الهيئة الاتحادية
للتنافسية والإحصاء
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Policy in Action

The UAE in the Global knowledge Economy

Fast-Forwarding the Nation

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الهيئة الاتحادية للتنافسية والإحصاء
FEDERAL COMPETITIVENESS AND STATISTICS AUTHORITY

Federal Competitiveness and Statistics Authority:
T +971 4 608 0000
F +971 4 327 3535
Email: info@fcsa.gov.ae
Website: www.fcsa.gov.ae
هيئة اتحادية
Federal Authority
@FCSAUAE

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I. The UAE in the Global Knowledge Economy: Background

Synopsis: ***In this, the first of the Emirates Competitiveness Council General Secretariat's Policy in Action series, we explore the UAE's move towards a knowledge economy, in keeping with its Vision 2021 to meet the country's prosperity agenda. The brief examines the context for the UAE's economic competitiveness. It then provides a conceptual overview of the knowledge economy and its driving forces, as well as a high-level view of the country's policy directions and progress towards becoming a strong competitor in a global knowledge market.***

The UAE has emerged as one of the most economically prosperous nations in the world with a high GDP[1] per capita and high living standards, earning a place among the world's most competitive countries. The UAE has also achieved remarkable political stability led by a government with a bold vision for the country's future economic development and prosperity. It is noteworthy that these achievements were accomplished in a relatively short period of time, characterized by an unparalleled intensity of competition in the global economic landscape.

> *"A diversified and flexible knowledge-based economy will be powered by skilled Emiratis and strengthened by world-class talent to ensure long-term prosperity for the UAE."*
>
> **UAE Vision 2021**
> **www.vision2021.ae**

The UAE's impressive economic performance has been primarily driven by the energy sector and a strong service industry—including logistics, tourism, and financial services, underpinned by world-class infrastructure development. This has been enabled by a clear focus on developing the country's competitive advantages in these sectors. The government's commitment over the past 20 years has been to increasingly diversify its economy beyond oil and gas and create the conditions necessary for a robust private sector, supported by excellent infrastructure to facilitate trade and sustainable growth.

As the UAE moves forward it seeks to compete with the world's leading nations on the basis of its knowledge capital, rather than solely on its natural endowments. Knowledge is the primary source of growth for developed nations, fueling their economic success and social development. In order to sustain its growth and prosperity over the long-term, the UAE leadership has recognized the imperative to compete on the basis of knowledge as articulated in its Vision 2021.

The UAE is developing policies and institutions to support its full transition towards a knowledge economy. Signs of this progress are already evident, as reflected by the UAE's rank in international competitiveness rankings. The World Economic Forum ranked the UAE 25th out of 139 countries internationally in its 2010-2011 Global Competitiveness Index (GCI)—an index that assesses nations on their overall competitiveness against 12 pillars (see **Inset 1**). In addition, the UAE was the only Arab nation to be classified as

[1] GDP estimated at US $252.736 billion by International Monetary Fund, World Economic Outlook Database-April 2010, making the UAE one of the top 10 affluent countries in the world on a per capita basis.

an innovation-driven economy—along with other highly developed countries such as the United States, the United Kingdom, Switzerland, Singapore and Ireland[2].

An innovation-driven economy is the most advanced stage of development a country can achieve within the Global Competitiveness Index framework. To be included in this group, a country needs to have a very high level of income per capita along with sufficient economic diversification. The UAE's designation as an innovation-driven economy provides strong evidence of the country's preparedness and need to compete with other advanced countries on the basis of innovation.

Similarly, in 2009, the World Bank Institute's Knowledge Economy Index (KEI)[3], ranked the UAE, along with Qatar, with the highest KEI score in the GCC region (see **Table 1**).

Table 1 **Knowledge Economy Index, GCC 2009**

Country	KEI 2009
Bahrain	6.04
Kuwait	5.85
Oman	5.36
Qatar	6.73
Saudi Arabia	5.31
United Arab Emirates	6.73

Source:
Adapted from World Bank, Knowledge for Development database

[2] Other countries classified by the Global Competitive Index as innovation-driven are Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea Rep, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovenia, Spain, Sweden, Switzerland, United Kingdom and the United States.

