



National Intellectual Capital Index

NICI: a UN
initiative

A United Nations initiative for the Arab region

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Abstract *The intellectual capital of a nation (or a region of nations) requires the articulation of a system of variables that helps to uncover and manage the invisible wealth of a country. Most importantly, an emphasis on human capital allows for a better understanding of the hidden values, individuals, enterprises, institutions, and communities that are both current and potential future sources of intellectual wealth. This paper endeavours to address the five research questions. The main outcomes of this paper are the development of a national intellectual capital measurement methodology and index. The NICI is also used within a structural equation model to test several hypotheses related to national intellectual capital development.*

Knowledge is like light. Weightless and intangible, it can easily travel the world, enlightening the lives of people everywhere. Yet billions of people still live in the darkness of poverty – unnecessarily (World Bank, 1998, p. 1).

Introduction

Rapid technological advances in computational power and communication technologies are transforming the nature of knowledge, skills, talents and the know-how of individuals in the workplace. Today's global information marketplace requires a different kind of worker, one with competencies, attitudes, and intellectual agility conducive to systemic and critical thinking within a technologically-oriented environment. For public and private institutions in the Arab states region to succeed in the new economy, this translates into restructuring industrial age organizational structures, processes, and mindsets to utilize the wealth-creating potential of people (Nsour, 2001).

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The intellectual capital of a nation (or a region of nations as is the case for this paper) requires the articulation of a system of variables that helps to uncover and manage the invisible wealth of a country. Although the importance of knowledge as a strategic asset can be traced back several thousands of years, it was the ancient Egyptian and Greek civilizations that represented the first evidence of the codification of knowledge for the purposes of leveraging regional power with their implementations of national libraries and universities. More recently, Machlup (1962) was the first to coin the term “intellectual capital” and used it to emphasize the importance of general knowledge as essential to growth and development. Alfred Marshall says “knowledge is our most powerful engine of production; it enables us to subdue nature and ... satisfy our wants” (World Bank, 1999, p. 20). However, “knowledge is often costly to create, and that is why much of it is created in industrial countries” (World Bank, 1998, p. 1).

The concept of intellectual capital was further expounded on by management guru Drucker (1993) in his description of post-capitalist society. Drucker (1993) highlights the importance and arrival of a society that is dominated by knowledge resources and competitive landscape of intellectual capital allocation. By the end of the 1990s, references to intellectual capital in contemporary business publications were commonplace (see Bontis, 1996, 1998, 1999). Intellectual capital management became the domain of the so-called chief knowledge officer (CKO) (Bontis, 2001a, b, 2002; Mitchell and Bontis, 2000). In his groundbreaking cover story in *Fortune Magazine*, Stewart (1991) provided the main impetus for a new world of intellectual capitalists.

Literature review

Much of the current academic literature on intellectual capital theory and its accompanying frameworks, constructs and measures stems from an accounting and financial perspective, focusing on the firm level of analysis (Bontis *et al.*, 1999, 2000, 2002). Theorists soon extrapolated the initial conceptual level to also include nations. Malhotra (2001) argues that leaders of national economies are trying to find reliable ways for measuring knowledge assets to understand how they relate to future performance. The expectation from finding reliable measures of knowledge assets is that such measures can help governments better manage the intangible resources that increasingly determine the success of their economies. Key to determining these success factors is an understanding of relationships and synergistic modulations that can augment the value of each sub-component of intellectual capital (Choo and Bontis, 2002). Approaching economic development from a knowledge perspective – that is, adopting policies to increase a nation’s intellectual wealth – can improve people’s lives in myriad ways besides higher incomes (World Bank, 1998).

The intellectual capital of a nation includes the hidden values of individuals, enterprises, institutions, communities and regions that are the current and potential sources for wealth creation. These hidden values are the roots for

nourishment and the cultivation of future wellbeing. For this purpose, it is essential to have a mapping system to describe the intellectual capital of nations and systematically to account and follow the evolution of such intellectual capital development. The system used to capture the statistics and describe the constructs of national intellectual capital can be presented in the shape of a modified intellectual capital navigator for nations. This framework consists of five value-creating fields, each focusing on an individual sphere of interest. Figure 1 is a modified version of the intellectual capital tree described by Edvinsson and Malone (1997). The following constructs have been transformed from a firm level to national level perspective: market value is now national wealth, financial capital is now financial wealth, customer capital is now market capital, innovation capital is now renewal capital. The remaining constructs are labelled the same (see Figure 1).

Although much of the history of intellectual capital literature spans only a decade, the national view of this phenomenon is in its infancy. There have been only two countries that have examined their intellectual capital development: Sweden (Rembe, 1999) and Israel (Pasher, 1999) prior to the Arab initiative established by the United Nations. This paper signifies the first attempt to measure and benchmark intellectual capital development across several nations.

Sweden and Israel plan to revisit their numerical assessments every couple of years, which is important due to the benefits of longitudinal trending.

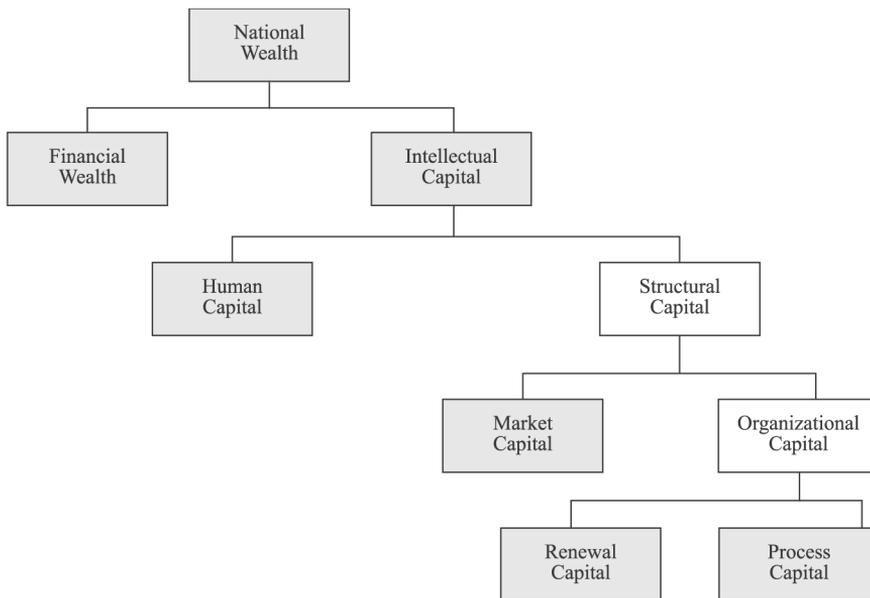


Figure 1.
Intellectual capital of nations

Source: Modification of Edvinsson and Malone (1997)

Furthermore, the intellectual capital development reports of both countries have provided a sound springboard for the advancement of other national programs such as foreign investment (Sweden) and government funding allocations (Israel).

