



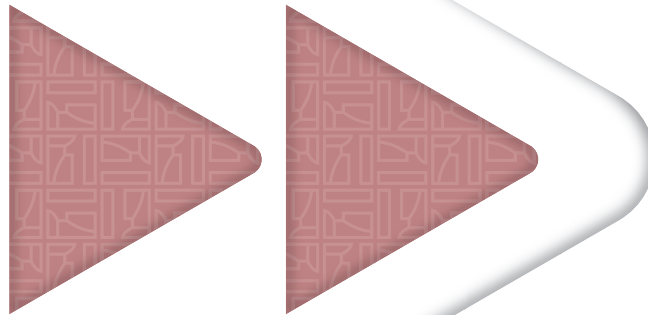
الهيئة الاتحادية
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United Arab Emirates

Policy in Action

UAE's Infrastructure-Driven Evolution
to a Knowledge-Economy



Fast-Forwarding the Nation

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UAE's Infrastructure – Driven Evolution to a Knowledge – Economy*

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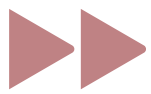
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*An earlier version of this article appeared in the Global Federation of Competitiveness Council's Annual Best Practices Report, 2015



UAE's Infrastructure – Driven Evolution to a Knowledge – Economy*

No matter how many buildings, foundations, schools and hospitals we build, or how many bridges we raise, all these are material entities. The real spirit behind the progress is the human spirit, the able man with his intellect and capabilities.

- H.H. (Late) Sheikh Zayed, founder of the United Arab Emirates

Abstract

Innovation and competitiveness are closely related concepts. The most competitive countries are often also the most innovative. This paper describes the United Arab Emirates' efforts to use investment in infrastructure to spur economic growth, attract and develop human capital, raise the living standards of its citizens and establish a foundation for the country to develop its innovative capacity, all of which will enable it to transition to a diversified knowledge-based economy in the coming decades.

The UAE's Infrastructure-Focused Growth Trajectory

Over the past four decades, since its founding in 1971, the UAE has propelled itself on the world stage as one of the most dynamic economies in the world. The critical success factor that enabled the UAE's economic development has been the strategic use of oil revenues which the country's visionary leadership has invested to create a world leading physical and social infrastructure-base that serves as a catalyst for the future development of the country. In so doing, it has been able to navigate the challenge of being an exclusively natural resource economy based on oil.¹

The core of the strategic policy planning by the UAE government has been to both, rapidly develop the capacity of its economic and governance institutions and build world-class physical and social infrastructure and leverage this to attract people. This approach has allowed the country to fast-track its development by accessing international talent, from across the skill spectrum, while upgrading the

know-how of its younger generations. In this way, the UAE has overcome the challenge of being a hydrocarbon-led economy to one that is diversified with greater reliance on its knowledge resources, for its development and prosperity.

The paper uses the World Economic Forum's framework for economic development to chart the rapid evolution of the UAE's economy from an agrarian economy in the early years of the country's founding, to a hydrocarbon resource-based economy in the 1970's, 80's and 90's, and laterally to a highly industrialized and diverse economic model focused on efficiency in the 2000's. In particular, the article explores how UAE's construction of world-class infrastructure - sea ports, air ports and a network of expressways - enabled the movement of goods and people to and from the UAE, linking the country to the global economy.

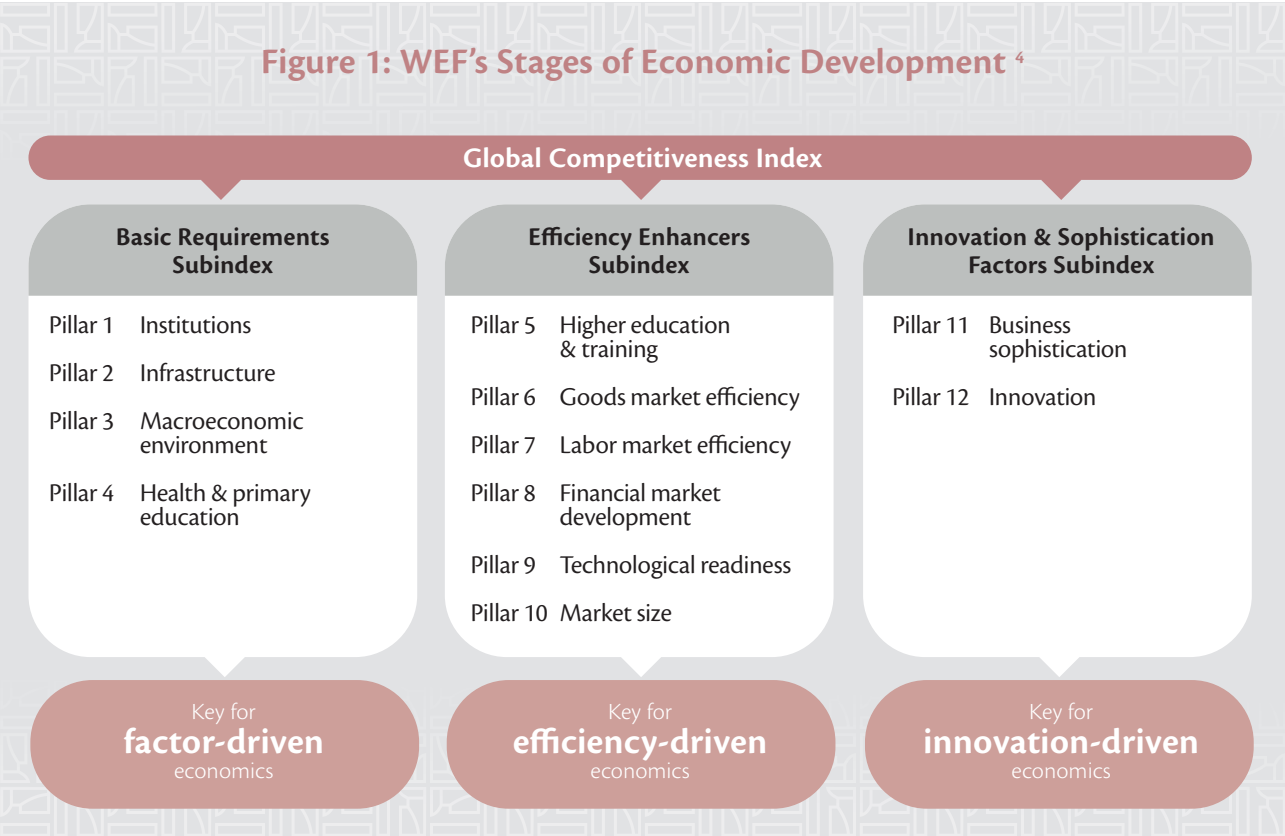
¹ Strong economic reliance on natural resources is often referred to as the "natural resource curse" wherein an abundance of natural resources serves as a hindrance rather than an enabler for development by diminishing incentives for institutional development and for individuals to engage in activities requiring risk-taking, innovation and entrepreneurship.

