

ОБРАЗОВАТЕЛЬНОЕ СОТРУДНИЧЕСТВО СТРАН – УЧАСТНИЦ ЕАЭС. КАДРОВОЕ ОБЕСПЕЧЕНИЕ РЫНКА ТРУДА

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INTERNATIONALISATION OF HIGHER EDUCATION FOR KNOWLEDGE AND TECHNOLOGY TRANSFER IN EGYPT

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Nahda University (NUB) believes that internationalisation of higher educational is able to provide global society with an education, that meets current needs and that can respond efficiently to contemporary demands and challenges. NUB are characterized by globalisation, interdependence, and multi-culturalism. In this paper, we will discuss the challenges of the Egyptian Higher Education system and the future vision to improve this system. In this report, a brief history of science in Egypt as well as the SWOT analysis to determine the strengths, weakness and the opportunities of improving the higher education in Egypt has been presented. In addition, we present a road map for the future vision of higher education system. This vision includes the following: 1) increasing knowledge on the development of specialized programs of study at the university; 2) developing international cooperation programs, which focus on the development of the students and staff skills, and providing academic culture and learning opportunities; 3) increasing the opportunities for student mobility, and research projects for faculty members; 4) increased opportunities for staff faculty and students to continue to learn foreign universities, and to benefit from scholarships in various disciplines; 5) taking the advantage of the educational experience and modern teaching methods; 6) providing the opportunities to study abroad without increasing the period of time required for graduation, and through greater integration in the curricula and programs; 7) more cultural interaction through student exchanges and 8) improving and providing job opportunities for graduates through participation in the global labor market. The NUB strategy to move towards that vision is stated. We are confident that greater explicit differentiation, greater freedom and greater collaboration are the keys to delivering the further improvement in quality we shall need to retain and strengthen our position as one of the world's leading higher education systems.

Keywords: *Higher Education, Knowledge Transfer, Internationalisation, Technology Transfer.*

Университет Нада (НУБ) предполагает, что интернационализация высшего образования обеспечит мировое сообщество образованием, которое соответствует современным требованиям и которое быстро реагирует на изменения. Сам университет характеризуется участием в процессе глобализации, независимостью и мультикультурализмом. В данной статье рассматриваются изменения, происходящие в сфере высшего образования в Египте, и представлены варианты ее изменения в будущем. Данный доклад представляет краткий экскурс в историю науки Египта, также представлены результаты СВОТ-анализа, помогающие определить сильные и слабые стороны, а также указаны различные возможности улучшения системы высшего образования в Египте. Дополни-

тельно мы разработали дорожную карту улучшения ситуации в сфере высшего образования. Данный подход состоит из следующих характеристик: 1) увеличение объема знаний о разработке специализированных программ об обучении в университете; 2) разработка международных программ о сотрудничестве; 3) увеличение различных возможностей для обеспечения студенческой мобильности; 4) увеличение различных возможностей для ППС университета и студентов продолжить свое обучение в зарубежных университетах, с получением стипендий на обучение; 5) освоение новых образовательных технологий, методов обучения; 6) предоставление возможности обучения за рубежом без увеличения общего периода обучения путём значительной интеграции учебных планов; 7) значительная культурная интеграция посредством студенческих обменов; 8) увеличение возможностей трудоустройства студентов посредством их участия в функционировании мирового рынка труда. Стратегия университета заключается в развитии данного приоритета. Мы уверены, что выраженная дифференциация, большая свобода и сотрудничество являются ключевыми параметрами улучшения качества и укрепления позиций нашего университета как одного из ведущих учреждений высшего образования.

Ключевые слова: высшее образование, трансфер знаний, интернационализация, технология трансфера.

INTRODUCTION

BRIEF history of science in Egypt has been fertile ground for science and scientists for several thousand years, and you don't have to look hard to find the evidence. A good place to start is the step pyramid of Zoser at Saqqara, 30 kilometers south of modern day Cairo, which was built during the 27th century BC – before the more famous pyramids of Giza – by Imhotep, renowned as an architect, sage, astronomer and chief priest, but most importantly as a physician. After his death, Imhotep was recognized as a medical deity. Several ancient artifacts demonstrate that medicine continued to thrive in Egypt thereafter. The Ebers papyrus, best known as the Egyptian Medical papyrus, which dates to 1600 BC, contains 700 formulas and remedies and identifies the heart as the centre of the blood supply. The Edwin Smith Papyrus, from 1550 BC, is known as the ancient Egyptian medical text on surgical trauma. Also, Egypt was considered as a centre of excellence in mathematics. This evidence was discovered in the year 1858 in another piece of papyrus near Luxor (the ancient capital of Thebes). The Rhind papyrus, 33 cm tall and over 5 meters long, contains a collection of arithmetic, algebraic and geometric problems, and even some dealing with the slopes of pyramids. The establishment of Islam in Egypt in the 8th century AD inspired a quest for knowledge, with the very first word of the Koran compelling followers to Iqraa (read). Muslim scientists and scholars began by translating the works of their predecessors, and Egypt was part of the scientific explosion that followed. Ibn Al-Haytham (965–1040) made significant contributions to many fields, including optics, physics, astronomy, mathematics, ophthalmology and philosophy, but his major contribution was his description of the scientific method of observation, hypothesis and experiment that exists to this day. The medical scientist Ibn-Al Nafis (1213–1288) was the first to describe