The Arab region

There has never been a intellectual capital development report published specifically for the Arab region nor for any of the Arab countries individually. This paper aims to fill that void and begin a process whereby the longitudinal intellectual capital evaluation for the Arab region becomes an essential policy intervention. Although the Arab states have never been examined through the intellectual capital framework lens, there have been independent evaluations of several of the sub-components of intellectual capital from various organizations including the United Nations and the World Bank. SIS (2000) reports that the modernization program of the Arab states should aim at adopting the following three principles:

- (1) human investment through education and training;
- (2) viewing workers as intellectual assets; and
- (3) implanting and nurturing innovative, developmental and cost saving behaviors in firms and government.

It should be able to enhance teamwork spirit among workers and citizens as a basis for effective collective performance. Moreover, modernization is no longer a luxury, but rather an inevitable necessity for those countries that work hard to achieve prosperity and progress for their peoples.

A significant challenge that resonates in the Arab states in particular is the presence of oil as a natural resource, which contributes significantly to the financial wealth of certain Arab countries. Zineldin (1998) reports that within the oil-rich countries there is rapid growth in non-oil sectors brought about by extensive government investment, continued growth in import demand, and rapid increases in the education levels of consumers, with consequent demands for sophisticated and high-quality products. Some economists distinguish between the oil-rich, such as Saudi Arabia, Kuwait, Iraq and Libya, and the oil-poor such as Egypt, Syria and Jordan. The ability of the oil-rich to use oil proceeds for domestic developments depends on their ability to translate these resources into useful imports. Owing to limitations on that capacity, they have been susceptible to shortages of domestic resources, resulting in internal inflation. In the oil-poor countries, the export sector cannot be distinguished from the non-export sector. Although export demand depends on the world economy, the supply of exports generally relates on the development of the whole economy. The oil-poor nations can become labor supply countries, where capital and import constraints usurp their economic growth. A number of oil-rich Arab countries (notably Saudi Arabia and the rest of the Gulf states) drive approximately 90 percent of government revenues from oil and have high

per capita incomes, but a limited industrial base. Other states with oil resources have encouraged industrial diversification, usually within a framework of rigid state control (e.g. Iraq and Libya fall within this group). The major Arab countries without extensive oil reserves (i.e. Egypt, Jordan, Syria, Morocco, Sudan and Tunisia) depend on industry and agriculture.

In summary, the lack of diversification in the economies of the Arab region is explored to set up the need for an overarching meta-policy to develop flexible and renewal intellectual capital in the region. The following arguments are introduced in support of an intellectual capital development report in the Arab region:

- a lack of a diversified industrial base in virtually all countries;
- a need for a solid educational system;
- education output does not equal market demand; and
- no infrastructure to stimulate spill-over effects from sectoral growth.

Conceptual framework

Prior to reviewing the four key constructs that encompass the intellectual capital of a nation: human capital, process capital, market capital and renewal capital (refer back to Figure 1), this section will focus on the traditional economic assessment of financial capital. Malhotra (2001) reports that traditional assessment of national economic performance has relied on understanding the growth of gross domestic product (GDP) in terms of traditional factors of production – land, labor and capital. Given the changing dynamics underlying national performance, it is not surprising that some less developed economies with significant assets in information technology and Internet-related expertise are hoping to leapfrog more developed economies. For example, the El Ghazala region of Tunisia is recognized among the world's top technological hubs (Hillner, 2000).

The UNDP (1998) reports that in recent years, private financial flows into the Arab Region have been below 2 percent of its gross national product (GNP). From this point of view, the strongest link of the region with the global market is the estimated \$800 billion of Gulf Cooperation Council (GCC) money that is invested outside the region. Another link is created by remittances of Arab migrant workers, mainly from Europe. Apart from oil and related products, the Arab states virtually do not sell on the global market (UNDP, 1998). To put things in perspective, around 260 million Arabs export the same quantity of product as 6 million Finns. Arab producers hide behind relatively high custom tariffs. In the case of Egypt, Jordan, Syria, and Libya – an average custom tariff is as high as 30 percent. There has, however, been a noteworthy move to join the global market via accession agreements. As of July 2001, Bahrain, Djibouti, Egypt, Jordan, Kuwait, Mauritania, Morocco, Oman, Qatar, Tunisia, UAE have become members of the World Trade Organization (WTO). Algeria, Lebanon, Saudi Arabia, Sudan and Yemen are observers (WTO, 2001). The

associative agreements with the European Union to eliminate trade barriers in 12 years were signed by Tunisia, Morocco, and Jordan, while Algeria, Egypt, Lebanon and Syria are at the negotiation stage. Last but not least, the Arab Free Trade Area was created to eliminate trade barriers between the members of the League of Arab States by the year 2008. In this way a hub-and-spoke structure is emerging in relations between the region and the outside world. Unfortunately, the Arab regions' present competitiveness positions itself more as a spoke than a hub (UNDP, 1998).

Financial capital

To evaluate the financial capital of Arab countries versus the OECD member countries we can compare GDP per capita values. The average GDP for Arab countries in 1999 was US\$7,238 per capita (see Table I for each country value). The average GDP for OECD member countries in 1999 was US\$22,020 per capita.

Assessing a nation's intellectual capital is a daunting task. Moreover, the availability of data for the Arab States is generally sparse. Notwithstanding the limited secondary sources for Arab State metrics, the data collection process was conducted as thoroughly as possible. The data reported in Table I represents the latest available information as reported by the various sources for the following countries: Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, UAE and Yemen (see Table I).

The scope of this paper focuses primarily on intellectual capital metrics. Clearly, there are many factors that relate to a nation's intellectual wealth such as health, poverty, and gender empowerment. However, it was decided that these related factors would be best acknowledged as beyond the scope of this particular study. This is not because these issues are not important. Rather, the complexities surrounding general human development (i.e. health, poverty and gender empowerment) would be best addressed by subsequent research.

The Arab countries represented in this report have a combined population of 280 million inhabitants (DES01). This number is expected to grow to 380 million by the year 2015 (DES05). The six most populous countries are Egypt, Sudan, Algeria, Morocco, Iraq and Saudi Arabia, which represent 72 percent of the overall population of the region. On average, 36 percent (DES04) of the population is between the ages of 0 and 15, which represents the future human capital of the Arab region (a copy of all the metrics collected for this study and referred to later in this paper can be downloaded from the full research report at www.bontis.com/research.htm).