World Economic Forum: Stages of Economic Development

The World Economic Forum (WEF) describes economic development as a three-stage evolution (Figure 1). In the first stage, economies are largely factor-driven, relying on natural resources and low cost labor to kick-start economic growth. In this early phase, countries may rely primarily on international aid, debt financing, or revenues from natural resources to build a foundation for future growth by creating jobs, developing state institutions, investing in basic physical and social infrastructure and laying the groundwork for a stable macroeconomic environment.

With advancing development and an increase in wages, countries move into the efficiency-driven stage of economic development. This is characterized by rapidly growing productivity and an increase

in the quality and sophistication of the products and services that countries provide. To enable an efficiency-based economy, continued expansion in the stock of physical and social infrastructure is important, as is investing in the higher education and training sectors. Efficiency gains in goods and labor markets are made as the public - and private - sectors adopt technology, modern business models and management practices. Innovative solutions are found as these practices are adapted to the local context. The development of capital markets and the financial services sector is critical to raising investor confidence and attracting FDI. Investing in ICT improves a country's ability to access cutting-edge knowledge and information, improve communication and foster collaboration and exchanges at both national and international levels.



² "The UAE in the Global Knowledge Economy: Fast-Forwarding the Nation", Policy in Action, Issue 01, January 2011, Emirates Competitiveness Council

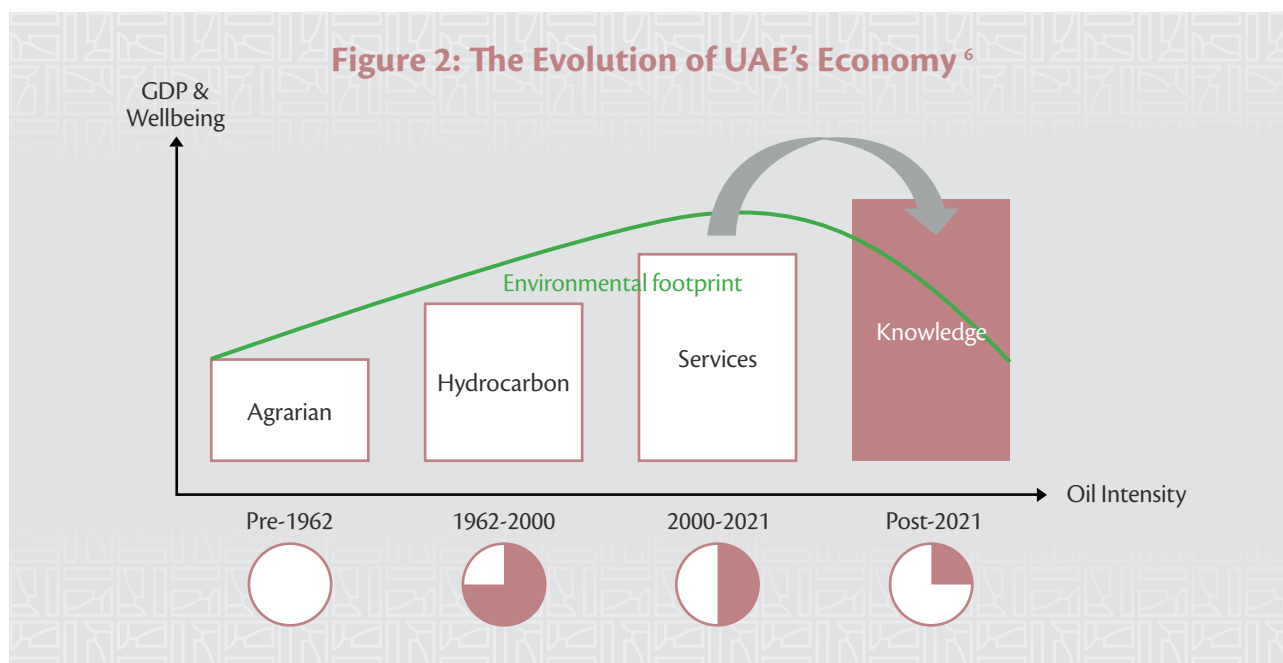
³ For an extended discussion of the innovation-driven stage of economic development, see Porter, M. 1990. The Competitive Advantage of Nations. New York: The Free Press

⁴ "Global Competitiveness Report". World Economic Forum. WEF, 2015. Web. 2015

Establishing research institutes, providing incentives for R&D for both the private - and public-sectors and extending support for highly innovative SME's allow a country to begin the transition to an innovation- driven economy. As countries move into the innovation-driven stage, they can sustain higher wages and standards of living if their firms are able to compete through innovation, that is, producing new and different goods and services using the most sophisticated design, production, management, financing and commercialization processes.² In addition, creating a social and economic environment that makes a country an attractive destination for both, highly-skilled, creative and

innovative knowledge-workers and multinationals is important to facilitate this transition.³

Through its competitiveness policies, investments and infrastructure-focused evolution of its development, the UAE transformed itself from an agrarian, trading, pearl-fishing economy in the country's early years, to one poised to become one of the world's leading knowledge-based economies in the coming decades (see Figure 2). The sections that follow use the WEF framework of economic development, to chart the UAE's rapid, infrastructure focused, transition along the three stages of development.⁵



Section 1 describes the history of infrastructure investments made in the early decades of the UAE's founding that paved the way for future developments by establishing the base for economic diversification away from oil and natural resources.

