A STUDY ON THE IMPACT OF TRANSPORT AND POWER INFRASTRUCTURE DEVELOPMENT ON THE ECONOMIC GROWTH OF UNITED ARAB EMIRATES (UAE)

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ABSTRACT

UAE as an autonomous country got constituted during the year 1971 by joining together seven different autonomous and independent emirates. Through meticulous planning and farsightedness, the country has set a development trend which is unique in the Arabian Peninsula as well as to the entire world. The wealth and richness of the country can be mainly attributed to the inflow of petrol income coupled with the farsightedness and vision of the founding fathers of the nation in deploying the income towards proper avenues of investment. Ever since its formation, the country has been giving core attention to the development of infrastructure in the form of transportation, construction and power generation. Now the country is equipped with world class infrastructure and is the focal place of attention of other countries of the world. Since the prime source of revenue is the petrol income, the performance of UAE economy fluctuates from time to time due to the high volatility in oil prices and its demand globally. Hence, the country has started laying the foundation for a total restructuring by focusing on the development of infrastructure and other diversified portfolios in business so that the primary dependence on petrol could be reduced. Since 1990's the country has been investing heavily in building up infrastructure so as to attract foreign capital for its development. Even though there occurred uncertainties in petrol income during the last two decades, the country could manage its GDP growth rate through development in infrastructure and other related industries. The country has gained appreciable improvement in formation of gross fixed capital through infrastructure development, which in fact acted as a cushion of growth during periods of uncertainties caused by fluctuations in petrol price. This study is an effort to find out the relationship between development of infrastructure and its impact on the economic development of UAE by considering various elements in infrastructure such as transportation, power generation and construction. From the study, it is found that there exists strong

relationship between the economic growth of a country like UAE and its infrastructure development.

Key words: Development, Economy, GDP, Transportation and Power

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1. INTRODUCTION

According to the recent Global Competitiveness Report (2017-2018), UAE has been ranked first regionally and 17th globally among the top twenty competitive economies in the world (WEF, 2018). The report highlights the annual performance and competitiveness of the economies by considering strengths, weaknesses, quality of life and well-being of the people. The ranking of UAE among the other countries of the regions itself is a proof of the fact that the country has achieved astounding success in creating facilities to the people. Among the facilities, one of the most important elements is the infrastructure in the form of transportation, communication, power generation and construction. Since construction is the major plank for development of the economy, Government has been giving high priority in injecting funds for the development of world class infrastructure in UAE. Due to the cautious and planned effort on the part of the government, the country has been consistently growing at a rate of more than 4 percent during the last two decades except in 2016-17 and 2017-2018, as the growth momentum had slowed down due to decrease in the price of crude oil globally. But the recent estimate of IMF shows that the country's economy is expected to grow at a rate in between 4 to 5 percent during the next few years due to the recovery of oil prices, infrastructure development works and diversification of the economy. It is also forecasted that the growth momentum get triggered by EXPO 2020 and is likely to attract an FDI flow in between \$100 to \$150 billion in Dubai and a flow of more than 25 million tourists (Government of UAE). The country has proved to be successful in containing the economic and financial crises as it has been diversifying its economy through various programs in order to reduce the oil reliance and to create non-oil based economy. The country has been performing well in manifold field of activities as it has been ranked number one on government efficiency index, number one for excellent management of public funds (WCY, 2014), number one regionally and number eight globally on general competitiveness index and is ranked number four on the index of European, African and Middle Eastern cities followed by Switzerland, Sweden and Germany (Government of UAE).