[3] The Knowledge Economy Index (KEI) is a broad measure of the overall level of preparedness of a country or region for the knowledge economy. It summarizes each country's performance on 12 variables corresponding to the four knowledge economy pillars described in Inset 3.

Inset 1 **Stages of Economic Development**

The World Economic Forum, based on theoretical work of Michael Porter, assesses countries' competitiveness along the pillars corresponding to three main stages of economic development:

1. Institutions
2. Infrastructure
3. Macroeconomic Environment
4. Health and Primary Education
5. Higher Education and Training
6. Goods Market Efficiency
7. Labour Market Efficiency
8. Financial Market Development
9. Technological Readiness
10. Market Size
11. Business Sophistication
12. Innovation

The three main stages of economic development, are described as follows:

Factor-driven economies: In the first stage, the economy is ***factor-driven*** and countries compete based on their factor endowments: primarily unskilled labour and natural resources. Companies compete on the basis of price and they sell basic products or commodities, with their low productivity reflected in low wages. Maintaining competitiveness requires well-functioning public and private institutions, well-developed infrastructure, a stable macroeconomic framework, and a healthy and abundant workforce.

Pillars at this stage are: 1) Institutions 2) Infrastructure 3) Macroeconomic Stability; and 4) Health and Primary Education.

Efficiency-driven economies: With advancing development and an increase in wages, countries move into the efficiency-driven stage of development when they develop more efficient production processes and increase product quality. At this point, competitiveness and wealth creation are increasingly driven by higher education and training, efficient goods markets, well-functioning labour markets, sophisticated financial markets, a large domestic and/or foreign market, and the ability to harness the benefits of existing technologies.

Pillars at this stage are 5) Higher Education and Training; 6) Goods Market Efficiency; 7) Labour Market Efficiency; 8) Financial Market Development; 9) Technological Readiness; and 10) Market Size.

Innovation-driven economies: Finally, as countries move into the innovation-driven stage, they can sustain higher wages and standards of living if their businesses are able to compete with new and unique products. At this stage, companies must compete through innovation, producing new and different goods and services using the most sophisticated design, production, management, financing and commercialization processes.

Pillars at this stage are: 11) Business Sophistication and 12) Innovation.

Source:
Adapted from *World Economic Forum, Global Competitiveness Index 2009-2010.*

II. The Path to a Knowledge Economy and its Drivers

Most advanced economies have developed along a trajectory of three stages of economic growth before transitioning to a knowledge-based innovation economy. To provide the context for the UAE's positioning as a knowledge-based economy, this section summarizes the three main stages of economic development as described by the World Economic Forum.

In a factor-driven economy, the main source of national income comes from exploiting natural resources. With development and increasing business sophistication, countries move into the efficiency-driven stage where the majority of the country's wealth comes from an ability to effectively produce and trade goods. As countries move into the third innovation-driven phase, growth and national income are increasingly based on human talent.

Countries that have moved along this trajectory have steadily shifted away from a dependence on natural resources such as food and agriculture for generating wealth, to industrialization and manufacturing, and then finally to economic activities that involve human creativity and talent. While factor or efficiency-driven economies essentially compete on the international market on the basis of price to export their commodities or undifferentiated basic products, innovation-driven economies position their production as unique and offer exclusive value propositions. Knowledge economies hold the promise for significant growth, because unlike economies that depend on finite natural resources, knowledge-based economies rely on the potentially limitless creativity and talents of its people to generate economic value. Finland, Ireland and Singapore are examples of countries that have experienced significant economic development as a result of their transition to knowledge economies.

The evolution of advanced countries towards innovation-based activities has resulted from cost pressures created by emerging markets. As manufacturing has increasingly been sourced from cheaper labour countries, advanced economies needed to focus on the more complex, higher value-added and knowledge intensive activities and segments. For instance, leading US technology companies market their products from the United

Inset 2 **What is Knowledge Capital?**

Knowledge workers provide the capital for a knowledge economy. A strong knowledge workforce is essential for creating, sharing, disseminating, and using knowledge effectively to create value. Knowledge professionals include—but are not limited to—academic researchers, scientists, managers, human resource professionals, engineers, health care professionals, educators, technicians, legal professionals, business professionals, accountants, software designers, designers, architects, urban planners, artists, filmmakers, writers, media professionals, and musicians. They all have in common the fact that their work calls for their human judgement, creativity, analysis, strategic thinking and problem solving.