Section 2 describes the second stage of the country's economic development and its transition from a factor driven economic model to a highly diversified, efficiency-based model.

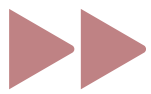
Section 3 discusses how investments in a range of physical and social infrastructure are driving the UAE

towards a culture of innovation and enabling it to rapidly transition into a knowledge-based economy. In particular the section highlights how ongoing infrastructure investments are aimed at stimulating innovation-driven economic growth, but are also focused on maintaining and improving the living standards of the country's citizens and attracting the world's most skilled and creative workforce.

Section 4 concludes by outlining the challenges the UAE faces in transitioning to a sustainable knowledge-based economy and the steps the country is taking in overcoming them.

⁵ "Global Competitiveness Report." World Economic Forum. WEF, 2015. Web. 2015

⁶ Emirates Competitiveness Council, 2015



Section 1 – Factor Driven Economic Development (1971 – 1990)

Investing Oil Revenue to Lay the Infrastructure Groundwork

Prior to the discovery of oil in the fifties⁷, the region's economy "depended mainly on subsistence agriculture, nomadic animal husbandry, the extracting of pearls and the trade in pearls, fishing, and seafaring".^{8,9}

This period "reflected the country's limited natural resources, and resulted in a simple subsistence economy".¹⁰ The discovery of oil and subsequent rise in oil prices in the early 70's "enabled the UAE to short-cut the usually difficult and lengthy process of saving and capital accumulation necessary for economic development."¹¹ In an effort to diversify away from an oil-based economy, oil revenues were invested in world-class roads, ports and built infrastructure that connected the seven emirates internally and the UAE to the global economy. This enabled the UAE to capitalize on its strategic geographical location, and make it a dynamic hub for the movement of goods and people from around the world.¹²

Concurrently, there were efforts to develop the country's political, social and economic institutions, to create a stable macroeconomic environment, invest in health, education and other growth-enhancing initiatives for the social well-being of the population.

This period was characterized by a significant demand for blue- and white-collar jobs, attracting migrants mainly from South-Asia and the greater MENA region. The rapid increase in the country's resident population along with the investments to establish the UAE as a center for retail, tourism and trade, laid the groundwork for the country's subsequent shift into a more diversified and "efficiency-driven" economy.

1: The Development of World-Class Sea Ports, Railways & Logistics Infrastructure

Beginning in 1972, the development of ports marked an important stage in the economic development of the UAE. Against the skepticism of foreign advisors, who didn't believe that a port of the size envisioned could be constructed, nor that ships would come, the late founder and ruler of Dubai, His Highness Sheikh Rashid Bin Saeed Al Maktoum forged ahead with his plans to build Port Rashid.¹³

The port quickly became oversubscribed and its success paved the way for the construction of an even more ambitious port - Port Jebel Ali which today stands as the world's largest man-made harbor, the biggest container port in the Middle East and the world's sixth largest container terminal port. Another example is the port at Fujairah that features 48 bunkering barges.^{14,15}

⁷ By some accounts, oil was first discovered in the region what is now the UAE around 1953 (see: "The Story of UAE." Zayed University. Zayed University, 2015. Web. 2015.) and the first cargo of crude was exported from Abu Dhabi in 1962 (see: "History." History. Embassy of United Arab Emirates, 2015. Web. 09 Sept. 2015.) from Abu Dhabi in 1962 (see: <http://www.uae-embassy.org/uae/history> accessed 9 September 2015)

⁸ Shihab, Mohammed. "Legal Developments in the UAE." Arab Law Quarterly 7.3 (1992): 199-204. UAE Interact. UAE Interact, 2015. Web. 2015.

⁹ The UAE was founded in 1971

¹⁰ Shihab, Mohammed. "Legal Developments in the UAE." Arab Law Quarterly 7.3 (1992): 199-204. UAE Interact. UAE Interact, 2015. Web. 2015.

¹¹ Shihab, Mohammed. "Legal Developments in the UAE." Arab Law Quarterly 7.3 (1992): 199-204. UAE Interact. UAE Interact, 2015. Web. 2015.

¹² For a discussion of Dubai's infrastructure-driven growth, see Sampler, J., & Eigner, S., Sand to Silicon, Motivate Publishing, 2008

¹³ ECC on opportunities Expo Bulletin: An Eye for Opportunities, Emirates Competitiveness Council, Internal Memorandum

¹⁴ "Port of Fujairah Authority." Port of Fujairah. Port of Fujairah, 2011. Web. 2015.

¹⁵ Recently Jebel Ali won an award for the best seaport in the Middle East for the 21st year in a row at the prestigious Asian Freight, Logistics and Supply Chain Awards, AFLAS, 2015, in Hong Kong. "Jebel Ali Retains Crown as Best Seaport in the Middle East." Emirates News Agency-WAM 15 Sept. 2015: n. pag. Print.

Together with investments in seaports, the development of airports and a network of road and expressway formed the backbone of trade facilitation. Today the UAE is one of the world's preferred trade and logistics hubs. In 2015 the World Bank Doing Business Report ranked the UAE 8th for the ease of Trading Across Borders.¹⁶ The UAE has become a world standard bearer for speed of the cost of importing and exporting.

Road infrastructure spanning nearly 12,000 kilometers of roadways, links each of the emirates and provides access to new development zones.¹⁷ The UAE has also developed public transportation means such as the Dubai Metro and Tram systems to respond to population growth. The development of the first railway in the region, Etihad Railway, is also under

process. The Etihad Railway network will be built in phases to link the principal centers of population and industry of the UAE. It will also form a vital part of the planned GCC railway network linking the UAE to Saudi Arabia in the west and to Oman in the East.¹⁸

In addition to infrastructure for land transport, the UAE has developed over ten airports. There are ongoing developments to accommodate increases in passenger numbers and cargo volumes increase at airports throughout the country. According to the Airport Council International, "Dubai is the sixth busiest airport in the world in overall passenger traffic, [and has] become the world's busiest in terms of international passenger traffic ahead of London-Heathrow in 2014".¹⁹

Global Rankings 2015 - UAE Infrastructure ²⁰

Report	Indicator	Global Rank
World Economic Forum, Global Competitiveness Report 2015	Quality of Overall Infrastructure	2
	Quality of Roads	1
	Quality of Port Infrastructure	3
	Quality of Air Transport Infrastructure	2

¹⁶ "Doing Business in United Arab Emirates." Doing Business in United Arab Emirates-World Bank Group. World Bank Group, 2015. Web. 09 Sept. 2015.