2. REVIEW OF LITERATURE

Various studies have been conducted to analyze the impact of infrastructure on industrial production, economic growth, effectiveness of the use of infrastructure and institutional value, effect on poverty and inequality etc. The infrastructure development can promote the industrial growth of an country by generating massive economies of scale and thereby promote the industrial productivity of countries (Aschauer, 1989; Holtz-Eakin, 1994; Cashin, 1995; Canning, 1999; Fernald, 1999; Roller & Waverman, 2001). Many of the research scholars, academicians and policy experts have given detailed insight into the relationship between infrastructure development and long term economic development through long term effect on the structural changes of an economy (Sanchez, 1998; Easterly & Robelo, 1993; Devarajan, Swaroop and Zou, 1996). There exists certain academic and literary work on the evaluation of the effectiveness in using infrastructure and its institutional values by considering the impact

of these variables on revamping and restructuring of the economies (Eastely and Levin, 1996; Hulten, 1996; Lopes, 2004). The relationship between infrastructure and income inequality also is highlighted in many studies (Fay & Yepes, 2003; Jacoby, 2000; Jalan and Ravallion, 2002). Munnell (1990) by analyzing the link between economic activity and public capital in various states in USA. In another study, the relationship between private output and infrastructure development was given focus by examining the sectoral elasticities in the background of a translog production function framework concerning infrastructure in Mexico cities (Feltenstein & Ha, 1995). Similarly, a study conducted in China by Dash, Sahoo and Nataraj (2010) related to data pertaining to the period of 1970-2006, found that both social and physical infrastructure have positive influence on the economic growth of the country. In the case of UAE, very few studies have been conducted in explaining the impact of infrastructure on the economic growth of the country. In a study conducted by Arafat, Bing and Al-Mutawakel (2017), analysis is done on the development of various infrastructural elements such as transport and power on the economic growth of the country through private and public capital accumulation. The study also analyses the impact of foreign direct investment (FDI) on the development of infrastructure of the country. The same factor is authenticated by the studies conducted by Bakare (2011) wherein a study was conducted in Nigeria on the relationship between capital formation and economic development of the country by using Harrod-Domar Model of economic growth. It is found that the economic growth is positively correlated to the ratio of savings and investment in a country. It is also approved by the studies of Bekhet and Al-Samadi (2017) conducted in Jordan by using time series data for the period of 1978-2013 who found that a long-run bidirectional granger causality between FDI and GDP in the country even though the relationship is unidirectional causality during the short run. From the discussion, it is obvious that the infrastructure development is inevitable to generate capital formation which is an important determinant of economic growth.

3. METHODOLOGY

The study is based on collecting data from various reliable secondary sources such as reports published by global organizations such as International Monetary Fund (IMF), World Bank, World Trade Organization (WTO), United Nations (UN) etc. Data also is sourced from international publications such as The Economist, The Guardian, Forbes etc. The major source of data is the various reports published by the UAE Government from time to time. Apart from this, journals, magazines, news papers are also sourced to get relevant information. Certain websites are also considered for eliciting information which is relevant to the study.

4. ECONOMIC PERFORMANCE OF UAE

Since 2008 onwards rapid unprecedented transitions caused by financial crisis has been witnessed across the world that has generated a series of shocks in various fields of global economic activities. The 2008-2009 crises was followed by European sovereign debt crisis during 2010-2012 and the restructuring of basic commodity prices between 2014-2016 (World Bank, 2018). Despite the global shocks, UAE economy remained relentless and resilient in generating new vistas of growth and has responded pro-actively by addressing the unprecedented challenges and resolving issues by implementing concrete solutions. The global growth of economies are estimated to be 3.7% in 2018 (WEO) despite poor performance has been shown by certain economies in Europe and Asia (WEF, 2018). The growth rate is forecasted to be 3.5% in 2019 and 3.6% in 2020 (UN, 2019). The UAE's economic growth is forecasted to be 3.7% in 2019 as compared to 2.8% in the year 2018 (IMF, 2019) which is a positive outlook on the performance of the economy. The growth projections are based on the increasing trend of oil prices and the efforts made by the country in fiscal adjustments in both revenue and expenditure side by imposing Value Added Tax (VAT) and reduction in budget

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deficit. The performance of the economy in Gross Domestic Product (GDP) and Per Capita Income is furnished in table 1.

Table 1 Growth of GDP and Per Capital GDP from 2007-2017.