Knowledge capital is the collective knowledge produced by knowledge workers. Given its intangible nature, knowledge is difficult to observe and measure directly. To give a few examples, it is the combined know-how of material scientists, aerospace engineers, and electronics specialists to design a lightweight, fuel-efficient aircraft, giving it an edge over its competitors. It is the collective creative output of artists, graphic designers, story boarders and programmers to create an animated television series. It is the shared work of policy makers to foster excellence in governance. It is joint efforts of physicians, epidemiologists and programmers to provide state of the art country health statistics readily available on desktops. It is the ingenuity of financial service providers to bring novel financial products to new markets. It is the analytical ability of lawyers to creating precedents in jurisprudence.

States, while assembly is performed in China, and the products are sold to world markets. Several Japanese companies have also adopted this operational model, which allows them to focus on the higher end or more lucrative portions of the value chain. Similarly, some European car makers develop their premium brands in their home market while manufacturing cheaper ones in emerging markets. In the garment design industry in Italy, the knowledge-intensive design and marketing process, which produces the greatest value, is done in Italy. The final products are likely to be manufactured in another country where the production costs are lower.

Knowledge Work and Knowledge Workers

Constructing a knowledge-driven economy requires new skills, new ideas and a heightened level of creativity from a highly-trained, flexible and adaptable workforce. For an innovation-driven society to flourish, a country needs to build its human capacity to meet the demands of a knowledge society.

With each stage of economic development, the labour market has different requirements. In factor-driven economies, largely unskilled labour is engaged in extracting and selling assets from natural resources such as agriculture, commodities, raw materials, and minerals. As a country shifts to higher levels of productivity in an efficiency-driven economy, a better-educated labour force is primarily engaged in transforming materials into a host of tangible goods through manufacturing. Finally, as the country transitions to an innovation-driven economy, there is a dramatic shift from physical labour and tangible goods-production industries to the production of knowledge-intensive, intangible service-oriented enterprises by a well educated workforce. Examples of output of knowledge workers include reports, musical scores, services, patents, software, graphic designs and architectural blueprints. When the preponderance of a country's wealth comes from knowledge-intensive goods and services, it is considered a knowledge economy. The competitiveness of a knowledge economy depends on the ability of companies working within its borders to innovate and consistently increase their market share among foreign and domestic consumers.

Knowledge Capital and Innovation

In an innovation-driven economy, knowledge capital plays a fundamental role in penetrating markets by virtue of its role in the production and development of superior products and services. Knowledge capital is the sum of information, knowledge, professional skills, intellectual property, enterprise processes, and applied experience which can be mobilized to generate wealth. It is not limited to the amount of scientific research and development that takes place inside a firm, or the number of patents and copyrights owned by a country, or the penetration level of technology within a society. Although these are important elements of knowledge-driven economies, knowledge capital also includes the collective tacit and intangible know-how of a workforce.

It is the use of knowledge capital that allows for innovation of products, services and processes to take place (see **Inset 2**). In effectively functioning knowledge markets, innovative ideas can be translated into goods, services and processes that can be commercialized for economic value. Innovation in all its forms becomes an indispensable engine for spurring growth, enhancing competitiveness, and increasing social well-being in economies of the world. Although traditionally innovation has been thought of as occurring primarily in scientific and technological fields, innovation is increasingly understood in a broader context that includes social and cultural spaces. In this article we focus on innovation in the economic arena.

III. The UAE's Progress Towards a Knowledge and Innovation-Driven Economy

Given its technology infrastructure and knowledge economy enablers, the UAE is well positioned to compete in knowledge-intensive economic activities.

A knowledge economy is characterized by an ecosystem of interconnected elements and networks that allows a country to generate, adopt, adapt, diffuse, and ultimately commercialize knowledge-intensive products and services. The World Bank Institute describes four fundamental pillars of a knowledge economy (see **Inset 3**), summarized as:

Pillar 1: Economic Incentive and Institutional Regime
Pillar 2: Education and Human Resources
Pillar 3: The Innovation System
Pillar 4: Information and Communication Technology (ICT)

Making effective use of knowledge in an economy requires the development of appropriate policies, institutions, investments, and coordination across these four pillars. The following highlights the UAE's performance in each of these key areas.