¹⁷ "Emirates Road Named after Mohammad Bin Zayed." Emirates Road Named after Mohammad Bin Zayed. Gulf News, 1 Jan. 2013. Web. 09 Sept. 2015.

¹⁸ Dossier Expo 2020 Dubai, UAE (2014)

¹⁹ ACI World Releases Preliminary World Airport Traffic and Rankings for 2014 - DXB Becomes Busiest Airport for International Passenger Traffic. N.p., 26 Mar. 2015. Web. 09 Sept. 2015

²⁰ Source: Forum, World Economic. "Global Competitiveness Report." World Economic Forum. WEF, 2015. Web. 2015.

2: Infrastructure Financing

According to the Global Infrastructure Investment Index 2014 (GIII)²¹, Gulf countries especially the UAE, Saudi Arabia and Qatar are among the most dynamic infrastructure investment markets in the Middle East. The UAE's growth and investment in economic infrastructure is ranked 3rd globally in the GIII 2014. Economic infrastructure comprises the infrastructure that makes business activities possible such as transportation, communication, distribution and energy assets.

Oil and other government revenues contributed to the initial capital for infrastructure investment in the UAE. In recent years, alternative financing mechanisms such as bond issuance (Islamic or non-Islamic) have become more prominent.²² With ambitious and iconic mega projects like Expo 2020 Dubai UAE, private sector finance and collaboration is expected to play an increasingly important role. However, Public- Private-Partnerships (PPP) are already quite common in the energy sector especially in Abu Dhabi where they are called Independent Power Producers (IPP). In the energy sector and more specifically oil, they are referred to as Production Sharing Agreements (PSA).

Well-developed capital markets and financial regulatory institutions also benefit infrastructure financing. In recent decades, the UAE has emerged as a global financial center with leading exchanges including Abu Dhabi Securities Exchange ADX, Dubai Financial Market DFM, NASDAQ Dubai, and Dubai Gold & Commodities Exchange. The UAE aimed to diversify funding streams further by accessing capital

market finance to support spending plans. For instance in 2013, Ruwais Power Company in Abu Dhabi secured \$825 million in project bonds to support its Shuweihat 2 power and desalination plant refinancing.

The UAE banking sector comprises around 50 banks, half of which are domestic banks (the government owns major stakes) and half foreign.²³ The recent merger of Emirates Industrial Bank and Emirates Real Estate Bank created the Emirates Development Bank (EDB), headquartered in Abu Dhabi. The EDB was launched to finance housing and other projects for UAE nationals, and to promote the government's social policy objectives. It is a key addition to the banking sector in the UAE and facilitates the government's support for housing and SMEs. With a capital of 10 billion dirhams (\$2.7 billion), the EDB will allocate Dh5 billion to finance housing, industrial and other schemes for UAE nationals.²⁴

In addition, the UAE has reduced barriers for SME finance by issuing new laws on SMEs and establishing financial infrastructure such as a credit bureau and credit registry. Other initiatives such as setting aside public funds to facilitate SMEs access to finance, fostering financial literacy and helping incubate businesses have also been undertaken.²⁵

The clear vision, sound regulatory framework, maturity of the capital market, strong credit ratings and favorable taxation regimes are the key factors behind the success of the UAE in boosting investors' confidence and in continuing to attract infrastructure investments.

²¹ ARCADIS is a publisher of The Global Infrastructure Investment Index 2014 (GIII). GIII ranks the world's 41 most dynamic countries with the greatest potential for growth and investment in their economic infrastructure. The indicators selected are those most pertinent to investors when making an investment in infrastructure.

²² Middle East Capital Projects & Infrastructure Survey, PWC, and June 2014. "Building Beyond Ambition." Building beyond Ambition (n.d.): n. pag. 2014. Web. 2015.

²³ "Financial Sector." Financial Sector. UAE Embassy Washington DC, Trade & Commercial Office, n.d. Web. 12 Nov. 2015.

²⁴ "UAE Launches New Bank to Fund Housing, Infrastructure Projects." AlBawaba Business, 18 June 2015. Web. 4 Oct. 2015.

²⁵ "United Arab Emirates: 2015 Article IV Consultation - Press Release; And Staff Report." International Monetary Fund Country Report No. 15/219, 4 Aug. 2015. Web. 5 Oct. 2015.



Section 2 – Efficiency Driven Economic Development (1990 – 2010)

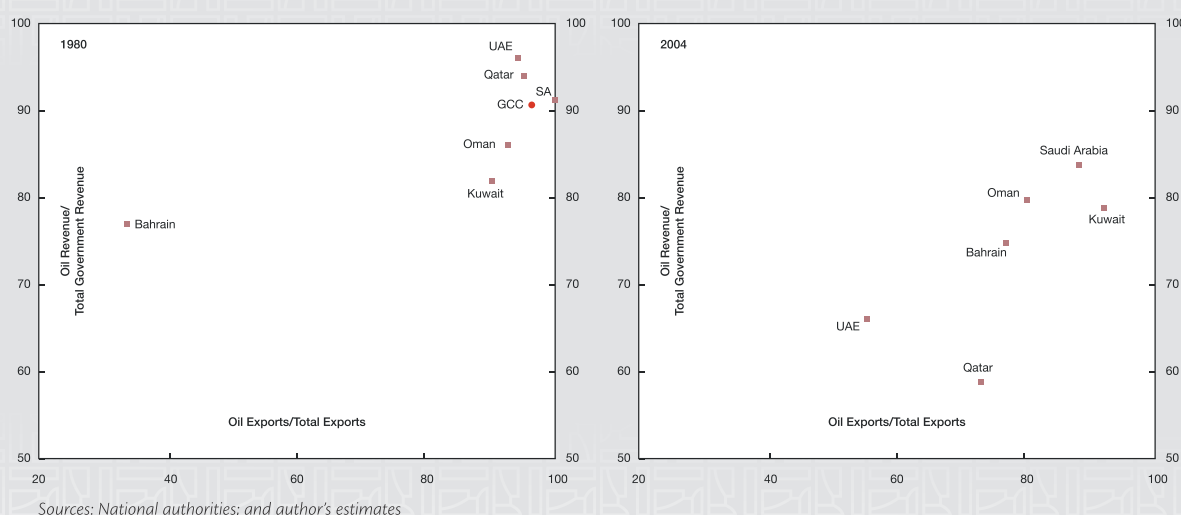
Developing the Services Sector and Launching UAE as a Hub for Trade and Talent