Year	Annual GDP USD Millions	GDP Growth (%)	Year	GDP per capita (USD)	GDP P.C. Annual Growth
2017	382,575	0.80%	2017	40,699	8.20%
2016	348,743	3.00%	2016	37,622	-3.80%
2015	358,135	5.10%	2015	39,122	-12.00%
2014	403,137	4.40%	2014	44,443	2.60%
2013	390,108	5.10%	2013	43,315	2.90%
2012	374,591	4.50%	2012	42,087	4.10%
2011	350,666	6.90%	2011	40,434	16.80%
2010	289,787	1.60%	2010	34,629	12.00%
2009	253,547	-5.20%	2009	30,920	-20.90%
2008	315,475	3.20%	2008	39,075	-5.80%
2007	257,916	3.2	2007	41,472\$	-6.40%

Source: UAE Ministry of Economy,

The economy is on the path of diversification with a view to reduce the heavy dependence on hydrocarbon sector by the year 2030 (Vision 2030). The contribution of various sectors to the total GDP of the country during 2018 is furnished in table 2.

Table 2 Contribution of different sectors to the GDP of UAE, 2018.

Economic sector	Contribution to GDP
(Extractive Industries (including Crude Oil and Natural Gas	29.50%
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	11.70%
Financial and Insurance Activities	8.60%
Construction and Building	8.40%
Transformative Industries	8.30%
Public Administration and Defense; Compulsory Social Security	5.80%
Real Estate Activities	5.70%
Transport and Storage	5.40%
Electricity, Gas and Water	3.20%
Information and Communications	2.90%
Professional, Scientific and Technical Activities	2.60%
Accommodation and Food Services Activities	2.20%
Administrative and Support Services Activities	1.90%
Other sectors	3.90%

Source: UAE Ministry of Economy, Economic Report, 2018.

According to the Economic Report, 2018, the total assets of the UAE Central Bank was 417.70 billion in December 2018 as compared to AED.406.40 billion in December 2017 which has been the result of an expansionary monetary policy adopted by the government. The foreign assets of the Central Bank also improved from AED. 347.66 in 2017 to AED.362.55 in 2018. The total credit in the country has increased from AED. 1580.3 billion in 2017 to AED.1656.60 billion in 2018 which records an increase of 4.8%. Thus the overall outlook of the economy has been promising.

5. INFRASTRUCTURE IN UAE

UAE has undergone massive changes in infrastructure building during the last two decades due to various initiatives by the Government through mega projects such as Burj Khalifa, Abu Dhabi airport development, Dubai Metro, Dubai Palm Island etc. The momentum continues by injecting in huge amount of investment in construction industry by targeting the Expo 2020. The construction boom also is expected to grow exponentially due to the opening up of the economy targeting free holding property in the country (UAE Ministry of Economy, 2018). The country has been successful in building up penetrating network of transport system through various modes of transportation such as road system, railway, air transport and water transport.

5.1. Road Transport System

UAE has one of the best road network systems globally. It occupies the first position in road quality index 2017-2018 by World Economic Forum. The road projects are designed to connect various parts of the country. All the federal roads are endowed with power-saving LED lamps now (Ministry of Interior Development, 2018). The total length of the road system is estimated to be 4080 kms in 2008 (CIA, 2015). There is approximately 3.4 million registered vehicles in the UAE out of which cars and light vehicles constitute the major chunk of automobiles (Global Status Report on Road Safety, 2018) and for every two Dubai residents, there is one car (Gulf News, 2015). The country is connected to Kingdom of Saudi Arabia and Sultanate of Oman through a strong network of national highways for which the government has invested more than 172 million dirham (MOI, 2018).