the pulmonary circulation of the blood. This era also marked the founding in Cairo (in 971) of Al-Azhar, the oldest degree-granting university in the world. The foundations of modern Egypt were laid down under the 30-year reign of Mohamed Ali Pasha, who was installed in 1805. Ali brought in western physicians such as Clot Bey to teach, opened new schools and laid down modern systems of education. He established a centre of art and mathematics in the citadel of Cairo. He sent students from Al-Azhar on missions to France and England to be educated so that when they returned they could help broaden his new institutions. He even established the country's first large-scale water management scheme by building barrages on the Nile at El-Kanater-ElKhairia 20 kilometers north of Cairo to protect the Nile Delta from flooding [1, 2].

Egypt's largest academic establishment – Cairo University – was founded in 1908 after thinkers such as Mustafa Kamil raised the idea of a modern university that could act as a beacon of liberal thought and spearhead an academic revival in all fields of knowledge. The university opened its doors to women in 1928, with the aid of Taha Hussein (1889–1973), who was the first graduate of the university to receive a PhD in 1914 and the first Egyptian dean of the faculty of the arts; later he became minister of education. Since then Cairo University has been the cornerstone for the launch of many of Egypt's modern universities, including Alexandria, Ain Shams and Assiut. In Egypt's research output as a proportion of the world's, field by field, its most significant contributions in the 2005–2009 period were in pharmacology (0,71 %) and the physical sciences (materials science 0,66 %, chemistry 0,64 %, engineering 0,57 %, and physics 0,4 %)17, which largely reflects the way its researchers are distributed across the disciplines. It is also worth noting that in mathematics it exceeds the world average in citation impact. Researchers in Egyptian governmental universities according to specialisation (2013/14) are 11 % Natural sciences, 10 % Engineering sciences, 38 % Medical and health sciences, 9 % Agricultural sciences, 22 % Social sciences and 12 % Humanities.

EGYPT'S KEY STRENGTHS IN RESEARCH AND INNOVATION

NUB-SWOT Analysis

Egypt revolution on the 30th of June 30, 2015, has presented a big opportunity to revive the country's STI system and put research and innovation at the forefront of economic and technological development. Overturning three decades of neglect will take time and commitment, and turning the tide will require substantial change at many levels – in schools, in the private sector, in universities and research centres, and in cultural and political attitudes. However, new initiatives are already taking shape and the sense of optimism and hope is palpable. Many researchers have underlined the need for the new administration to catch the mood and act fast. Here we summaries the main strengths, weaknesses and opportunities of Egypt's science and technology system, as uncovered by

our analysis, and make some recommendations for change that could help accelerate the country's transition to a knowledge-based economy.

I. Strengths

a) Human Capital

Egypt has a large pool of researchers and science students that harbours great talent, as well as a powerful and active diaspora. Several Middle Eastern countries, notably Saudi Arabia, use significant numbers of Egyptian scientists and technicians in their universities and research centres. The best of the country's scientists can compete with any on the world stage.

b) Collaboration

Egypt plays a critical linking role in research in the Middle East and North Africa region. Egyptian's researchers co-author on average 10 papers a year with collaborators in Saudi Arabia, UAE, Kuwait, Lebanon, Qatar, Jordan, Oman and Libya. Further, afield, new collaborative initiatives have led to significant research partnerships with USA, England, Germany, Italy, France and Japan. The new Egypt-Japan University of Science and Technology (E-JUST) near Alexandria is considered a model of international cooperation in education and industry-orientated research.

c) Foreign Investment

The UN Conference on Trade and Development's World Investment Report 2010 ranked Egypt first among North African countries in its ability to attract foreign direct investment, and in the Middle East, its FDI is greater than all except Saudi Arabia's, Turkey's and Qatar's.