The second wave of investments was aimed at expanding and adapting the initial stock of infrastructure assets to accommodate the rapid growth in the resident population, develop hubs for retail, hospitality and tourism. (See Box 3). This wave also facilitated increased connectivity between the emirates and established the UAE as a key trading hub in the MENA region. At the same time efforts were directed at upgrading the country's higher education and research institutes, creating efficiencies in goods and labor markets, modernizing the domestic financial market, enabling the rapid adoption of technology to boost productivity, creating both a trade oriented and domestic consumption-driven economy.²⁶ The collective effect of these measures

led to a “reduction in oil dependency in the UAE” and drove rapid economic diversification which, according to a 2005 study by the IMF, was the fastest among GCC countries between 1980 and 2004.²⁷ (see Figure 3)

In keeping with the government's commitment to provide first-rate social services for the well-being of its citizen's, this period was also characterized by large-scale investments in social infrastructure, in particular schools, universities, hospitals and public housing. These investments had immediate benefits in terms of their impact on indicators of human development (see Box 4).

Figure 3: GCC Countries Oil Dependency, 1980 - 2004 ²⁸



²⁶ Adapted from: World Economic Forum, Stages of Economic Development / Emirates Competitiveness Council analysis, 2015

²⁷ “United Arab Emirates: Selected Issues and Statistical Appendix.” IMF Country Report No. 05/268 (August 2005): n. pag. International Monetary Fund, Aug. 2005. Web. 5 Oct. 2015.

²⁸ Source: Ibid.

3: An Evolving Retail and Hospitality Sector

Dubai has one of the fastest-growing tourism sectors in the world. In the 2014 MasterCard Global Destination Cities Index, Dubai ranked 5th for the number of overnight international visitors worldwide, outranking cities like New York, Beijing and others. Investment in retail and hospitality infrastructure has grown with the rapid increase in tourism in the UAE. Dubai alone has close to 71 malls. The World Economic Forum's Travel and Tourism Competitiveness Report ranks the UAE 34th globally for the availability of hotel rooms per 100 of the population.²⁹ Over 100 hotels will be inaugurated for the upcoming Expo 2020 Dubai UAE. The world's first fully solar-powered hotel, Hotel Indigo in Sustainable City, the

luxurious urban resort by Mandarin Oriental and the Bulgari Luxury Hotels, are all due to debut in the emirate by 2017.³⁰

In the category of retail infrastructure, there is an emerging trend of integrated retail and hospitality services. For instance, the UAE has pioneered a model whereby malls take on the characteristics of a community or neighborhood as a way to adapt to the country's extreme climate. Malls such as Abu Dhabi's Galleria Mall and the Dubai Mall are examples of urban concentrations that allow people to shop, stay and pursue various 'outdoor' activities such as skiing and skating within the mall.

4: Social Infrastructure and Human Development

Ensuring happiness and wellbeing are central tenets of Vision 2021, the National Agenda and the Dubai Plan 2021. The UAE's global ranking for happiness and wellbeing is on an upward trend. The Earth Institute and the Legatum Prosperity Index respectively rank the UAE as the 20th and 28th happiest country globally and the happiest and most prosperous among MENA countries. The IMD World Talent Report ranks the UAE 16th in quality of life proceeding OECD countries like Japan and the U.S.³¹ The Human Development Index ranks the UAE among countries with "very high human development".³² These rankings are, in large part, the consequence of a consistent investment by the UAE to develop world class social infrastructure and implement innovative solutions for the delivery of government services to ensure the wellbeing of its citizens.³³

Housing is considered to be the right of every UAE citizen. The UAE offers its citizens three types of housing assistance: home loans and grants to citizens who own a piece of land, interest-free long-term loans for citizens who can repay them and free housing for low-income citizens.³⁴ Education has long been a priority for the UAE. The UAE

offers free secondary school education to all citizens and residents and free tertiary education for UAE nationals. "In 1970, only 48% of UAE adults were literate; today over 93% are literate, with nearly equal rates for women and men".³⁵ Schools are not only built by the government but also the private sector and cater to the needs of the country's residents. The UAE has the highest number of international schools of any country in the world.³⁶ According to Knowledge and Human Development Authority (KHDA), there are 13 different types of curriculum on offer in Dubai's private schools, of which many are international schools accredited by international bodies.³⁷

The government has also invested significantly in its health infrastructure. Investments in this sector include hospitals, health-care centers, clinics, school health centers. The UAE now boasts advanced healthcare infrastructure including well-equipped hospitals, specialist clinics and primary care centers. Average life expectancy has risen from 63 to 77 years between 1970 and 2014. The rate of infant mortality has dropped from 67 per 1,000 in 1970 to 6 in 2010. The rate of child mortality rate has also dropped from 91 per 1,000 of population to 7 over the same time period.³⁸

²⁹ "Tourist Service Infrastructure." Travel and Tourism Competitiveness Report 2015. World Economic Forum, n.d. Web. 12 Nov. 2015.

³⁰ Maceda, Cleofe. "Dubai to Have 100,000 Hotel Rooms by Expo 2020." Dubai to Have 100,000 Hotel Rooms by Expo 2020. Gulf News, 28 June 2015. Web. 09 Sept. 2015.