5.2. Railway System

The railway system in the country comprises of the national railway which is called as the Ethihad Rail which commenced its commercial activity in 2015. When completed, it will connect the seven emirates and link five countries such as Bahrain, KSA, Qatar Kuwait and Oman (Government.ae). It will be 1200 kms long and is estimated that one train can remove 300 trucks from the road and can reduce carbon dioxide emission by 70 to 80% (Ethihad Rail, 2018). Apart from the national railway, Dubai has developed metro which is a rapid transit rail network in Dubai which commenced its operation in 2009. Currently red line and green line is operational with 49 stations and annual ridership of 200,075,000 people yearly. The daily traffic is approximately 353244 in 2017. The total investment was \$7.8 billion (RTA, 2017).

5.3. Air Transport System

In quality of air transport infrastructure, UAE was ranked first in the year 2015 by World Competitiveness Yearbook 2015, by outweighing countries such as Singapore, France, Germany, UK and USA. There are seven major airports in the country in addition to airports maintained by the military and royal family. The following are the lists of airports in the country.

Table 3 List of Major Airports in UAE (2018)

LIST OF MAJOR AIRPORTS IN UAE		
Location	Emirate	Airport name
Abu Dhabi	Abu Dhabi	Abu Dhabi International Airport
Al Ain	Abu Dhabi	Al Ain International Airport
Dubai	Dubai	Dubai International Airport
Dubai	Dubai	Dubai World Central - Al Maktoum International Airport
Fujairah	Fujairah	Fujairah International Airport
Ras al-Khaimah	Ras al-Khaimah	Ras Al Khaimah International Airport
Sharjah	Sharjah	Sharjah International Airport

Source: IATA, 2018.

According to the government estimate, nearly 99000 jobs were created by airline related activities in the country during 2014. The industry contributed to nearly \$21.10 billion gross value added to GDP in the year 2014. Another \$26 million gross value added contribution was made by foreign tourists arriving in the country during 2014. Thus nearly 11.7% of the country's GDP is contributed by air transport sector and foreign tourists (Oxford Economics, 2015). Currently the country plans to invest approximately more than \$23.16 billion in aviation infrastructure so that more than 502 aircrafts can serve 75 million passengers annually in the country. This investment comprises of nearly \$8 billion for the development of Al Maktoum International Airport, \$7.6 billion for the expansion of Phase IV of Dubai International Airport, \$6.8 billion for the development of Abu Dhabi International Airport and nearly \$400 million for the development of Sharjah airport (Arabianbusiness.com, 2018).

5.4. Water Transport System

The water transport system is highly developed in the country, which comprises of regional and international hubs that adds to economic development through development of ports, operating ships, maintenance and development of dry docks, maritime safety and protection. The UAE has more than 16 seaports having more than 9 port container terminals. According to World Shipping Council (2017), two of the world's 50 container ports are located in the UAE. The major lists of ports are furnished in table.

Table 4 List of Seaports and Waterways in UAE (2018)

List of Major Seaports and Waterways in UAE		
Location	Emirate	Name of Seaport
Dubai	Dubai	Port of Mina Rashid
Jebel Ali, Dubai	Dubai	Port of Jebel Ali, Jebel Ali
Sharjah	Sharjah	Port of Mina Khalid
Khorfakkan	Sharjah	Port of Khorfakkan
Harmriyah	Sharjah	Port of Hamriyah
Abu Dhabi	Abu Dhabi	Port of Mina Zayed
Abu Dhabi	Abu Dhabi	Khalifa Port
Fujairah	Fujairah	Port of Fujairah

These ports are active in handling cargo and logistics across the world. It is estimated that nearly 61% of the total cargo for the GCC countries arrives via the UAE ports. The commercial ports in the country consist of 310 berths with a cargo capacity of 80 million tones. (Ministry of Infrastructure Development, 2018). In addition to the sea-ports, ferry services are in operation in Dubai and Abu Dhabi to assist local transportation requirement of the people and cargo.