As mentioned earlier, the most common metric denoting the financial wealth of a nation is its GDP per capita. It is important to also normalize this figure for the difference in purchasing power across nations. Metric FC01 represents the GDP per capita with purchase power parity. Based on this figure, UAE, Qatar and Kuwait have the highest financial wealth averaging around \$18,000 per capita whereas Sudan and Yemen have less than \$1,000 GDP per capita. This

	Population		Age 0-14 (%)	Projected population (millions) 2015	World Bank indices		NICI Intellectual capital (index) 2001	
	Total growth (%) 1950-2000	Total (millions) 1950			Health HDI (index) 2001	Poverty HPI-1 (index) 2001		Gender GDI (index) 2001
	DES01	DES02	DES04	DES05	DES07	DES08	DES09	NICI
Algeria	30.31	8.75	34.8	37.85	0.693	23.5	0.673	0.255
Bahrain	0.64	0.11	28.2	0.78	0.824		0.814	
Comoros	0.71	0.17	43.0	0.98	0.510	29.9	0.503	
Djibouti	0.63	0.06	43.2	0.85	0.447	34.7		
Egypt	67.89	21.83	35.4	84.51	0.635	31.7	0.620	0.424
Iraq	22.95	5.16	41.6	32.53				
Jordan	4.91	0.47	40.0	6.97	0.714	8.5	0.698	0.539
Kuwait	1.91	0.15	31.3	2.36	0.818		0.815	0.604
Lebanon	3.50	1.44	31.1	4.31	0.758	10.2	0.741	
Libya	5.29	1.03	33.9	6.84	0.770	16.7	0.748	
Mauritania	2.66	0.83	44.1	3.84	0.437	47.2	0.428	
Morocco	29.88	8.95	34.7	37.90	0.596	36.4	0.579	0.349
Oman	2.54	0.46	44.1	3.92	0.747	32.2	0.715	0.386
Saudi Arabia	20.35	3.20	42.9	31.06	0.754	17	0.719	0.324
Somalia	8.78	2.26	48.0	13.66				
Sudan	31.10	9.19	40.1	41.36	0.439	34.8	0.413	0.170
Syria	16.19	3.50	40.8	21.95	0.700	19.8	0.677	
Tunisia	9.46	3.53	29.7	11.52	0.714		0.700	0.459
UAE	2.61	0.07	26.0	3.09	0.809		0.798	
Yemen	18.35	4.32	50.1	33.16	0.470	42.5	0.672	0.204
Arab states	281.22	75.51	35.9	380.12	0.665	27.5	UNDP	0.371
Source	UNDP (2000)	UNDP (2000)	Unesco	UNDP (2000)	UNDP (2001)	UNDP (2001)	UNDP (2001)	Bontis

Table I.
Descriptive statistics on Arab countries

compares with an average of \$26,050 among high-income OECD countries, and an average of \$7,238 among Arab states.

In addition to GDP measures, trade policy is an important factor in determining financial capital. Barriers to trade influence overall economic wellbeing. Indicator FC04 is published by the Heritage Foundation and represents a nation's barriers to trade on a scale from 1 (low) to 5 (high barriers to trade). The Arab region on average has a relatively high score of 3.75 with the lowest scores coming from UAE, Oman and Kuwait. Another chief indicator of financial capital is the market capitalization of a nation's stock markets (FC05). The Arab region has \$165 billion in market capitalization in its stock markets with Saudi Arabia (\$67 billion), Egypt (\$29 billion) and UAE (\$28 billion) representing 75 percent of that total.

Human capital

Human capital is defined as the knowledge, education and competencies of individuals in realizing national tasks and goals. The human capital of a nation begins with the intellectual wealth of its citizens.

This wealth is multifaceted and includes knowledge about facts, laws, and principles, as well as the less definable knowledge of specialized, teamwork and communication skills (OECD, 2001). When Doraid (2000) states that the real wealth of Arab states is the people that reside within them, it is this wealth to which Doraid refers. Schultz (Unesco, 1991) states that one-fourth of our income is explained by our physical capital while the rest is generated by human beings, highlighting the importance of human capital.

The measurement of this human capital however is quite difficult. Care must be exercised to ensure that metrics include the quality and quantity of individual stores of knowledge as well as that of the collective knowledge stores found within organizations (OECD, 2001). When analyzing the human capital of a nation, it is important first to examine fully the educational systems, which are the prime developers of human capital. In addition to education, the quantity and quality of a nation's educated population is key, including the degree to which people are developed after formal education is completed.

Education is the basic building block of human capital (Human Development Network, 1999). It is through education that knowledge and skills are developed, enhancing more than simply the ability of labor to perform. Weiss states that "students are not taught civics, or art, or music solely in order to improve their labor productivity, but rather to enrich their lives and make them better citizens", suggesting that educated people provide additional value to a nation (OECD, 2001, p. 18).

Literacy figures (HC01 in 1980 and HC02 in 2000) for the Arab states are widely disparate, ranging from Mauritania's 39.9 percent to Jordan's 89.8 percent in 2000. However, growth over the past 20 years among several Arab countries has been fairly positive (see Figure 2).

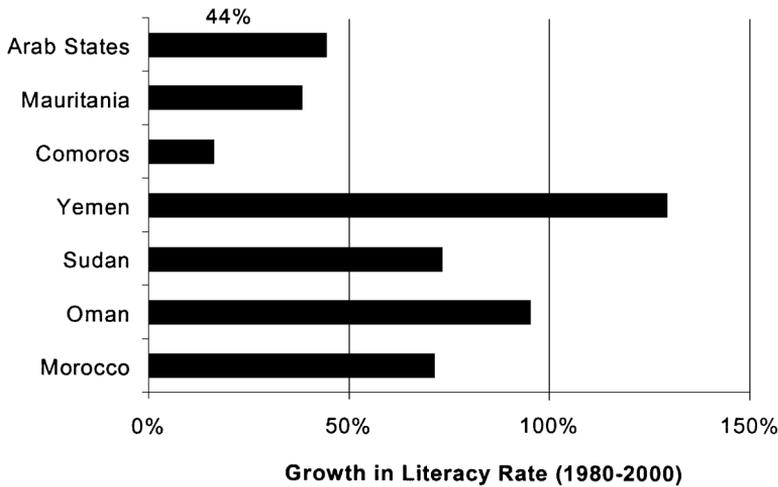


Figure 2.
Growth in literacy rates

In fact, Yemen exhibited a literacy rate of 20.2 percent in 1980, and has since incurred 129 percent growth, earning a 46.9 percent rating in year 2000. While several countries have experienced exceptional growth over the past 20 years, Comoros and Mauritania have encountered slower growth amidst existing low literacy rates. The average literacy rate among Arab states is still less than 70 percent, which is inhibiting the wide-spread sharing of knowledge and information between people both within and outside of these countries. This is directly impeding human capital development within the region. Although education enrolment numbers are increasing, particularly at the primary levels, quality of education is still a contentious issue in the Arab states.

Formal education is not sufficient for the continued development of human capital. Companies and post-education training facilities must provide ongoing training to a nation's work force to enable it to cope with a rapidly changing world. The human capital of a nation is the intellectual wealth of its citizens and is developed through education and lifelong learning.

Process capital

Process capital is defined as the non-human storehouses of knowledge in a nation which are embedded in its technological, information and communications systems as represented by its hardware, software, databases, laboratories and organizational structures which sustain and externalize the output of human capital.

In today's global information society, one cannot overstate the implications of the knowledge revolution. We have only begun to comprehend the effects of this revolution on the economic, social and political structures of societies around the world. It has been compared in magnitude to the industrial

revolution that transformed the agrarian societies of the eighteenth century (UNDP, 1998).