Economic Incentive and Institutional Regime
An economic and institutional framework that allows for knowledge generation and its commercialization are fundamental to the proper functioning of a knowledge economy. Key elements include macroeconomic and political stability, fair competition, and regulatory policies that are conducive to entrepreneurship. More specific to knowledge economies is the recognition and protection offered to the creators of intellectual property, through proper patenting, copyrighting and trade-marking policies. The UAE government has, over the past few years, been working to strengthen its already strong business-enabling environment and institutional framework towards improving the country's competitiveness. In 2010, the UAE was ranked as one of the world's top five business reformers by the widely referenced World Bank Group's Doing Business Report. It was also ranked 40th out of 183 countries for overall ease of doing business in the 2010 report.

Education and Human Resources
Education is the cornerstone of the knowledge economy as it supplies the necessary skills and talent. The objective of educational policy is to create a society of skilled and creative people, with opportunities for quality education, employment or self-employment, and the chance to participate fully in the country's development. In order to truly develop its human capacity and create a workforce with the skills and talent that will drive a knowledge economy, the UAE needs to ensure quality education at every level from pre-school to adult learning . Currently there are reforms underway to improve the quality of teachers, curriculum, and assessment at primary and secondary education levels to improve the country's educational outcomes. In higher education, curricula are being upgraded to improve competencies that ensures creativity and innovation.

In addition, the UAE is partnering with some of the world's leading educational institutions to fortify the country's education sector (see **Appendix 1**). This substantial investment to bring world-class education and strong research capabilities into the country is an important step in developing a workforce with the right skills to generate growth and in increasing the country's research output. In order to keep pace with global developments there is still a need to develop a critical mass of specialized research institutions and highly-skilled knowledge professionals, including scientists and engineers. By strengthening its capacity as a centre for education in the region, the UAE can leverage its position as a knowledge hub and serve as a talent pool, while competing globally.

Upgrading the Innovation System
An effective innovation system consists of firms, science and research centres, universities, and other organizations that can tap into and contribute to global knowledge, adapt it to local needs, and create new products and services. Knowledge economies make better use of their assets and capabilities in contexts where there are strong links and synergies between research institutions and industry—often in cluster environments. The close proximity of research and industry allows for knowledge spillover effects and the increased local competition gives the products an edge to compete on the global stage.

There are efforts underway to strengthen the UAE's innovation drive. Key to fostering innovation will be

the establishment of stronger ties between education, industry, trade, services, enterprises and entrepreneurs. Strengthening the motivation for innovation among individuals and firms is also critical to fostering a culture of innovation and entrepreneurship. Currently in the Small & Medium Enterprises (SME) sector there are business support programmes including efforts by the Sheikh Khalifa Fund, the Mohammed Bin Rashid Establishment and Ruaad to encourage entrepreneurship by smaller-sized businesses. Going forward, a challenge will be to provide incentives to large multinational companies to anchor their Research & Development (R&D) functions in the UAE to encourage valuable knowledge transfer.

Information and Communication Technology
A dynamic information and telecommunication infrastructure is critical to enable a knowledge economy. Information and Communication Technologies (ICTs) facilitate effective communication, dissemination and processing of knowledge, and have a particularly important role in the dissemination of scientific and technical information. An effective ICT network also has important applications for social and civic development, in the areas of education, healthcare and e-governance.

The UAE has already developed an impressive ICT sector with a demonstrated commitment to providing its people and businesses with access to the latest technologies. The UAE is rated as the leader in the MENA region for ICT and a solid performer internationally. According to the World Economic Forum's Global Information Technology Report 2009-10, the UAE ranked 23rd globally making it among the world's most networked economies.

The UAE is also determined to use ICTs as a vehicle for the promotion of culture and national identity. There are initiatives underway for the development of Arabic content such as applications for learning, development of Arabic media and digitization of scientific content. The Mohammed bin Rashid Al Maktoum Foundation has an initiative to translate and digitize masterpieces in science and culture at the rate of one book per day.