³¹ The IMD World Talent Report. N.p.: Institute for Management Development, Lausanne, Switzerland, n.d. IMD World Competitiveness Center, Nov. 2014. Web. 1 Oct. 2015.

³² "Human Development Reports." Global Launch of HDR. UNDP, 2014. Web. 09 Sept. 2015 & "Human Development Index Trends, 1980-2013." UNDP Open Data. UNDP, 2013. Web. 09 Sept. 2015.

³³ The UAE government places great emphasis on the use of ICT to deliver public services. Select rankings of the UAE according to the 2015 World Economic Forum's - Global Information Technology Report, are as follows: ICT use & government efficiency (1), impact of ICT's on access to basic services (1), government success in ICT promotion (2), importance of ICTs to government vision (1). Source: "The Global Information Technology Report 2015." (2015): n. pag. World Economic Forum. Web. 4 Nov. 2015.

³⁴ "United Arab Emirates: Country Note." (n.d.): n. pag. <https://www.mofa.gov.ae/>. Ministry of Foreign Affairs, 2013. Web. 2015.

³⁵ "UAE: 40 Years of Progress: Retrospective Analysis of Key Indicators." (n.d.): n. pag. Crown Prince Court Emirate of Abu Dhabi, 2010. Web. 1 Oct. 2015.

³⁶ The UAE Has the Highest Number of International Schools Globally. Gulf News, 9 Sept. 2015. Web. 09 Sept. 2015.

³⁷ "United Arab Emirates: Country Note." (n.d.): n. pag. <https://www.mofa.gov.ae/>. Ministry of Foreign Affairs, 2013. Web. 2015.

³⁸ "UAE: 40 Years of Progress: Retrospective Analysis of Key Indicators." (n.d.): n. pag. Crown Prince Court Emirate of Abu Dhabi, 2010. Web. 1 Oct. 2015.



Section 3 – Innovation Driven Economic Development (2010 – present)

Creating a sustainable knowledge economy

His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the United Arab Emirates and Ruler of Dubai has emphasized that '[w]e have to start work immediately on the third phase of development... and boost the UAE economy to enable it to enter a new era in which it will become the capital of entrepreneurship, arts, culture, and family tourism for over 2 billion people... We have a vision and high aspirations. The future does not wait for those who are hesitant. We do not anticipate the future. We build it.'³⁹

For several years, the World Economic Forum has classified the UAE as being in the innovation-driven stage of economic development.⁴⁰ In the years to come, the UAE will continue to take steps to translate its natural resource base - its "inherited prosperity" - into innovation-driven "created prosperity".⁴¹ Therefore, future spending on infrastructure will be directed both, at further expanding, adapting and maintaining the base of existing physical infrastructure assets and also investing in new initiatives that will further the UAE's vision to create a knowledge-based, sustainable and highly productive and diversified economy.

Continued growth in retail, cultural and medical tourism along with mega-events such as the Expo 2020 will motivate further infrastructure spending to expand existing and establish new retail, hospitality and health-care hubs and transport and logistics networks. The UAE's Vision for the year 2021 provides further impetus for large-scale investments in physical and ICT infrastructure.⁴²

These investments will enable the country to meet a set of ambitious environmental targets and rank among the top countries in terms of the quality of its sea ports and air transport infrastructure and the performance of its logistics and telecommunications networks. The investments will also spur scientific discovery and technological advancement. In 2015 the Government of Dubai inaugurated the Mohammed Bin Rashid Space Agency which has already launched two satellites - DubaiSat 1 and DubaiSat 2 - is working towards completing the KhalifaSat in 2017 and a mission to Mars in 2021, the first such endeavor in the Arab and Islamic world.^{43 44}

In the world's most successful and dynamic economies, clusters are a source of innovation and competitiveness. A country's ability to produce high-value products and services that support high wage jobs depends on the creation and strengthening of such clusters.⁴⁵ As part of its infrastructure development UAE has focused on developing a number of clusters. Today the country hosts several industrial free zone clusters that vary from renewable clean technology clusters such as Masdar, to media clusters such as twofour54 media and production in Abu Dhabi and Media City in Dubai, and a Financial Cluster in Dubai, DIFC. The UAE ranks 1st in the state of cluster development according to the WEF Global Competitiveness Report (GCR).⁴⁶ "The combined output of the country's free zones accounts for more than half of its non-oil exports and underpins the UAE's ranking as the third most important re-export center in the world."⁴⁷

³⁹ "United Arab Emirates: Country Note." (n.d.): n. pag. <https://www.mofa.gov.ae/>. Ministry of Foreign Affairs, 2013. Web. 2015.

⁴⁰ "Global Competitiveness Report 2015-2016." (2015): n. pag. The Global Competitiveness Report 2015-2016. World Economic Forum. Web. 4 Nov. 2015.

⁴¹ Professor Michael Porter, Harvard Business School, UAE's Competitiveness for the Third Millennium, presentation to UAE's leadership, 2010

⁴² "We Want to Be among the Best Countries in the World by 2021." UAE Vision 2021. UAE Vision 2021, 2014. Web. 09 Sept. 2015.

⁴³ "Introduction & Milestone." <http://mbrsc.ae/en/page/introduction>. Mohammed Bin Rashid Space Centre, n.d. Web

⁴⁴ "UAE Takes First Step to Mars Mission." Emirates Mars Mission. Mohammed Bin Rashid Space Centre, 21 Oct. 2017. Web. 27 Sept. 2015

⁴⁵ Emirates Competitiveness Council

⁴⁶ "Global Competitiveness Report 2015-2016." (2015): n. pag. The Global Competitiveness Report 2015-2016. World Economic Forum. Web. 4 Nov. 2015.

⁴⁷ "United Arab Emirates: Country Note." (n.d.): n. pag. <https://www.mofa.gov.ae/>. Ministry of Foreign Affairs, 2013. Web. 2015.