The development of the information society is spearheaded by rapid innovations in science, communication and computing technologies. Technological progress in information and communication technologies (ICT) enables us today to process, store, retrieve and communicate information in whatever form it may take, unconstrained by distance, time, volume and increasingly, by cost (UNDP, 1998). This new concept adds new capacity to human intelligence and constitutes a resource that transforms the way we interact and the way we do business. Infact, the UNDP (1998) reports that the combination of human intelligence and information technology has replaced accumulation of physical capital as the leading factor of production.

The role of knowledge and information technologies in nurturing sustained development is increasing by leaps and bounds. The continuous developments in ICT are opening up a world of new opportunities for harnessing knowledge for development. This trend brings about urgent threats, especially for developing countries. Taking advantage of ICT would undoubtedly help advance the knowledge and information systems of societies, allowing the creation, accessibility and dissemination of current data, information and knowledge. Countries with inadequate computers, Internet access and telecommunications are at risk of falling even greater behind competitors in the world market.

The Internet has not considerably penetrated the Arab region. For example, Syria and Saudi Arabia do not even officially support such connectivity. However, the UAE has begun to develop an infrastructure, controlling 92.13 hosts per 10,000 people (PC09). Another yardstick to measure Internet access is the number of top-level domain names.

Current estimates indicate that individuals and companies in Arab countries own a significantly smaller proportion of top-level domain than much of the worldwide population (UNDP, 2000). Therefore, one can conclude that the connectivity of the region stands at a moderate to low state (UNDP, 1998).

Increasing Internet connectivity is an important step that many of the Arab Regions must undergo to access the myriad knowledge stores available through this technology. Furthermore, collaboration both within the country and across borders can be facilitated through shareware technologies that leverage the Internet. These tools enable the sharing and accessing of explicit knowledge from around the world, and will increase the renewal capital of the country. Furthermore, by posting and collaborating through the Internet, market capital will increase as the knowledge of these countries can be publicized to other nations. Utilizing process technologies is a necessary action to participating in the global economy of the twenty-first century.

Weak telecommunications and Internet infrastructure in the region, coupled with the high cost of connecting to the Internet are major impediments responsible for the slow penetration of process capital development in the Arab region. The region lacks a comprehensive and strategic approach to the

multifaceted challenges and opportunities of the global information and knowledge society, where competitiveness reigns supreme (D'Orville, 1999). Although the development of ICT in the Arab region faces many challenges, it has huge potential for Arab trade and industry if government and private sectors unite to support it.

There is significant potential for the application of high technology infrastructure to aid in the dissemination and retrieval of information from around the world. However, government and private sector leaders must redirect investments into fast growing, high productivity areas. In the coming decades, these opportunities will be in businesses that can compete in the global market and utilize current information technology (UNDP, 1998). Developing countries have an opportunity to leapfrog into new technologies without entering intermediary stages incurred over the past 50 years by economically developed countries.

Market capital

Market capital is defined as the intellectual capital embedded in national intra-relationships. Market capital represents a country's capabilities and successes in providing an attractive, competitive solution to the needs of its international clients, as compared with other countries. A country's investment and achievements in foreign relations, coupled with its exports of quality products and services, constitute a significant component in its development of market capital, which is rich in intangible assets.

Market capital is social intelligence created by elements such as laws, market institutions and social networks. It is similar to social capital, but a lot more because it includes systemic qualities with embedded discovery attributes that enhance social capital creation. Of course proxies for these elements may be hard to find in the Arab region.

One major factor that ascertains market capital is international trade. Doraid (2000) states that from 1981 the growth of merchandise trade in the Arab states has been the lowest in any part of the world. International trade with the Arab states dropped below 3 percent in 1997-1998. As mentioned earlier, around 260 million Arabs export the same quantity of product as 6 million Finns. Apparently, these nations have not been able to use capital from within the region and invest it domestically to attract foreign trade.

Trade in exports from the three existing trading blocks has not kept pace with trade in the rest of the world over the last 20 years (World Bank, 2001). The Arab Maghreb Union (UMA – Algeria, Libya, Mauritania, Morocco and Tunisia), the GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAE), and the Arab Common Market (ACM – Egypt, Iraq, Jordan, Libya, Mauritania, Syria and Yemen) are three trade blocks that exist within the Arab Region. While their membership does not account for all countries within the region, these three blocks experienced declined overall trade decline for the period 1970-1990 (World Bank, 2001).

Relationships within and across countries enhance the ability to create knowledge and also provide a greater ability to extract value from the knowledge of a nation (Sullivan, 2000). International trade brings innovative and more efficient methods of producing new and improved goods and services. The World Bank (1999) reports that foreign direct investment provides benefits to countries through spill over of workforce, influence on local suppliers and technology sales. Foreign technology and knowledge transfer can be facilitated by initiating open trading regimes, encouraging foreign direct investment and licensing foreign technology.

The brain drain suffered by some countries is a large problem resulting in some of the brightest graduates leaving for better job opportunities elsewhere (World Bank, 1999). In the past, qualified professionals would opt to not return to their home after obtaining a higher more prestigious degree in a foreign country.

An example of the brain drain problem arises in Lebanon, due to the lack of business opportunities in the country. However, educated people in Qatar generally prefer to stay and work there because of their strong economy and all the financial advantages granted by the government of Qatar to its citizens (McMaster University Arab Students Association, 2001).

The market capital of a nation manifests its intellectual capital. Even though a lack of information persists throughout the variables used to measure market capital, the underlying structure of imbalance provided from an economic, social and intellectual standpoint is evident in the Arab region. Among the Arab countries, Egypt is one of the most prominent in market capital. It has hosted the most international meetings of any Arab country, and it ranks among the highest revenue generators from book and journal exports. From the sections outlined above, Egypt can be used as an example for other Arab countries to follow.

Renewal capital

Renewal capital is defined as a nation's future intellectual wealth. This includes its capabilities and actual investments in renewal and development for sustaining competitive advantage. Examination of the forces shaping renewal capital demonstrates the link between continued investment in renewal capital and sustained economic growth. Further analysis of such components will yield a better understanding of existing challenges facing Arab states, and the future steps needed to remedy the situation.

Research and development (R&D) is a key parameter in renewal capital. This significance comes from the direct relationship between the success of a country's financial systems and the effectiveness of its R&D sector. The results of investment in R&D are not only limited to financial strength on the national balance sheet, but also increase the efficiency of its population as a whole. Ducharme (1998) reports that in the context of intangible investment, the empirical literature on the private and social rates of return of R&D vary

between 25 and 50 percent providing further evidence of the impact of research on innovation and productivity.

Further components of renewal capital include patents and scientific publications. A country that performs well in these areas exhibits a high level of educated people who share and codify their knowledge and ideas. This typifies a country with potential to perform well in an intellectual capital audit. Total R&D expenditures in 1996 in Egypt (\$227 million) and Saudi Arabia (\$196 million) lead the region. All other remaining countries in the Arab region were far behind, each spending less than \$75 million (RC10). The number of researchers per million people of the population stood at 594 in Qatar, 459 in Egypt, and 362 in Libya (RC15).

Although Egypt and Saudi Arabia have distinctly outperformed their neighbors, the average performance will not ensure long-term information development at a global pace. R&D expenditures develop the intellectual capital of a nation, and thus should be a focal point for government expenditure.