d) Information and Communication Technology

The number of Information and Communication Technology (ICT) companies in Egypt is increasing at a rate of around 13,5 % per year. The country's fast-developing IT infrastructure and growing number of tech savvy graduates have attracted a host of foreign companies, including Microsoft, Ericsson, Vodafone, Intel and IBM. Spending in this sector is expected to increase from \$1.4 billion in 2010 to \$2.6 billion by 2014, making it one of the fastest growing IT economies in the world [3].

e) Mathematics

This is another strength area on a global scale. Egypt exceeds the world average in citation impact for mathematics papers. Furthermore, Alexandria University came 147th in the Times Higher Education World Universities Rankings 2010 – the first time an Egyptian university had made the top 200 – largely on account of the quality of its research in mathematics and theoretical physics.

f) Natural Resources

Egypt's geography makes it vulnerable to climate change, but it favours it in another way: the solar radiation in its western desert is among the highest in the world, making it a prime site for the production of solar energy. Egypt is blessed with another natural resource: wind, which along the Red Sea coast

II. Weaknesses

Lack of research funding Lack of money for research, and the scant pay of researchers, has been a constant struggle for scientists across Egypt. This is especially true for those in public universities who until recently had to rely almost exclusively on the government's meager annual funding allocation. The various competitive grant initiatives introduced in 2007 have helped, and recently the government introduced several new proposals to increase funding and salaries. Raising the proportion of GDP spent on R&D from the current level of 0,4 % to the 1 % suggested by the Organisation of the Islamic Cooperation or the 2 % suggested by the Egyptian Academy of Scientific Research and Technology will be critical for the country's economic development.

a) The Education System is Letting Student Down

Egypt's rapid population growth has proved an enormous challenge for its education system. Average class sizes are 44 in public primary schools, close to 40 in secondary schools, and the country has fewer universities per head of population than just about any other country in the Middle East and North Africa. One of the commonest criticisms of school education is the standard of teaching, especially in the sciences. Students who study science are not taught to think like scientists – to question orthodoxy, to analyse critically. Instead, memorisation and rote learning dominate. All this could have serious implications for Egypt's future, since the degree to which a country's education system encourages critical thinking in part dictates its economic development.

b) Graduates Need More Job Internships

One often-cited criticism of universities in Egypt is that they do not properly prepare their undergraduates for the jobs market, either because they offer an insufficient choice of subjects to cater to students' career preferences, or because large parts of the curricula are irrelevant to employers' needs. 41 % of employers consider their young recruits poor at applying knowledge they acquired at school or university to the job in hand, according to a survey by the International Labour Organization. Another report found that education in entrepreneurship skills – such as understanding how ideas in the lab can translate into market opportunities – is among the worst anywhere.

c) Private Enterprise has Little Faith in R&D

Out of Egypt's total investment in R&D, just 5 % comes from non-governmental sources. This is among the lowest contributions anywhere. With the exception of the IT sector, investing in novel research or nascent technologies for long-term gain is simply not a priority for most businesses. A major reason appears to be a lack of trust and understanding between academia and industry that makes it almost impossible for them to serve each other's needs. Furthermore, too much university research is not geared to the needs of the community.

d) There is Little Public Appetite for Science

Public interest in science in general in Egypt appears to be low. The proportion of pupils majoring in science subjects in secondary school has more than

halved over the last four decades. Furthermore, people do not generally see science as playing a pivotal role in development or in improving their livelihoods. This makes it harder for government to justify spending large amounts of public money on research.

c) The Rigid Academic Culture Holds Back Creativity and Innovation

Egypt's higher education regulations make it difficult for academics to move between universities. This ensures a deeply hierarchical system in which it is difficult for younger people to question their superiors, since they will be their superiors for life, and in which promotion is determined largely by seniority rather than, say, success at obtaining patents. The deleterious effects of this and other aspects of the rigid academic culture are apparent in the lack of cross-fertilisation not only between universities, but also between different faculties at the same university. Faculties tend to work independently; interdisciplinary research is rare. Furthermore, women are significantly underrepresented in the scientific community in Egypt, and especially in leadership positions, despite progress in recent years.

