

Technology and Intelligent City Strategies in Saudi Arabia^{*}

Nicos Komninos¹
URENIO, Aristotle University
www.urenio.org

1. Introduction

Four new cities are under development in the western part of Saudi Arabia: Prince Abdul Aziz Bin Mousaed Economic City near Hail; King Abdullah Economic City northwest of Jeddah; Knowledge Economic City Al-Madinah; and Jizan Economic City. They have been planned by the Saudi Arabian General Investment Authority (SAGIA), forging the high-tech profile of the Kingdom's regions. Fauaz Al-Ghreimil from the Marketing & Investor Services Sector of SAGIA clearly states this goal: "the new cities are part of a regional plan for the whole country; they are independent and each one has a different vocation; but all are linked to the same vision: developing the technological capabilities of the country".

The project is very ambitious. The attempt to create new cities and specialised high technology poles through top-down planning procedures entails complexities that probably exceed conventional urban planning. SAGIA is willing to adopt intelligent city strategies to endorse its vision and cope with the challenges. Seema Khan, Chief Strategy Officer at SAGIA, says that "with 10x10 as its national goal (Top 10 Most Competitive Economy by the Year 2010), the Saudi Arabian General Investment Authority is breaking the thought barrier again with another project seeking to develop the Kingdom's economy through private sector investment: the Intelligent City."

The challenge for SAGIA is to turn this vision into a reality.

2. Saudi Arabian new economic cities

The Saudi Arabia New Economic Cities shape a general strategy that seeks to accommodate the changing needs of a growing non-oil economy embracing new knowledge based industries and, at the same time, ensuring adequate employment opportunities, educational facilities, and housing for a young and growing Saudi population. Three New Economic Cities lay along the Red Sea coast of Saudi Arabia, while the fourth one is located in the hinterland near the city of Hail.

The **Prince Abdul Aziz Bin Mousaed Economic City near Hail** is focused on transport, logistics, and food-related industries. Designed as a new city clustered around the international airport of Hail, aims to be a state-of-the-art transport hub with corresponding logistical arrangements. The city of Hail is approximately 700 km northwest of Riyadh and its population of 230.000 inhabitants is growing at a rate of

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2.8 percent per year. The Hail region, rich in natural resources, is one of the key agricultural areas accounting for 10 percent of the Kingdom's agricultural land.

The New City project will include a number of land zones with specific uses such as: Logistics and Supply Chain, Education, Agriculture & Food Processing, Mining and Industry, Entertainment, and Housing. The planning of the City aims to redesign and improve the Hail Airport area, offering a high quality urban environment, with its major characteristic being the extended green spaces. The planning concept has been conceived in such a manner as to facilitate investment opportunities without compromising physical planning standards.

The **Knowledge Economic City AI - Madinah (KEC)** aims to establish an economically viable catalyst for knowledge-based industries located approximately 5km to the East of Medina. The total built up area will reach 8.8 square km that will house about 200.000 inhabitants. The city will be comprised of various zones designed to compliment each other: a technology and knowledge based industries zone; an advanced IT studies institute; an interactive museum on the life of Prophet Mohammad; a centre for Islamic civilization studies; a campus for medical research and life sciences; an integrated medical services zone; a retail zone; a business district and various residential zones.

The strong presence of Medina inspires the design of the New City that reflects the pattern of the classic Islamic architecture in terms of spirit and heritage. The whole area includes a number of plots that receive various land uses, each of which enjoys specific planning qualities in harmony with the specific functional needs. The sub-areas are connected by modern transportation and served by an infrastructure that is supported by sophisticated communications networks. Transportation within KEC will be facilitated via a ring road with a monorail above it, connected to the planned train station thus tapping into the railway access to Makkah, Yanbou, the King Abdullah Economic City as well as the port city of Jeddah.

King Abdullah Economic City (KAEC) aims to be an integrated modern metropolis at the forefront of Saudi Arabia's strategy for diversification and expansion, concentrated on energy and transportation industries. KAEC is to be established at a site near Rabigh, 200 kilometres northwest of Jeddah. This location allows the City to be a nucleus for a highly integrated transport covering land, air, and sea.

Spread over 55 square km, the City lies like a "shell" in front of the Red Sea. The whole area is divided into six successive zones that host the various land uses. A world - class Sea Port; an Industrial District that will be a powerhouse for manufacturing and logistics; a Resort zone provides the area with luxurious tourist destination, while the Financial Island will make the Kingdom a world-class capital for finance and commerce. The Education Zone is equipped with the best educational programs to ensure a rich learning experience. The Residential Area provides the very best in living standards.