Foreign patent applications represent the renewing of ideas and innovation within industries throughout a country. This figure represents renewal capital since this patent would likely not have been filed on behalf of the Arab country if the foreign worker had not been resident within that country. This indicates that intellectual capital from abroad is being leveraged within the Arab country. While the total number of foreign patent applications for the Arab States was 70,793, over 95 percent of the foreign patent applications came from Sudan. All other countries which did report were clearly behind in this statistic, whereas 14 of the countries included in this study did not report this statistic.

The persistent dilemma in renewal capital is exacerbated by the lack of infrastructure, deficient funding and insufficient modernization of skills. A recognition that government funding will not be adequate calls for the involvement of private industry in the form of R&D funding. Such investment will refresh a nation's store of renewal capital providing rejuvenation of national wealth.

Research methodology

The purpose of the NICI™ (National Intellectual Capital Index is a trademark of the Institute for Intellectual Capital Research Inc.) is to assess the intellectual capital of a nation. The index is based on a conceptual framework in which the intellectual capital of a nation comprises four sub-components that include human capital, process capital, renewal capital and market capital. The following sections explain which items were used and the calculation of each respective sub-index.

It is important to qualify this section by stating that it is not an exhaustive use of all available measures. This is merely a bold but necessary exploratory exercise. A more comprehensive set of countries with accompanying data would be necessary for such an index to be formally validated.

All of the items measured in this report were initially eligible for inclusion in each corresponding sub-index. However, a quick scan of the tables clearly indicated the extent to which measures for some Arab states were still not published (and perhaps not tracked). It was methodologically necessary to include metrics that would maximize the number of countries in the proposed sample of study. There are a total of 22 countries that encompass the population of Arab states. After selecting the metrics that were reported by most countries, a sample list of ten countries remained. This sample represents 77 percent (216.70/281.22) of the overall population of the Arab states.

National Human Capital Index (NHCI)

A total of seven metrics were available to calculate a NHCI. There were data available from each of the ten representative countries. Table II outlines a summary of these metrics. As with any composite index, the selected weightings of metrics is open to academic debate. However, the research team of analysts debated and agreed on the following weightings. Literacy rate (H1) was selected to have the largest weighting (30 percent) due to its significance as an important antecedent for knowledge absorption (see Table II).

National Process Capital Index (NPCI)

A total of eight metrics were available to calculate a NPCI. There were data available from each of the ten representative countries. Table III outlines a summary of these metrics. Telephone mainlines (P1) was selected to have the

Index Metric	H1 HC02	H2 HC05	H3 HC11	H4 HC16	H5 HC23	H6 HC25	H7 HC26	NHCI™
Algeria	0.633	0.124	0.930	0.498	0.368	0.82	0.79	0.586
Egypt	0.553	0.077	0.998	0.544	0.793	0.88	0.85	0.647
Jordan	0.898	1.000	0.467	1.000	1.000	0.63	0.63	0.842
Kuwait	0.823	0.151	1.000	0.672	0.923	0.63	0.62	0.726
Morocco	0.489	0.135	0.910	0.453	0.374	0.55	0.51	0.481
Oman	0.719	0.114	0.990	0.274	0.135	0.75	0.75	0.537
Saudi Arabia	0.770	0.114	1.000	0.585	0.308	0.87	0.75	0.638
Sudan	0.571	0.241	0.611	0.084	0.173	0.46	0.41	0.382
Tunisia	0.708	0.183	0.933	0.560	0.430	0.87	0.85	0.644
Yemen	0.462	0.236	0.743	0.156	0.110	0.83	0.51	0.410
Weighting (%)	30	10	10	15	15	10	10	

Notes:

H1 HC02 literacy rate

H2 HC05 number of tertiary schools per capita relative to highest value

H3 HC11 percentage of primary school teachers with required qualifications

H4 HC16 number of tertiary students per capita relative to highest value

H5 HC23 cumulative tertiary graduates per capita relative to highest value

H6 HC25 percentage of male grade 1 net intake

H7 HC26 percentage of female grade 1 net intake

Table II.
National Human Capital
Index calculation

Index Metric	P1 PC01	P2 PC08	P3 PC09	P4 PC10	P5 PC12	P6 PC13	P7 PC14	P8 PC17	NPCI™
Algeria	0.217	0.048	0.000	0.013	0.013	0.357	0.151	0.101	0.177
Egypt	0.313	0.099	0.037	0.056	0.051	0.468	0.171	0.101	0.168
Jordan	0.363	1.115	0.063	0.047	0.114	0.400	0.118	0.111	0.178
Kuwait	1.000	1.000	1.000	1.000	1.000	1.000	0.728	1.000	0.973
Morocco	0.221	0.089	0.014	0.032	0.082	0.364	0.166	0.072	0.130
Oman	0.375	0.218	0.130	0.376	0.310	0.895	1.000	0.074	0.385
Saudi Arabia	0.538	0.473	0.066	0.282	0.253	0.473	0.378	0.156	0.327
Sudan	0.038	0.024	0.000	0.003	0.000	0.401	0.124	0.072	0.073
Tunisia	0.375	0.126	0.004	0.061	0.038	0.330	0.144	0.082	0.158
Yemen	0.071	0.882	0.003	0.010	0.013	0.094	0.042	0.040	0.125
Weighting (%)	20	10	15	10	10	10	10	15	

Notes:

- P1 PC01 telephone mainlines per capita relative to highest value
- P2 PC08 personal computers per capita relative to highest value
- P3 PC09 Internet hosts per capita relative to highest value
- P4 PC10 Internet users per capita relative to highest value
- P5 PC12 mobile phones per capita relative to highest value
- P6 PC13 radio receivers per capita relative to highest value
- P7 PC14 television sets per capita relative to highest value
- P8 PC17 newspaper circulation per capita relative to highest value

Table III.
National Process Capital
Index calculation

largest weighting (20 percent) since it is a fundamental requirement in leveraging the benefits of any Internet service (see Table III).

National Market Capital Index (NMCI)

A total of three metrics were available to calculate an NMCI. There were data available from each of the ten representative countries. Table IV outlines a summary of these metrics. The number of meetings (e.g. conferences and conventions) hosted (M3) was selected to have the largest weighting (40 percent) since it is one of the best opportunities to market a nation’s intellectual capital (see Table IV).

National Renewal Capital Index (NRCI)

A total of seven metrics were available to calculate an NRCI. There were data available from each of the ten representative countries. Table V outlines a summary of these metrics. The total expenditures in research and development (R3) was selected to have the largest weighting (30 percent) since it provides the funding for most national R&D activities and represents future investment (see Table V).