III. Opportunities

a) Devise a mechanism that can help forge partnerships between academic institutions, research centres and the production sector so that research output more effectively meets the needs of the community and of industry.

b) Ensure that research funding is used more efficiently and in line with national research priorities. It is important that government identify the research gaps before trying to fill them, so that research money is used optimally.

c) With other partners in the advanced countries, Egypt should seek to build a comprehensive collaborative research funding mechanism, along the lines of the EU's Horizon programme that could direct funding to research areas that are crucial to the whole region, such as water resources, renewable energy and agriculture. Education

d) Upgrade school and university curricula and teaching methodology to ensure they reflect the needs of the marketplace, with greater emphasis on problem solving, critical thinking and communications skills. Revise science curricula to make them more interdisciplinary and to incorporate knowledge about new technologies.

e) Increase the emphasis on vocational and technical education, whose critical role is often downplayed or is considered socially inferior to that of higher education.

f) Introduce entrepreneurship courses into university degrees and vocational and technical training courses, and encourage more students at universities and research centres to start up their own businesses. University research.

g) Dismantle the hierarchical academic culture that restricts the mobility of faculty members within and between universities and inhibits innovation. Discourage universities from solely hiring faculty members who were awarded their PhD by the same institution.

h) Grant more autonomy to universities so that they become to a certain extent self-governing, allowing them greater administrative control and greater control over their academic programmes and curricula. Furthermore, encourage the establishment of a single administrative body within each university to supervise the management and operation of all research facilities and their use by researchers.

i) Change the merit system by which university officials and faculty members are evaluated so that it takes account not only of published work but also of the extent to which they are involved with or funded by industry – so that building links with industry becomes integral to a researcher’s role.

j) Introduce flexible learning programmes in universities to enable women to study without having to sacrifice their other commitments, and a more flexible work environment in universities and research centres. Business and industry.

k) Offer more incentives to encourage businesses to invest in R&D in areas that will benefit the country – for example, the government could provide matching funds, infrastructure or tax incentives. In addition, provide the right regulatory environment to encourage more venture capital and private equity funds to invest in young innovative enterprises.

Sustainable and Development

a) As part of Egypt’s climate change adaptation strategy, develop a system that gives farmers the most up-to-date information – for example, using mobile ICTs to inform farmers about the impact of rising temperatures on various crops or about best practice for cropping patterns, planting new cultivars or other innovations.

b) Launch a national awareness campaign to preserve Egypt’s water supplies, encouraging the efficient use of resources and their protection from pollution. This should become part of formal school and university education.

We consider the topics of the Educational design and technology are the main issues to diminish the gap in developing higher education in Egypt. NUB is proposing the importance of establishing technology development zone, to promote the establishment of science and technology parks under the guidance and lead of universities.

The aims beside to create technological know-how for export are: 1) to introduce innovations in products and production methods, 2) raise the quality or standards, 3) support entrepreneurship, adapt new and advanced technologies. In addition, to create opportunities of investment in technology intensive areas and to help the transfer of technology to provide the technological infrastructure.

Since 2009, this framework NUB established a centre for future studies under the supervision of Prof. Ali Al-Salmi, the former vice Prime Minister of Egypt. The aim is to present strategies on the sustainable development of Egypt

not only in education but also in the fields of economy, industry, environment and social life.

On February 23–25, 2015, Nahda University in collaboration with University Malaysia Perlis has organized the first international conference on "The Development of University Education in the Arab" and Islamic World in the Age of Globalization and Knowledge which was held at Triumph Hotel, Cairo [2]. This event is considered as an important event, as a response of the two universities' recognition of the vital role of university education in the progress of the Arab and Islamic countries, the advancement of their economies and the raising of the level of living of their citizenship. Therefore, the development of university systems, techniques and methods became a pressing need for keeping a pace with our peoples' aspirations for sustainable growth, social justice and catching up with the rising scientific levels and political, social and economic development in today's world where "globalization" and knowledge society took root. In the following, the main themes and the achievements of the above-mentioned conference are presented [4–7].

THEMES AND OUTCOMES

The conference addressed the following three major themes.

First Theme: How far did university education in the Arab and Islamic world assimilate the achievements of the age of globalization and knowledge with their orientations and values?

Second Theme: Trends of developing and modernizing systems, techniques and methods of university education that cope with developments in the age of globalization and knowledge while preserving national identity and Arab and Islamic culture.

Third Theme: Prospects and forms of cooperation between Arab and Islamic countries to develop and update their university education, find out means of coordinating their initiatives which aim at preserving Arab and Islamic values in university education and maximize the use of achievements of the age of knowledge while facing globalization threats.

The conference participants reached the following recommendations addressed to our Arab and Islamic universities.

1. Participants place emphasis on the importance of basing projects of education development in our universities on Arab and Islamic values while preserving our identity and dynamics of our culture.

2. A work team should be set up to lay down a system of university rankings based on criteria aligned with education quality, considerations of justice and requirements of Arab and Islamic identity, applicable at the same time at the international level.