5.5. Power Sector

The power sector has been controlled by monopolies in the emirates such as DEWA (Dubai Electricity and Water Authority), FEWA (Federal Electricity and Water Authority) and SEWA (Sharjah Electricity and Water Authority). According to UAE State of Energy Report (2015), the UAE residence use 550 litres of water and 20 t 30 Kwh of electricity a day and the demand is expected to increase by 9% annually. The total installed capacity is 32 GW for the country as a whole out of which 10200 MW is generated by DEWA (UAE State of Energy Report, 2017). During the period from 2007 to 2012, the installed capacity in the country increased by more than 54%. The electricity demand has surged to 105 billion kilowatt hours during 2013, placing UAE as one of the highest per capita electricity consuming countries in the world (Government.ae). Even though budget deficits and tightened expenditure, power sector

investment remained unaffected. The private public participation (PPP) model will be adopted for development of power sector by the UAE Government in future (Government.ae). As a country having seventh highest natural gas reserves and eighth largest oil reserves in the world, nearly 98 % of the total power generation capacity is provided by hydro-carbon. The country has taken up the plan to investment nearly USD 150 billion in renewable power sources by 2050 (Mordor Intelligence, 2018). The country is gradually shifting the source to nuclear energy in future.

6. INFRASTRUCTURE DEVELOPMENT AND ECONOMIC DEVELOPMENT

According to the data released by IMF, the country is expected to grow at a rate of 3.7 % in future. The GDP growth rate was only 2.7% during 2017-2018 due to decrease in oil prices and the recessionary trend across the globe due to the slowing down in the growth rate of leading economies of the world. But the country has been consistently focusing on the development of infrastructure and capital accumulation which is clear from the table.

Table 5 Gross Fixed Capital Formation in UAE (2016-2017)

Gross Fixed Capital Formation According to Economic Sectors in 2016 and 2017 (AED million)				
Economic Sectors	2016		2017	
	Value	Contribution %	Value	Contribution %
Agriculture, Forestry and Fishing	1,323	0.40%	1,381	0.40%
Extractive Industries (including crude oil and natural gas)	64,149	20.00%	59,939	18.60%
Transformative Industries	23,453	7.30%	24,627	7.60%
Electricity, Gas and Water and Waste Management Activities	20,285	6.30%	21,876	6.80%
Construction and Building	9,334	2.90%	9,583	3.00%
Wholesale and Retail Trade and Repair of Motor Vehicles and Motorcycles	22,806	7.10%	23,145	7.20%
Transport and Storage	44,332	13.80%	45,395	14.10%
Accommodation and Food Service Activities	6,182	1.90%	6,464	2.00%
Information and Communications	7,347	2.30%	7,671	2.40%
Financial Activities and Insurance Activities	5,419	1.70%	5,575	1.70%
Real Estate Activities	48,386	15.10%	49,534	15.30%
Professional, Scientific and Technical Activities	5,263	1.60%	5,395	1.70%
Administrative and Support Services Activities	5,013	1.60%	5,243	1.60%
Public Administration, Defense and Compulsory Social Security	44,205	13.80%	42,795	13.20%
Education	3,248	1.00%	3,550	1.10%
Activities of Human Health and Social Service	6,505	2.00%	7,202	2.20%
Arts, Entertainment, Promotion and Other Service Activities	3,517	1.10%	3,635	1.10%
Household Activities as Employer	0	0.00%	0	0.00%
Total	320,766		323,008	100.00%

Source: United Arab Emirates, Federal Competitiveness and Statistics Authority, preliminary figures-June 2018.

From the table it is obvious that out of the total capital accumulation during 2016, nearly 20.14% is in transport, power and water. The figure is nearly 20.82% in the year 2017. If we add other infrastructure facilities such as communication, information technology and construction sector, the total capital accumulation is nearly 25.34% in the year 2016 which has

increased to 26.16 % in the year 2017. Thus the investment in infrastructure development is nearly one fourth of the total capital accumulation of the country during the year 2016 and 2017.

The GDP and Gross Fixed Capital Formation (GFCF) of UAE for a period of ten years from 2007 to 2017 show the following trends.