NICI rankings by country

Once the four sub-indices of national intellectual capital were calculated, they were combined to form the overall composite NICI. Based on the NICI, Kuwait and Jordan have the highest level of national intellectual capital. This is

Index Metric	M1 MC01	M2 MC08	M3 MC11	NMCI™
Algeria	0.042	0.000	0.122	0.062
Egypt	0.004	0.027	0.433	0.183
Jordan	0.236	1.000	0.712	0.655
Kuwait	0.150	0.013	0.646	0.307
Morocco	0.036	0.013	0.509	0.219
Oman	1.000	0.016	0.324	0.434
Saudi Arabia	0.016	0.004	0.040	0.022
Sudan	0.000	0.000	0.053	0.021
Tunisia	0.757	0.035	1.000	0.637
Yemen	0.000	0.002	0.034	0.014
Weighting (%)	30	30	40	

Notes:**Table IV.**

National Market Capital Index calculation

M1 MC01 high-technology exports as a percentage of GDP relative to the highest value
M2 MC08 number of patents granted by USPTO per capita relative to the highest value
M3 MC11 number of meetings hosted per capita relative to the highest value

intriguing given that it was Kuwait and Oman that scored the highest in financial capital. More importantly, it is interesting to identify the countries that have high NICI scores relative to their financial capital (see Table VI).

Both Jordan and Egypt have developed their national intellectual capital to a greater extent given their financial resources compared to any other Arab state.

Index Metric	R1 RC08	R2 RC09	R3 RC10	R4 RC12	R5 RC16	R6 RC17	R7 RC21	NRCI™
Algeria	0.243	0.031	0.275	0.580	0.066	0.199	0.734	0.254
Egypt	0.180	0.095	0.999	0.150	1.000	1.000	0.141	0.699
Jordan	1.000	0.099	1.000	0.280	0.027	0.059	0.530	0.480
Kuwait	0.355	0.511	0.889	0.290	0.041	0.035	0.305	0.411
Morocco	0.738	1.000	0.838	0.410	0.102	0.315	0.403	0.564
Oman	0.297	0.410	0.281	0.130	0.007	0.011	0.316	0.187
Saudi Arabia	0.528	0.014	0.551	0.170	0.038	0.226	0.438	0.309
Sudan	0.053	0.188	0.405	0.160	0.062	0.060	0.433	0.204
Tunisia	0.838	0.710	0.540	0.330	0.033	0.091	0.434	0.395
Yemen	0.145	0.210	0.591	0.050	0.025	0.028	0.800	0.267
Weighting (%)	10	10	30	10	15	20	5	

Notes:**Table V.**

National Renewal Capital Index calculation

R1 RC08 book imports as a percentage of GDP relative to the highest value
R2 RC09 periodical imports as a percentage of GDP relative to highest value
R3 RC10 total R&D expenditures as a percentage of GDP relative to highest value
R4 RC16 number of ministry employees in R&D per capita relative to highest value
R5 RC17 number of university employees in R&D per capita relative to highest value
R7 RC21 tertiary expenditure as a percentage of public education funding

	NHCI TM	NMCI TM	NPCI TM	NRCI TM	NICI TM	FC	NICI-FC
Kuwait	0.726	0.307	0.973	0.411	0.604	1.000	0.310
Jordan	0.842	0.655	0.178	0.480	0.539	0.229	0.226
Tunisia	0.644	0.637	0.158	0.395	0.459	0.345	0.157
Egypt	0.647	0.183	0.168	0.699	0.424	0.198	0.151
Oman	0.537	0.434	0.385	0.187	0.386	0.773	0.132
Morocco	0.481	0.219	0.130	0.564	0.349	0.198	0.114
Saudi Arabia	0.638	0.022	0.327	0.309	0.324	0.626	-0.038
Algeria	0.586	0.062	0.117	0.254	0.255	0.293	-0.301
Yemen	0.410	0.014	0.125	0.267	0.204	0.047	-0.386
Sudan	0.382	0.021	0.073	0.204	0.170	0.038	-0.396

Note:

FC FC01 National financial capital, GDP per capita relative to highest value

Table VI.
NICI rankings by country

The following section aims to model the relationship that appears to exist between national intellectual capital and financial capital.

Hypotheses

The aim of this section is to investigate the inter-relationships among the independent variables: national human capital, national process capital, national market capital, national renewal capital and the dependent variable, national financial capital.

As a conceptual extension of the hypotheses tested by Bontis (1998) and his colleagues (Bontis *et al.*, 2000, 2002), the proposed model examines the following relationships for the sample of ten Arab countries represented above. The following six hypotheses are tested:

- H1. National human capital is positively associated with national process capital.
- H2. National process capital is positively associated with national renewal capital.
- H3. National renewal capital is positively associated with national human capital.
- H4. National process capital is positively associated with national market capital.
- H5. National human capital is positively associated with national financial capital.
- H6. National market capital is positively associated with national financial capital.

Analysis

A Cronbach's alpha test was used to evaluate the reliability of the measures as suggested by Nunnally (1978). Churchill (1979) suggests that this calculation be the first measure used to assess the quality of the metrics. Since a rigorous psychometric evaluation of the NICITM and its subcomponents had never been conducted in previous studies, this test was used as an exploratory tool to aid in the removal of poor metrics.

Cronbach's alpha is considered an adequate index of the inter-item consistency reliability of independent and dependent variables. Nunnally (1978) suggests that constructs have reliability values of 0.7 or greater. The following three metrics were removed to increase the overall reliability measures of each construct:

- (1) H3 – HC11 percentage of primary teachers with required qualifications.
- (2) M2 – MC08 number of patents granted by USPTO per capita relative to highest value.
- (3) R7 – RC21 tertiary expenditure as a percentage of public education funding.

Removing the above items resulted in the following Cronbach alpha scores for each construct: national human capital (0.752), national process capital (0.957), national market capital (0.639) and national renewal capital (0.525). The latter two constructs fall below the 0.7 threshold but were retained for overall model development given the exploratory nature of this research study and the small sample of countries available for study.

PLS modelling

Once the final items for each construct were retained, they were modelled using partial least squares (PLS). As discussed in detail by Bontis (1998) and his colleagues (Bontis *et al.*, 2000, 2002), PLS is a structural equation modeling technique typically chosen for handling relatively small data samples. PLS has been used as a research tool in a variety of settings such as business disciplines, cooperative ventures, global strategy, risk-return outcomes, geographic scope and in intellectual capital research. Hulland (1999) reports that PLS maximizes the explanatory power of a conceptual model by examining the *R*-squared values for the dependent (endogenous) constants. PLS is used to test the model within its nomological network.

The four constructs in this study derive their meaning from both their underlying measures as well as their antecedent and consequent relations giving a researcher the benefit of examining the constructs in an overall theoretical context. In this study, the sample size of ten countries is clearly a limitation. Statistical results cannot be construed as significant with such a small sample. However, if paths are deemed to be substantive and in their appropriate direction, a commitment for further data collection can and should be supported.

Figure 3 outlines the final conceptual model into structural equation map. Each of the beta coefficients is substantive and in the appropriate direction with *H1* and *H3* clearly significant. It is important to reiterate that no claims of overall statistical significance can be made given the small sample of countries. At minimum, with four exogenous constructs in this model, PLS would require a sample of 40 countries to realize tests for statistical validity (Bontis, 1998). It is also important to note that the overall conceptual model yields an *R*-squared value of 20.9 percent which is relatively strong for such macro-economic measures. In other words: national intellectual capital accounts for nearly one-fifth of the explanatory power of the financial wealth of an Arab country.