Sea water is used as an integrated feature for the City's urban structure, slipping into the urban tissue. These "water roots" as well as the dispersed green spaces will help the City to provide a high quality and comfortable microclimate.

The development of **Jizan Economic City (JEC)** stems from an aspiration to utilize the Kingdom's capabilities, location and provision of energy resources and energy-intensive primary and secondary industries. The New City lies 50 Km north of Jizan city, covering an area of 100 square km.

The city plan includes an Industrial zone (the 2/3 of the total area) that will accommodate a port, an aluminium smelter, steel plant, oil refinery, copper processing plant as well as fisheries and other agro-related industries. The non-

industrial zone will comprise the central business district, residential areas, a marina, and facilities for education, hospitality and recreation.

The master plan is divided into two distinguished areas with divided urban characteristics. The organisation of the industrial zone follows a classical modernist regularity, while the residential and recreation area follows another geometry using more organic patterns. The residential area is expected to accommodate nearly 250.000 people

3. The organisation of the new urban technological complexes in Saudi Arabian

The industrial and technological focus of the four new economic cities varies according to the specific characteristics of each location. “This vital project falls well within plans to upgrade the Kingdom’s regions in a sustainable fashion taking into consideration each region’s competitive advantages” says Amr Dabbagh, governor of SAGIA.²

In order to achieve this focus all the cities have adopted common design features which are the combination of high level technology infrastructures and telecommunication networks, with the creation of an attractive living environment for the installation of the employees and their families. In King Abdullah Economic City (KAEC), for instance, the premises will be built to the highest specifications and will feature transport links and a full set of amenities. Light industrial modules will be set up to encourage start-up entrepreneurs. Mohammed Khoja, Marketing Director of Knowledge Economic City Al-Madinah (KEC), expects that “a combination of smart infrastructure and quality of life will attract knowledge-based industries and people to the city”.

The further growth of the cities, after the initial development of each city’s infrastructure, will be based on the attraction of both domestic and foreign direct investments. The target industries / companies depend on each city’s focus. The investigation of potential investors is already in progress with encouraging messages. Prince Abdul Aziz Bin Mousaed Economic City (PABMEC) has developed a comprehensive investment portfolio titled 360° Opportunities that outline a detailed prospectus for around 400 investment opportunities in the city’s six sectors. David Nicoll, from Jizan Economic City considers that “core investors for Power, Aluminium, Steel/Rebar, Port and trans-shipment projects are already in place and we are actively talking to other potential investors in other significant sectors”.

The four cities plan to create research, technology, and innovation infrastructure, including research centres, incubators, technology networks, industrial liaison centres, and venture capital funds. In KEC Al-Madinah, such infrastructure comprises a technology park, technological and management colleges, a complex for medical studies, bio-sciences and health services, the Islamic Civilization Studies Centre, and a business centre. Despite the fact that all the above units will have separate management bodies, they will collaborate, developing complementary functions. David Nicoll states that the development of the industrial complex in Jizan Economic City will be a hub for management, technology, and related research skills, and it is expected to attract considerable local and international equity capital and venture capital funds.

The creation and supply of ICT infrastructures and services is also a primary goal. “Our target is to have a fully networked facility offering state-of-the-art information technology infrastructure”, says Nidal Jamjoom, CEO, Emaar the Economic City. “Wireless networks, Wi-Fi hotspots and e-market places will be encouraged within the project”. PABMEC’s Intelligent Infrastructure is based on four components: People,

Services & Applications, Systems & Processes, and Hard Infrastructure. “The idea is to have ‘connectivity’ approach that extends the value for owners, operators, and users of buildings into the city’s fabric, onto the (future) remote workforce, citizens, and other users”, states Majid Bin Ayed Al-Ayed, Head of Corporate Communications, Rakisa Holding.

4. Technology agglomeration and intelligent city strategies: state-of-the-art

Can these high profile places generate self-sustained complexes of technology and innovation? Let’s turn for a while to theory and international good practice.