3. Participants reaffirmed the need for making universities in our countries participate actively in the international movement of promoting sciences and educational techniques.

4. Our universities should seek to organize their competitive competencies all over the world.

5. It is imperative that our universities participate in the process of knowledge creation and dissemination in all lifestyles with the goal of helping progress and sharing in the advancement of human culture.

6. We should maximize the role played by our universities in areas of scientific research and scale up their research and scientific innovative techniques for the promotion of levels of production and services in their societies. Imperative also is the establishment of research and specialized universities.

7. We should link university education with development programs in Arab and Islamic societies by means of three intermingled axes, namely revival, updating and building.

8. We should design a strategy for promoting university education matrix through establishing development triangles based on designing educational programs, which aim to create the kind of knowledge that serves development programs. First priority should go to knowledge, excellence, competition, innovation and creativity.

9. We should develop university education systems, methods, programs, curricula and techniques by our own scientists and researchers, while keeping in contact with the development of sciences and results of scientific research in different foreign universities. We must also avoid dependence on and imitation of these universities.

10. We should follow methods of strategic management and governance in developing our universities and explore areas where democratization of education is possible.

11. It is imperative to recognize the importance of developing laws of organizing university education so as to concentrate on basic principles and make sure that universities align with requirements and orientations of scientific and research promotion in the service of society while stressing universities autonomy at the academic, administrative and financial levels. We should emphasize democratization of education and support academic freedoms.

12. The role of ministries and governmental councils concerned with university education has to be geared towards strategic direction and positive support without interference in executive affairs.

13. Our universities are invited to enhance cooperation, activate communication networks and mechanisms, and participate actively in the promotion of education and exchange knowledge in the service of society besides contributing to the process of scientific and cognitive development in the world and establishing a standing mechanism for implementation. Our universities are also invited to pay due attention to student training and training and developing of fac-

ulty members and academic leadership according to systems and criteria which will be contained in the proposed university rankings.

14. Participants stressed the need for enhancing the exchange of academic dissertations, research papers, books, magazines and scientific information in general and establishing an information base to help with scientific research. Subscription to foreign databases and making information accessible in all fields and the recommended specializations.

15. The participants called for the establishment of modern database to benefit Arab and Islamic universities and regional and international organizations interested in university education. This database should constantly updated to become an efficient means of communication between our universities. It can help them in organizing subsequent conferences and can keep the universities informed of their findings and recommendations.

16. The conference calls for the expansion in holding conferences, symposia, and shared workshops and the encouragement of the exchange of students between universities to discuss common issues and means of strengthening national and regional competencies of distinction at the international level.

17. Among the recommendations of the conference is the need for restructuring university and pre-university education matrix and combining concerned ministries into one ministry only, including scientific research.

18. It recommended that universities set up a permanent secretariat for the next international conferences whose first mission is to follow up on the implementation of the conference's recommendations. The conference will be held annually with its place exchanged between Arab, Islamic, European and American countries.

19. Thanks go to the governments of both countries, Egypt and Malaysia, for supporting the idea behind holding the conference and removing all obstacles and barriers in its way. Both governments made every effort to promote Arab and Islamic university education matrix to keep up with the age of globalization, knowledge society and world scientific and technological development.

CONCLUSION

In conclusion, the road map for the development of higher education system in Egypt is found as follows:

A. There will be a well-planned and integrated, high quality national system of higher education whose students and staff are increasingly representative of Egyptian society. The system will be linked to national and provincial reconstruction, in particular to human resource development and the production of scientific and other knowledge to service the economic, political, cultural and intellectual development of our communities and nation.

B. Greater flexibility via a national qualifications framework in order to improve access to higher education and to increase mobility between higher ed-

ucation and the world of work, and within higher education between different kinds of institutions.

C. The system to be expanded in order to address historical distortions and to develop human resources particularly in the sciences, technology and economics to address developmental needs.

D. Priority was to increase the intake of students disadvantaged due to race, gender, class, disability and rural background. The talk at the time was of the 'massification' of higher education.

E. Funding would support the new direction and redress historical inequalities.

F. The system would be democratized, and the process would be characterised by consultation and cooperative governance, breaking with the hierarchical and authoritarian structures.

G. A subsequent commission on higher education and the development of policy greatly elaborated the vision, relevance to the needs of a globalised economy and labour market.

H. At the same time, the development of curricula which recognised Egypt's own realities within including the following: a) Greater the Arabic continent and fostered indigenous knowledge and culture, and b) The need to reconfigure the landscape of higher education to make it more effective, to overcome ethnic division, and to develop clearer missions for the different higher education institutions.

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