Inset 3 **Knowledge Economy Pillars**

The World Bank Institute defines the following four pillars as fundamental to a well-functioning knowledge economy:

Pillar 1: Economic and Institutional Regime
The country's economic and institutional regime must provide incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship. Indicators are:

- Tariff and non-tariff barriers
- Regulatory quality
- Rule of law

Pillar 2: Education and Human Resources
The country's population requires education and skills to enable them to create, share and utilize knowledge effectively. Indicators are:

- Adult literacy rate
- Secondary enrollment rate
- Tertiary enrollment rate

Pillar 3: Innovation System
The country's innovation system—firms, research centres, universities, think tanks, consultants, and other organizations—must be capable of tapping the growing stock of global knowledge, assimilating and adapting it to local needs, and creating new technology. Indicators are:

- Royalty and license fees payments and receipts
- Patent applications granted by the US Patent and Trademark Office
- Scientific and technical journal articles

Pillar 4: Information & Communication Infrastructure
A dynamic information infrastructure is needed to facilitate effective communication, dissemination, and processing of information. Indicators are:

- Telephones per 1,000 people
- Computers per 1,000 people
- Internet users per 1,000 people

Source
Adapted from *World Bank Institute, Knowledge Assessment Methodology and Knowledge Economy Index, KAM: www.worldbank.org/kam*

IV. The Way Forward

Accomplishing the UAE's vision of building a competitive knowledge-based economy will require the engagement of government, businesses and individuals:

- *Government*: For governments, this means putting in place the appropriate policies and institutions and establishing a knowledge economy infrastructure. This includes implementing knowledge economy-focused educational policies, strengthening regulatory frameworks for ensuring knowledge generation, adoption, protection and dissemination; and for ensuring robust and attractive business and investment environments.

- *Private Sector:* As the engine for economic growth, the role of the private sector is critical. Companies need to deepen their competitive advantages and strengthen their capacity to innovate by forging stronger networks with universities and research institutions and increasing their investment in R&D. They also need to improve their export competitiveness based on knowledge-intensive products and services.

- *Individuals:* For individuals, being successful in a knowledge economy will mean developing capabilities and skills to participate in creating the country's knowledge economy. This includes having the skills to respond to global conditions in the areas of science and technology and arts and humanities, being multilingual, and being entrepreneurial.

The knowledge economy holds significant promise for the UAE to have sustained high growth and prosperity over the long-term. With a focus on the country's vision and the active engagement of different stakeholders, the UAE is well positioned to leap forward from vision to actualization, to develop regional leadership in key areas and to compete globally as an innovation-driven knowledge economy.

About the author: Shaheena Mohamed is a Senior Project Manager at the General Secretariat of the Emirates Competitiveness Council, based in Dubai, UAE. She is former staff member of the International Financial Corporation/World Bank Group where she worked on economic development advisory services in the MENA region. Shaheena holds a Master of International Affairs Degree from Columbia University, New York.

Appendix 1

Some national and international higher education institutions in the UAE:

Examples of UAE Universities and Colleges	
Zayed University	www.zu.ac.ae
United Arab Emirates University	www.uaeu.ac.ae
Higher Colleges of Technology	www.hct.ac.ae
Dubai School of Government	www.dsg.ae
Masdar Institute of Science and Technology in collaboration with Massachusetts Institute of Technology (MIT)	www.masdar.ac.ae

Examples of International institutions in the UAE	
INSEAD	www.insead.edu/abu_dhabi_campus
London School of Economics	www.lse.ac.uk
New York Institute of Technology Abu Dhabi	www.nyit.edu/locations/abu_dhabi
New York University Abu Dhabi	www.nyuad.nyu.edu
L'université Paris-Sorbonne	www.paris-sorbonne.fr
American University in Dubai	www.aud.edu
British University in Dubai	www.buid.ac.ae
London Business School	www.london.edu/programmes/executivemba.html
City University	www.cass.city.ac.uk/mba/dubai/index.html
Esmod France International Fashion University Group	www.esmod.com/en
American University in Sharjah	www.aus.edu
RAK Medical Health and Sciences University	www.rakmhsu.com
Preston University Ajman	www.preston.ae
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