The more novel theories of innovation and technological development recognize the role of communities and agglomerations in innovative practices. Technological development and innovation are seen as collaborative processes in which knowledge and insights from different fields of science and technology are combined and create something new. This mainly happens within human communities, in which different skills and competences are pooled together.³ Innovation is also seen as an uncertain, cumulative and path-dependent process, based on the transformation of tacit into explicit knowledge.⁴ But, tacit knowledge is spatially ‘sticky’; it is not easily communicated other than through personal interaction; clustering becomes inevitable, not as a condition for minimizing transaction costs, but to make probable the innovative behaviour itself. The external environment of innovation is also extremely decisive because the external organisations’ knowledge is more important than the internal one; and because genetic processes of innovation are regulated by a ‘selection environment’ which institutions (venture capital, product development consultants, IP lawyers) switch on-off the flow of knowledge and funds.⁵ Innovation is a systemic phenomenon, and innovative clusters, districts, cities, and regions help establishing systems, networks, supply chains, and other forms of collaborative alliances.

But, how are innovative agglomeration created? Can they be grown or do they just emerge? Can we plant innovative clusters through planning and policy making or only the market has this privilege? Most planners and policy makers accept that under certain conditions innovative agglomerations may result from planning. A number of clusters and innovative cities around the globe, mainly planned technology parks and technopoles, sustain these arguments. This was, however, the feeling at the adolescence of technological planning, during the 1980s. Since 1990s, policy making shifted from technopolitan planning to regional systems of innovation and the management of intangible assets. It became clear that innovative agglomerations are depending more on knowledge sharing, funding and technological cooperation institutions than hard infrastructure. If you look today at the indicators that measure innovative success in all OECD countries and regions, you won’t find anything about hard infrastructure investment. It is entirely about education, R&D, cooperation, innovative companies, venture capital, and patents.

The emphasis on knowledge, skills and information marks a new stage in the thinking about innovative agglomerations. In the flat world that Thomas Friedman described information technology and communication networks are a precondition and a necessity for global supply chains, subcontracting, and distributed product development.⁶ Innovation systems become more and more global. Therefore, intelligent city strategies come to deal with local innovative agglomerations, global networks, and online services.⁷

The concept of intelligent city refers to an innovative agglomeration in which three different dimensions / levels coexist:

L1: Level one, the base, relates to people: the intelligence, inventiveness and creativity of the individuals who live in the city. Cities compete to attract creative people and creativity has become the crucial source of economic growth: to be successful in this emerging creative age, cities and regions must develop, attract and retain those people who generate innovations, develop technology-intensive industries and create new companies and wealth.

L2: Level two relates to the collective intelligence of a city's population. This derives from institutions of knowledge creation, knowledge sharing, transfer and absorption. Collective intelligence is advanced intelligence: the sharing of knowledge, know-how and experience in order to generate a higher individual and collective benefit; the co-operation to solve more complex problems .⁸

L3: Level three is about ICTs and artificial intelligence available to the city's population. This is both a public communication infrastructure, and virtual environments, digital spaces, and online services and tools based on multimedia technologies and software.

The concept of 'intelligent city' refers to all the three aforementioned aspects of the physical, institutional, and digital space of a city; but, also to the ability to innovate, manage and resolve problems that appear for the first time, since the capacity to innovate and to manage uncertainty are the critical factors for measuring intelligence.⁹

Box 1: Intelligent city strategies blending technology and broadband

One of the best illustrations of the parallel deployment of innovation and ICTs is found in the city of **Taipei**, Taiwan, which has been selected from the Intelligent Community Forum (<http://www.intelligentcommunity.org>) among the seven best intelligent communities of the world in 2003, and received the award as top intelligent community for 2006. The city hosts the country's greatest concentration of high-tech firms. It is a fertile ground for new knowledge-based businesses with 88 technology incubators that launched over 2,000 new businesses during 2005 only. Forty five R&D centres and two major science and technology parks operate in the city, while a third one is under development. The most significant industry continues to be ICTs, a thriving sector in which nearly 400,000 jobs have been created during 2004-2006. Taipei is one of the world's top cities for broadband deployment. PCs are in 88% of homes, and an equal high percentage uses ADSL connections. A series of government initiatives are enhancing online services in health care, media and banking systems, and elearning, direct voice to the administration, and others.

In Europe, **Glasgow** received the award as top intelligent community in 2004 for a long effort to broadband development. In the 1980s, the city began reorienting its economy to services, culture and tourism, while at the end of 1990s the Scottish Enterprise engaged in projects making Scotland an e-commerce hub. Glasgow is a focal point of national and regional initiatives of e-commerce, and huge investments are being made in high-speed broadband infrastructure, new office space, and the deployment of e-commerce.