Model interpretation

Given the model, it is worthwhile to convert the hypotheses into prose. By following the hypotheses in consecutive order with the model above, the following commentary can be made:

Human capital is the pre-eminent antecedent for the intellectual wealth of a nation. As a nation's citizens codify their knowledge into the systems and processes of a country (*H1*), those structural capital assets can then be renewed for the future (*H2*) by investing in research and development. A feedback loop further develops a nation's human capital (*H3*). Eventually, the codified knowledge base of a nation can be marketed (*H4*) within the global and domestic economies. As the human capital continually develops (*H5*), a nation's ability to market its intellectual wealth will result in a higher financial well-being (*H6*).

It is interesting to note that there is a strong relationship among groups of Arab countries. Figure 4 illustrates this relationship graphically. When the relative

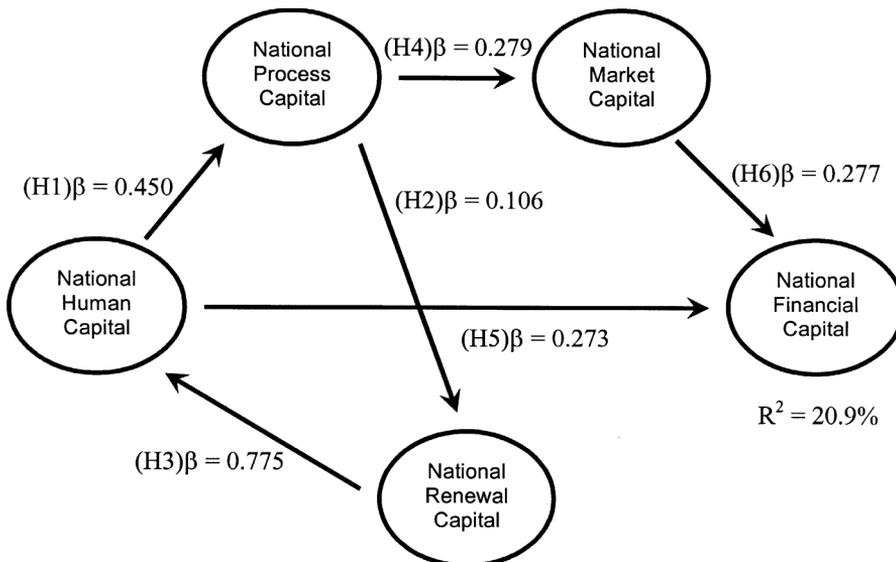


Figure 3.
NICI conceptual map

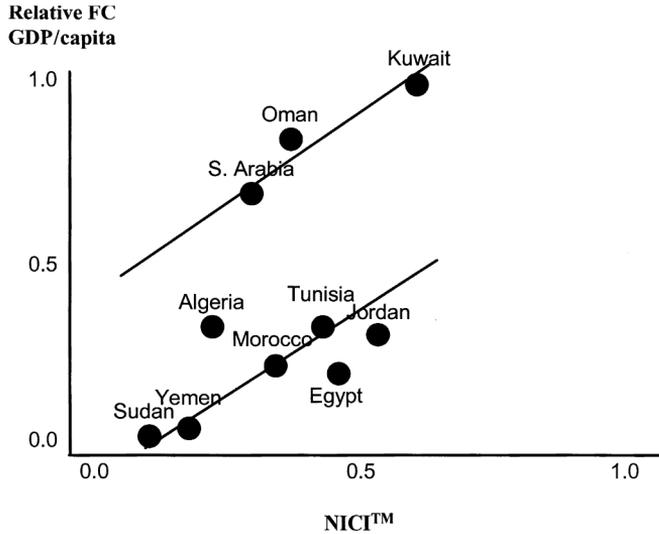


Figure 4.
Country clustering

financial capital index is plotted against the national intellectual capital index, two clusters of countries form (see Figure 3).

Clearly, the relatively higher cluster contains the oil-rich countries Saudi Arabia, Oman and Kuwait. In this case, it seems that vast amounts of oil reserves may explain a significant portion of the remaining explanatory power of the national intellectual capital development conceptual map.

Measurement challenges

There are many limitations to the measures used in this study due to the incomplete data available from many nations. The following human capital metrics would be useful for future collection:

- figures on the cumulative organizational level of training and development per capita and training and development participation rates;
- the percentage of GDP spent on education by level of education over the size of the population at various age groups;
- measures with respect to quality of education and the further development of standardized testing results;
- instruction time and length of school year;
- penetration of education such as a measure to determine the urbanization versus ruralization of educational participation, quality and results;
- the total number students at each level of completion as a ratio of the total population; and
- numeracy rates in addition to reading and writing, basic science.

The following process capital metrics would be useful for future collection:

- computer literacy rates;
- digital storage per capita;
- volumes of books in libraries per capita;
- transportation statistics such as paved roads per capita and road safety;
- availability and extent of software usage;
- entrepreneurship and number of venture start-up; and
- venture capital funding.

The following market capital metrics would be useful for future collection:

- openness to different cultures;
- number of foreign spoken languages;
- inflow and outflow of tourism;
- subjective measures of honesty and trust in business dealings;
- time required to launch services and products internationally;
- international awards won by country or individuals from country;
- immigration and emigration data including source of inflow and outflows as well as area of expertise;
- magazine exports (to go along with books and periodicals);
- host of world expos and world conventions;
- professional athletes a country produces, and what sport;
- appearances at Olympics, number of athletes on team; and
- number of graduate students studying abroad on scholarship

The following renewal capital metrics would be useful for future collection:

- number of graduate students studying abroad who return
- ratio of patent applications to granted patents by domestic individuals and corporations versus individuals who are abroad;
- number of applications for registered trade marks; and
- various measures regarding intellectual aptitude of the younger population.

Implications

The development of a nation's intellectual capital requires the application of concerted effort in the development of human, process, market, and renewal capital. Each component of intellectual capital has distinct characteristics and thus recommendations are specific to each component.

Particular attention must be given to the measurement and monitoring of key capital metrics. Through effective monitoring of key capital metrics, a

nation's progress can be measured and strategies adjusted. For this monitoring to occur, the metric data must be complete, accurate and current. Without this monitoring, the outcomes of policies and programs will remain unknown.

In addition, when developing policies and strategies for each component, a global wealth of knowledge can be tapped. The best practices in each component can be studied from countries as far away as Canada and Japan. Each Arab country has different strengths that can be studied, enhanced and implemented. Currently, Arab countries tend to apply a vertical approach to problem solving focusing on the successes and failures of the past as opposed to a horizontal examination of others around the world (UNDP, 1999). Establishing strong networks with decision-makers in other countries can prove to be an excellent long-term investment.

The emergence of the global information economy is driven by rapid technological innovations and offers tremendous opportunity. Coupled with this opportunity is a danger of being left even further behind if developing countries do not become more competitive, diversify their economies and integrate more effectively with the global information economy. An opportunity also exists to leapfrog over old technologies and bypass the growing pains that developed countries have endured. The application of information and communication technologies to government, education, business, healthcare and natural resource management provide significant boosts to a countries interconnectivity and process capital (Dahlman and Adhar, 1999).