Table 6 GDP and GFCF of UAE from 2007 to 2018

Year	Annual GDP USD Millions	GDP Growth (%)	Gross Capital Formation (GFCF) USD Millions	Annual Growth of GFCF (%)
2007	257,916	3.2	223283	
2008	315,475	3.20%	259220	16.09%
2009	253,547	-5.20%	269224	3.86%
2010	289,787	1.60%	263094	-2.28%
2011	350,666	6.90%	276425	5.07%
2012	374,591	4.50%	286691	3.71%
2013	390,108	5.10%	261337	-8.84%
2014	403,137	4.40%	290307	11.09%
2015	358,135	5.10%	307904	6.06%
2016	357,743	-.10%	302830	-1.65%
2017	382,575	0.80%	323008	6.67%

Source: World Bank national accounts data, and OECD National Accounts data files, 2018.

The table shows the changing trend of GDP growth rate and gross fixed capital formation in the country for a period of ten years from 2007 to 2017. During 2008, the gross fixed capital accumulation was nearly 16.09% of the GDP of the country. But due to global recession, the growth rate of the economy slowed down. The growth during the period of 2009 was negative which impacted the capital accumulation during the next year period of 2010. The capital accumulation can be found to be negative during 2013-2014 which is the result of European financial crisis. When the country was gradually coming out of the clutches of the crisis during 2014 and 2015, the country's income got threatened by sharp decline in oil prices globally, which really reduced the current account surplus of the country. The growth rate of the economy was negative during 2016 which affected the rate of capital accumulation in the country. During 2017, the economy started showing symptoms of growth and is expected to improve during 2018-2019 as per the forecasts of IMF (IMF Report, 2018). During 2017, the fixed capital accumulation got improved due to the various measures adopted by the government. From the analysis, it is obvious that the countries capital accumulation has been increasing on an average rate of nearly 4% during the period of study. The latest data shows that a substantial part of the investment is directed towards provision of infrastructure facilities such as power and transport. Thus we may conclude that there exists positive relationship between the accumulation of fixed capital formation through infrastructure building and the growth of GDP of the country.

7. FINDINGS

The following are the findings of the study:

- UAE has been giving high priority in building up infrastructure to match with the leading countries of the world through public private participation model. The provision of world class infrastructure facilities attracts people from other parts of the world in search of employment opportunities as well as exploring business opportunities. Since the local population is less, the country needs expat involvement in business activities and MNCs will enter the country only if there exists infrastructure.

- The GDP growth of the country has been relatively better as compared to the other Arab nations which is the result of world class infrastructure available in the country as compared to the other countries of GCC.
- Very close relationship exists between infrastructure development and GDP growth as it is evident from the capital accumulation that takes place in infrastructure building in the country. Nearly more than 25% of the total capital accumulation has taken place in infrastructure building in the country.
- The growth of GDP is closely linked to the growth of infrastructure capital accumulation as it is evident from the data that whenever there is sluggish economic growth, the infrastructure investment is less. Thus infrastructure development is a causal factor that promotes GDP growth.
- In the initial three decades after formation of the country, the country depended upon petrol income as the primary source of income, but the percentage of dependence has been gradually going down. This is one of the reasons for the consistency of maintaining stability in economic growth even after the petrol income show high fluctuations during certain periods.

7. CONCLUSIONS

The study provides a brief overview on the impact of infrastructure development on economic growth of UAE. The country has been the focus of attention of investors, employment seekers as well as tourists globally. The country has got many landmarks developed meticulously through planned effort to attract the global attention and thereby attract tourists. The government has been contributing much to the development of infrastructure in the country and hence, the country can be regarded as one having world class infrastructure facilities. The government efforts to develop infrastructure has proved to be highly beneficial for sustaining its tempo of economic development. As the country is on the path of diversifying the economy by reducing the dependence on oil income, the infrastructure development is one of the crucial elements that will enable the country to attract business from external world. The study proves that the infrastructure has got a vital role in promoting and maintaining the tempo of economic development.

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