5: Higher-Education

His Highness Sheikh Zayed Al Nahyan, the late President of the UAE, said that “[t]he real asset of any advanced nation is its people, especially the educated ones, and the prosperity and success of the people are measured by the standard of their education”. The focus on education has been a development priority since the country’s inception in 1971 and the UAE’s commitment to higher education is demonstrated by significant government investment accounting for 7% of total government budget.⁴⁸ “Tertiary education enrollment in the UAE rose from 1.3% in 1979 to 30% in 2009, with female tertiary enrollment rates rising even higher to 41.3%.”⁴⁹

The UAE has more than 100 higher education institutions and the development of educational hubs is an important aspect of the UAE’s knowledge and innovation strategy.⁵⁰ Sharjah University City and Dubai International Academic City are clusters of tertiary institutions that are intended to make the UAE a global destination for higher education. Dubai International Academic City houses campuses of twenty two international universities. INSEAD, New York University in Abu Dhabi, the French Fashion University Esmod in Dubai and the Paris-Sorbonne University in Abu Dhabi are examples of renowned institutions that have recently established campuses in the country.

6: A New Model for Urban Development - Smart Cities

The Dubai Plan 2021 sets out a framework to adopt the model of a smart city to enable sustainable growth by balancing out the ease of mobility taking into account environmental sustainability. Electric vehicle power and charging, advanced parking management systems, and network-enabled utility metering are just some of the components of the framework.⁵¹ Silicon Oasis and Masdar are examples of recent smart city developments and the ongoing development of the Dubai Design District aims to provide a creative ecosystem which incorporates smart city elements. Masdar, Mohammed bin Rashid Solar Park and Shams 1- the largest renewable energy project in operation in the Middle East - are examples of built infrastructure

that mark the way for the transition to a green economy.⁵² Masdar is a live urban space and a live test bed for a green city in the making. It includes a research institute (Masdar Institute) which is a graduate level university affiliated with the Massachusetts Institute of Technology (MIT) and dedicated to innovation in clean energy. The institute is the first of its kind in the region making the UAE frontrunner in the sector.⁵³

Masdar not only hosts the headquarters of International Renewable Energy Agency (IRENA), but is also featured as a global best practice for its approach to the clean-tech industry in the Harvard Business Review.^{54 55}

⁴⁸ “Ministerial Cabinet Approves 2015 Budget and Allocates 3.4 Billion Dirhams for Higher Education.” Ministerial Cabinet Approves 2015 Budget and Allocates 3.4 Billion Dirhams for Higher Education. N.p., 14 Oct. 2014. Web. 09 Sept. 2015

⁴⁹ “United Arab Emirates: 40 Years of Progress: Retrospective Analysis of Key Indicators.” (n.d.): n. pag. Crown Prince Court Emirate of Abu Dhabi, 2010. Web. 1 Oct. 2015.

⁵⁰ Indicators of the UAE Higher Education Sector. Rep. N.p.: Center for Higher Education Data and Statistics, Ministry of Higher Education & Scientific Research, United Arab Emirates 2012. Print

⁵¹ “Dubai Design District.” Dubai Design District Smart City Comments. Dubai Design District, 2014. Web. 09 Sept. 2015.

⁵² “Masdar Launches Shams 1, the World’s Largest Concentrated Solar Power Plant in Operation.” Masdar, n.d. Web. 16 Sept. 2015.

⁵³ Dossier Expo 2020 Dubai, UAE (2014)

⁵⁴ Emirates Competitiveness Council

⁵⁵ Emirates Competitiveness Council, Policy in Action - The Heart of Competitiveness: Higher Education Creating the UAE’s Future, Issue 06 | April 2014

▶▶ Section 4 – Challenges and Opportunities

The UAE is a constitutional federation of seven emirates. At the federal level, the UAE's Vision 2021 statement sets the blueprint for future development and reflects the unified vision of the country's leaders. In turn, each of the UAE's seven emirates, through their individual development plans, set their domestic policy agendas.

The Vision 2021 statement makes a strong commitment to transitioning the UAE to a knowledge and innovation-driven economy. It

stipulates that by 2021 - the year of the golden jubilee of the country - the UAE will "transform its economy into a model where growth is driven by knowledge and innovation".⁵⁶ In addition to efforts in developing resilient institutions, Vision 2021 sets out an important role for continued investment in infrastructure and in achieving sustainable environmental outcomes.⁵⁷ The National Innovation Strategy sets forth a plan for the UAE to become one of the most innovative countries of the world by 2021.⁵⁸

Ensuring Sustainability & Competitiveness

For the UAE to continue its trajectory as a knowledge-driven economy, there will need to be a relentless drive towards its ongoing competitiveness. While the country has taken great strides in diversifying its economy, oil and related industries remain a significant component (35%) of GDP.⁵⁹ Therefore broadening the country's revenue base and maintaining appropriate reserve buffers to deal with fiscal challenges as a consequence of oil-price volatility will remain a concern in the near term. A related challenge is for the country to use its natural resources more sustainably, reduce its carbon footprint, build infrastructure and create policies that lead to better environmental outcomes. There are strides being made in this direction, for example the ongoing investment in solar parks and other solar initiatives.

Attracting Global Talent

The UAE is home to residents of over two hundred nationalities and continues to be an attractive destination for workers from across the skill spectrum - it ranks 3rd and 5th globally in its capacity to attract and retain talent and 7th in the world in terms of the availability of scientists and engineers.^{60 61} However, it faces competition from a number of countries and will have to continue to take steps to develop its physical and social infrastructure and ensure that the country remains an oasis of opportunity and political stability if it is to continue to attract the best and brightest of the internationally mobile workforce.

⁵⁶ 2021, Vision. (n.d.): n. pag. 2014. Web. 2015.

⁵⁷ "Sustainable Environment and Infrastructure." Vision 2021. Vision 2021, 2015. Web. 2015.

⁵⁸ ASTREAMIDEAST. "UAE National Innovation Strategy." Astrea Mideast Internationalization UAE Made in Italy Promotion in Dubai. UAE National Innovation Strategy, 20 Aug. 2015. Web. 09 Sept. 2015.