The major challenges in the area of human capital are increasing enrolment numbers, levelling discrepancies between rural and urban education access, enhancing opportunities for lifelong learning, raising literacy rates and improving education quality. The tracking of information pertaining to the above challenges must be both quantitative and qualitative. Data that track education enrolment, literacy rates and number of graduates are important; however, details on how teachers use textbooks and design curriculum are valuable as well. The importance of measuring both quantitative and qualitative measurements cannot be overstated.

Literacy is a strong measurement of the intellectual capabilities of a nation's labor force. Today however, basic literate proficiency in reading and writing is not sufficient. Skills in teamwork, problem solving, information and communication technologies, and math are requirements (OECD, 2001). Literacy measurements should be expanded to include these metrics and then literacy should be aggressively monitored and developed.

The existence of education in itself is not sufficient for proper human capital development. More crucial is the quality of the education being delivered. Compounding this problem is the lack of information regarding the quality of education in many Arab states. Very few Arab countries (e.g. Jordan, Oman and Egypt) have attempted to assess the performance of their students and the results from these studies suggest many areas for improvement (Berryman, 1997).

Arab countries may also benefit from the intellectual capital development initiatives of other countries like Israel. Israel used its own intellectual capital examination to evaluate curriculum redesigns which opened up competition to new ideas and targeted the further development and reallocation of resources for science and technology degrees.

Two reports published by ESCWA (2000a, b) favour using the education system to increase the acceptance of computers and information technology. By offering incentives to students and faculty and beginning introduction of computers in education curricula at early ages, adoption can be significantly increased. As a complement to formal education, leveraging information technologies in offering distance education will further speed adoption and development of ICT skills (D'Orville, 1999).

Nations should concentrate on formulating national and regional ICT strategies and maintaining modern international and domestic communication systems. This must be complemented with massive efforts to provide relevant content in Arabic (D'Orville, 1999). Private enterprise has a role in supporting a national technological infrastructure as well. They must promote partnerships between industry, universities and research institutions and invest heavily in designing and converting software to facilitate knowledge creation and management in Arabic.

The promotion of intellectual capital assets is the most effective way to benefit financially from them. It is the flows of people, technology, and ideas between and within countries that is key to overall market capital success. The essence of market capital is a nation's ability to share their knowledge with the rest of world. Nations that have never hosted an international meeting, conference or event should prioritize and put forth an effort to help market the strengths of their country and plan meetings. Additionally, professional and trade organizations should be encouraged to participate so that experiences can be shared. However, market capital is about knowledge coordination and contextualization as well. Tourism is an excellent way to develop the market capital of a nation. As tourists begin to appreciate a country, their desire to establish financial and intellectual capital flows increase.

Improvements to tertiary education will stem the flow of highly desirable Arabs emigrating to foreign countries. These improvements would also increase the ability of a nation to attract new academics as well as promote additional ties with other countries through academic research cooperation. Finally, the shift from closed and protected systems to more open environments that encourage investment, and increased trade should be encouraged. Investing today for the benefit tomorrow is often difficult. The pressures of existing problems require direct and immediate attention; however, investing in future potential must not be ignored. The first priority in enhancing renewal capital is to forge stronger links between university research and the industries they serve. This link will serve the vital purpose of aligning the needs of industry with current research as well as challenge industry with new technologies and ideas.

Arab countries should immediately develop long-term policies on scientific research, based on intimate cooperation between R&D institutes, universities and industry. Central to such policies is the realization that various components feeding into R&D must be developed simultaneously. These include: educational systems and standards; research institutions dealing with basic and applied research; information acquisition systems; funding institutions; professional societies; consulting services; technical support systems; procurement services; and science education for the public at large.

The renewal capital of a country may also be further developed beyond R&D initiatives. For example, further investment in libraries, book imports as well as teaching faculty per pupil provide the intellectual infrastructure for a country to replenish its overall intellectual capital in the future.

Conclusion

The Arab region has long been known for its rich natural resources. The oil industry is recognized as the key component of national income for this region. However, the intellectual capital of this region is the renewable asset of this developing territory and must become a top priority for each constituent in order to sustain an increased financial wellbeing.

Technological developments coupled with fast paced markets and continuous information regeneration requires knowledge-based skills to be consistently measured, utilized and improved. Furthermore, as economies continue to become more knowledge intensive, intellectual capital will become the competitive edge of people, corporations, and nations. Historically, higher levels of intellectual capital have been associated with higher standards of living, improved health, and continued increases in international political involvement. However, the power of knowledge and ideas are not often associated with the long-term prosperity of a nation. This disparity highlights the need to value the intellectual capital of a nation, as it is a key antecedent for involvement in the global economy of this century.

The model created in this report inter-relates market capital, renewal capital, process capital, and human capital as a means of articulating the intellectual wealth of a nation. Renewal capital represents a nation's future intellectual wealth, valuing infrastructure and investments that aim to create long-term competitive advantage. While traditional economic measurement tools consider average life expectancy as an indicator of human potential in an economy, they do not recognize the intrinsic value of the human storehouses of knowledge as depicted in the comprehensive human capital indicators. Furthermore, consideration must also be given to non-human stocks of knowledge, such as digital storage that accounts for the process capital of a nation. Finally, market capital depicts a nation's ability to market its own intellectual resources. This motivates cooperation and the sharing of new ideas, information, and tools for development across international borders.

The following two key propositions resulted from the NICI model development:

- (1) National intellectual capital accounts for nearly one-fifth of the explanatory power of the financial wealth of the Arab region.
- (2) Human capital is the pre-eminent antecedent for the intellectual wealth of a nation. As a nation's citizens codify their knowledge into the systems and processes of a country, those structural capital assets can then be renewed for the future by investing in research and development. A feedbackloop further develops a nation's human capital. Eventually, the codified knowledge base of a nation can be marketed within the global and domestic economies. As the human capital continually develops, a nation's ability to market its intellectual wealth will result in a higher financial well-being.

Although the metrics designed in this study have shown a link between national intellectual capital and financial capital, continued research must be done to ensure consistent and complete data is analyzed to represent the entire region effectively. Furthermore, additional measures must be developed to create a solid index of measures for use in both the Arab region and abroad. The NICI should be reviewed and updated regularly, ensuring that governments can begin to actively leverage the intellectual wealth of their nations.

Arab professionals would benefit from collaboration across nations. Two associations in particular that would be of benefit for Arab states commencing knowledge management initiatives include: The Arab Knowledge Management Society (www.akms.org) and The Arab Club for Information (www.arabcin.org). Even though the problems and bottlenecks in enhancing the economic growth and human development are well recognized by Arab officials and experts (UNDP, 1999), Arab government officials cannot play these roles effectively without input from business. There is need for leadership in both the public and private sectors. This is a cliché, but as a result of the tremendous inertia built into Arab economies and their institutions, it becomes an absolute imperative for the overall intellectual capital development of the region.

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