aiginger, K. 2006. Competitiveness: From a dangerous obsession to a welfare creating ability with positive externalities, *Journal of Industry, Competition and Trade*, 6(2), 161–177. DOI: 10.1007/s10842-006-9475-6.

Alawadhi, S. Aldama-nalda, A. Chourabi, H. Gil-García, J-R. Leung, S. Mellouli, S. Nam, T. Pardo, T-A. Scholl, H-J. and Walker, S. 2012. Building Understanding of Smart City Initiatives, *IFIP International Federation for Information Processing*, 40–53.

Alexandros, P. N. and Theodore, M. 2015. Porter vs. Krugman: History, Analysis and Critique of Regional Competitiveness, *MPRA*, (68151). Available at: <https://mpra.ub.uni-muenchen.de/68151/>.

Atkociuniene, V. and Petruliene, D. 2014. Impact of Multifunctional Agriculture on Territorial Competitiveness:

Theoretical Approach, *Economics and Rural Development*, 10(2), 7–15.

Brenner, N. and Wachsmuth, D. 2017. Territorial competitiveness: Lineages, practices, ideologies, in. Available at: <https://www.researchgate.net/publication/317001362%0A>.

Camagni, R. 2002. On the concept of territorial competitiveness: Sound or misleading? *Urban Studies*, 39, 2395–2411. DOI: 10.1080/0042098022000027022.

Camagni, R. and Capello, R. 2005. ICTs and territorial competitiveness in the era of internet, *the annals of Regional Science*, 39, 421–438. DOI: 10.1007/s00168-005-0244-y.

Cheshire, P-C. and Gordon, I-A. 1996. Territorial Competition and the Predictability of Collective (In) Action, *Blackwell Publishers*, 383–399.

Chourabi, H. Gil-Garcia, J-R. Pardo, T-A. Scholl, H-J. and Walker, S. and Nahon, K. 2012. Understanding Smart Cities: An Integrative Framework, in 45th Hawaii International Conference on System Sciences Understanding, 2289–2297. DOI: 10.1109/HICSS.2012.615.

Côme, T., Magne, S. and Steyer, A. 2018. Être ou ne pas être une smart city : une étude empirique des innovations valorisées sur le site web des villes, *Gestion et management public*, 7/n°2(4). DOI: 10.3917/gmp.072.0073.

D’Arcy, E. and Keogh, G. 1998. Territorial Competition and Property Market Process: An Exploratory Analysis, *Urban Studies*, 35(8), 1215–1230.

Dirks, S., Gurdgiev, C. and Keeling, M. 2010. Smarter cities for smarter growth, IBM Global Business Services, 1- 24. DOI: GBE03348-USEN-00.

Doheim, R. M., Farag, A. A. and Badawi, S. 2019. Smart city vision and practices across the Kingdom of Saudi Arabia & mdash; a review, *Smart Cities: Issues and Challenges*. Elsevier Inc. DOI: 10.1016/B978-0-12-816639-0.00017-X.

Eldeen, H-S. 2014. A Smart “Cairo” in the Making: A Strategic Approach towards a Better Quality of Life Heba Safety Eldeen, *REAL CORP*, 8(May 2014), 1063–1070.

Elice, S., Graveline, E. and Stahl, J. 2019. Achieving Connectivity through Smart City Initiatives in Madinat Al Irfane, Rabat, Morocco.

European Commission 2012. Communication on Smart Cities and Communities. http://ec.europa.eu/energy/technology/initiatives/doc/2012_470_1_smart_cities_en.pdf.

European Parliament 2014. Mapping Smart Cities in the EU, directorate general for internal policies policy department a: economic and scientific policy.

Falco, S. 2014. ‘A model for analysis of territorial competitiveness’, in *Capitolo 2*, 39–58. DOI: 10.13140/RG.2.1.4313.9287.