⁵⁹ Emirates Competitiveness Council analysis, Tanmia, UAE Ministry of Economy

⁶⁰ "Global Competitiveness Report." World Economic Forum. WEF, 2015. Web. 2015.

⁶¹ Source: Forum, World Economic. "Global Competitiveness Report." World Economic Forum. WEF, 2015. Web. 2015.

Incentives for Entrepreneurship

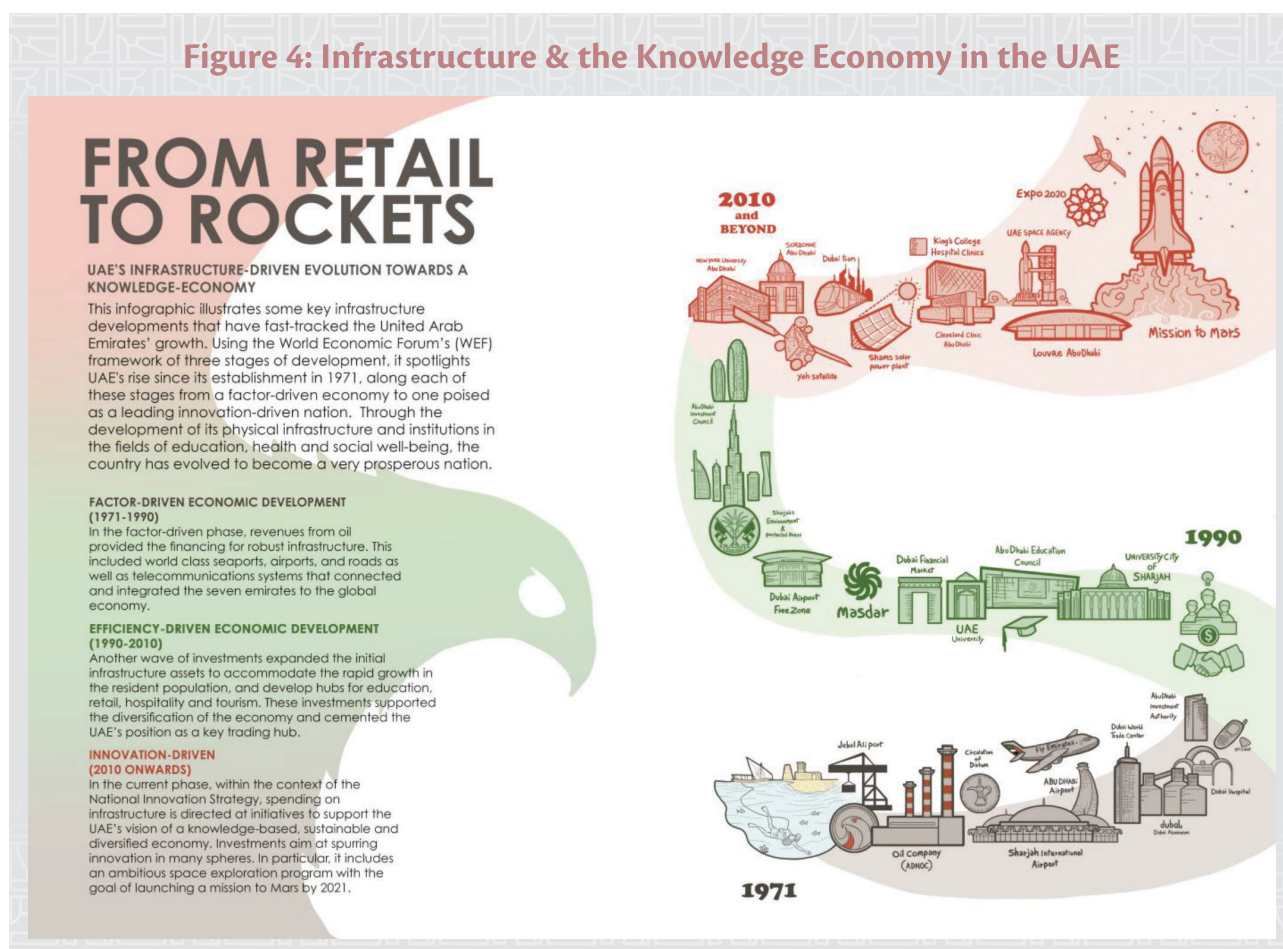
The most competitive countries are also often the most innovative. Recognizing this, the UAE endeavors to rank among the top countries in innovation and entrepreneurship by committing to increase R&D expenditure from 0.5% to 1.5% of GDP by 2021, increasing the share of GDP produced by hi-tech small and medium-sized enterprises (SMEs) and by expanding the share of knowledge workers in the labor force.^{62 63}

In an effort to incentivize entrepreneurship among UAE nationals, the government has recently created a number of programs such as the *Khalifa Fund for Enterprise Development*, the *Ruwad Establishment* and *Dubai SME*. The Khalifa Fund for Enterprise for instance has a total capital of 2 billion dirhams dedicated to strengthening the capacity and skills of

local entrepreneurs. Sharjah's Ruwad Establishment similarly aims to provide financing opportunities for SME business owners and organizes a number of training programs to enhance their business skills.

Results of such efforts are reflected in the UAE's fast improving global standing as a leading center for entrepreneurship. The Global Entrepreneurship & Development Index (GEDI) ranks 120 countries across three sub-indices - entrepreneurial attitudes, activities and aspirations - and through efforts such as the ones mentioned above, the UAE has improved its GEDI ranking from 29th in 2014 to 20th in 2015 making it the top performing country in the Middle East and North Africa.⁶⁴

Figure 4: Infrastructure & the Knowledge Economy in the UAE



⁶² ASTREAMIDEAST. "UAE National Innovation Strategy." Astrea Mideast Internationalization UAE Made in Italy Promotion in Dubai. UAE National Innovation Strategy, 20 Aug. 2015. Web. 09 Sept. 2015.

⁶³ "Competitive Knowledge Economy." Vision 2021. Vision 2021, n.d. Web. 2015.

⁶⁴ "Global Entrepreneurship Development Institute." Global Entrepreneurship Development Institute. N.p., n.d. Web. 11 Nov. 2015.

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