5. Intelligent city plans in the NECs

SAGIA is planning the most exquisite infrastructure in the world to support all functions and operations performed in the new economic cities, working with key technology players like Intel. "Economic cities are seeking to break the knowledge frontier by matching hardware manufacture & infrastructure to its software management to resulting content generation in a manner not done before", says Seema Khan. He expects an economic growth fuelled by four characteristics:

“Telecom connectivity designed to handle as much information traffic as possible.

Technology Infrastructure built into the groundwork of the city - whether roads or buildings - allowing for an interconnected communications web to exist that will enhance knowledge sharing, security, and civil service responsiveness.

Software and content creation companies built on top of the technology infrastructure to ensure that the hardware’s lifespan is extended by software management.

Knowledge generation and sharing built on the technology infrastructure and software management of that infrastructure allowing international virtual knowledge communities to exist within the physical space of the economic city”.

But IT only seems insufficient. Craig Barrett, CEO of Intel sent this message clearly at the First Economic Cities Forum focusing on Intelligent Cities. There are only a few options, he said, available for nations to use to increase their competitiveness. Education and investment in R&D are two of these options. The third is to focus on enhancing the environment for the attraction of business.¹⁰

The same message comes also from CISCO: “We are very strong believers in the vision behind the new economic cities” says Mohammed Saqqa, manager at CISCO Saudi Arabia. “In fact, we have taken the initiative to participate with SAGIA and help shape the “smart” operating model for each city. The “smartness” of the cities and their further development will be the end result of three factors: (1) enhancing all aspects of life, (2) acting as test beds for other new technologies, and (3) advancing the technology skills of the Saudi human capital.” CISCO is planning a Networking Academy in almost each of the new cities, which will promote public-private partnerships between Cisco and governments, educational institutions, NGOs and industry, with the objective to teach and train students to design, build and maintain computer networks.

6. Technology and intelligent city strategies in the new Saudi Arabian economic cities

The creation of four new cities from scratch and the ambition to see them developing in intelligent cities promoting knowledge, technologies, and innovation is a challenge for any aspect of the project.

Since the late 70s, urban planning realised the complexity and risks of creating entirely new cities, and has re-oriented towards revitalisation and renewal of existing places, bringing into them ingredients of the new era that is rising: adding small technology districts, enhancing global connections, human skills, education, science-industry cooperation, incubators and centres for innovation. This is not an argument against the new economic cities project; it is a message for precaution. The new cities have to be seen as agglomeration of countless knowledge-intensive activities, clusters, micro-districts, networks, joint-ventures, and other locus of know-how. Planning has to open space for leadership and bottom-up initiatives.

The stake for creating new high tech centres and intelligent cities is on intangible assets, knowledge, R&D, education, and IT. Mainstream land-use and infrastructure planning have a rather limited impact in managing high technology centres. In

knowledge-intensive development, nothing in urban and regional planning is the same any more. Infrastructure has to enhance spin-offs, spillovers, local networks, and creative investments.

The last concern is about integration of technology clusters and IT. SAGIA seems more preoccupied with IT, while its major partners correctly emphasise human capital, education and skills. To some degree this is due to actual planning concerns. Infrastructure comes first in time schedules, but managing the intangible should also be a priority from the first day.

Notes

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² <http://www.sagia.gov.sa/innerpage.asp?ContentID=7&Lang=en&NewsID=827>

³ Hargadon, A. (2003) *How Breakthroughs Happen. The surprising truth about how companies innovate*, Boston MA, Harvard Business School Press.

⁴ Nonaka, I and Takeuchi, H (1995) *The Knowledge-Creating Company*, Oxford University Press, Oxford.

⁵ Nelson, R and Winter, S (1982) *An Evolutionary Theory of Economic Change*, The Belknap Press, Cambridge, MA.

⁶ Friedman, T.L. (2006) *The World is Flat. The globalized world in the twenty-first century*, London, Penguin Books.

⁷ Komninos, N. (2002) *Intelligent Cities: Innovation, knowledge systems and digital spaces*, London and New York, Spon Press.

⁸ Collective intelligence by T. Atlee, Blog of Collective Intelligence, <<http://www.community-intelligence.com/blogs/public/archives/000288.html#more>>

⁹ Komninos, N. (2006) 'The Architecture of Intelligent Cities', *Intelligent Environments 06*, Institution of Engineering and Technology, pp. 53-61.

¹⁰ <http://www.arabnews.com/?page=11§ion=0&article=90178&d=19&m=12&y=2006>