- Filo, C. 2006. Territorial competitiveness for territorial intelligence, in International Conference of Territorial Intelligence, Region, Identity and Sustainable Development. Alba Iulia.
- Filo, C. 2008. Indicators of territorial competitiveness', in International conference of Territorial Intelligence, Information, Indicators and Tools, p. 6.
- Gargiulo, C. and Tremitterra, M. R. 2015. Smart city, metropolitan areas and competitiveness the case study of Florence, *TEMA, Journal of Land Use, Mobility and Environment*, 8(2), 203–217. DOI : <http://dx.doi.org/10.6092/1970-9870/3010>.
- Garriazo, J. C. 2018. *Implantation et élaboration des critères des villes intelligentes*, Javier Caballero. Montréal. Mars 2018.
- Giaccaria, P. 2014. Territorial competitiveness in a systemic perspective. Evidence from Turin's territorial productive systems. London school of Economics and Political Science London., p.280.
- Giffinger, R. Fertner, C. Kramar, H. Meijers, E. 2007. Smart cities Ranking of European medium-sized cities. *Centre of Regional Science*, Vienna UT.
- Giovannella, C. 2013. Territorial "Smartness" and Emergent Behaviors, in 2nd International Conference on Systems and Computer Science. Villeneuve d'Ascq, 170–176.
- Harmes-Liedtke, U. 2007. Benchmarking Territorial Competitiveness. 9. Buenos Aires. Available at: www.mesopartner.com.
- IMD World Competitiveness Centre .2018. Smart City Index. Singapore.
- Krugman, P. 1994. Competitiveness: A Dangerous Obsession, *Foreign affairs*, 73(2), 28–44.
- Kumar, H. Singh, M-K. and Gupta, M-P. 2017. Evaluating the competitiveness of Indian metro cities: in smart city context, *J. Information Technology and Management*, 16(4), 333–347.
- Kumar, T. M. V. and Dahiya, B. 2017. *Smart Economy in Smart Cities*. Advances i. Singapore: Springer Nature. DOI : 10.1007/978-981-10-1610-3.
- LEADER 1999. La compétitivité territoriale Construire une stratégie de développement territorial à la lumière de l'expérience LEADER. Commission européenne direction générale de l'agriculture.
- Leydesdorff, L. and Deakin, M. 2011. The Triple Helix Model of Smart Cities: a neo-evolutionary perspective, *Urban Technology*, 18(2), 53–63. DOI: 10.1080/10630732.2011.601111.
- Lombardi, P. Giordano, S. Farouh, H. and Yousef, W. 2012. 'Modelling the smart city performance, Innovation: *The European Journal of Social Science Research*, 25(2), 137–149. DOI: 10.1080/13511610.2012.660325.
- Malecki, E. J. 2004. Jockeying for position: What it means and why it matters to regional development policy when places compete, *Regional Studies*, 38(9), 1101–1120. DOI: 10.1080/0034340042000292665.
- Malecki, E. J. 2007. Cities and regions competing in the global economy: knowledge and local development policies, *Environment and Planning C: Government and Policy*, 25, 638–655. DOI: 10.1068/c0645.
- Matos, F. et al. 2016. Increasing Smart City Competitiveness and Sustainability through Managing Structural Capital, *Intellectual Capital*. DOI: 10.1108/JIC-12-2016-0141.
- Nieto, A. B. T. 2011. Territorial Competitiveness in a Globalised Economy: Regional Efficiency of the Mexican Service Sector, *Chinese Business Review*, 52(April), 239–254.
- Nikos, K. Theodore, M. and Noelle, D. M. 2011. Territorial 'units' competitiveness: A self-reliant concept or a derivative concept of firms' competition? in (ERSA), E. R. S. A. (ed.) *New Challenges for European Regions and Urban Areas in a Globalised World*. Barcelona, Spain: ECONSTOR, p. 27. Available at: www.econstor.eu.
- Noori, N., Hoppe, T. and Jong, M. 2020. Classifying Pathways for Smart City Development: Comparing Design, Governance and Implementation in Amsterdam, Barcelona, Dubai, and Abu Dhabi, *MDPI*, 12(2019), p. 24. DOI: 10.3390/su12104030.
- Papa, R. Gargiulo, C. Franco, S. Russo, L. 2014. Urban smartness Vs. Urban competitiveness. A comparison of Italia cities ranking, *TEMA, Journal of Land Use, Mobility and Environment*, (special).
- Porter, M. E. 1990. *The competitive advantage of nations*. The Free P. United States.
- Ratten, V. 2017. *Entrepreneurship, Innovation and Smart Cities*. Rutledge. London and New York.
- Schwab, K. and Forum world economic. 2018. The Global Competitiveness Report.
- Wilson, F. V. J. R. 2017. 'Servitization for territorial competitiveness: taxonomy and research agenda, *competitiveness Review: An International Business Journal*, 27(1), pp. 2–11. DOI: 10.1108/CR-02-2016-0005.
- Wilson, J. 2008. 'Territorial competitiveness and development policy', *Institute of competitiveness and development*, (May 2008), 1–31.
- Zurinah, T. and Jalaluddin, A. M. 2016. Main criteria in the development of smart cities determined using analytical methods, *Planning Malaysia*, XIV, 1–14.