Policies on Building World-Class Universities in Saudi Arabia: An impact study with KFUPM's example

Dr. Sadiq M. Sait, PhD
31 October 2011
Introduction

An overview of our University System (MoHE)

Core requirements for building a World Class University:
- Initiatives
- Drivers
- Enablers

Some of the initiatives mentioned specifically represent the work done in KFUPM (King Fahd University of Petroleum & Minerals) and supported by MoHE

We look at a few national policies that help in setting up some of the core fundamentals that are needed to start the process
Policies and Factors

Excellence in educating students

- A core fundamental national directive in providing excellence in education is to focus on:
  - Available expertise in the region
  - Realities
  - Expectation
- Example: KFUPM
  - Focused in serving the industrial and business sectors in Saudi Arabia
  - Awards only Business, Engineering & Science degrees
- Important Parameter
  - Selection of Students and Faculty
- Objective
  - Development and delivery of innovative courseware
Student Intake

**Number of HS Graduates Nationwide (Science)**
- 122,000

**Number of Students Applied**
- 30,000

**Number of Students Fulfilled Criteria Nationwide**
- 4,000

**Number of Students Fulfilled Criteria from Applicants**
- 3,560

**Number of Students Joined KFUPM**
- 1,800

---

Innovative Approaches

- A national directive to create an **Academic Development Deanship** was provided to Universities in the Kingdom
  - To guarantee the continued development of the academicians
  - Deanship was charged to oversee four-program mechanism designed to improve educational performance:
    - Planning and Managing eLearning in Higher Education
    - eLearning Teaching and Learning Skills for Online Education
    - Peer Consultants in Teaching
    - Developing Tests to Assess the Quality of Higher education outcomes
Centers of Excellence

- Institutional initiatives for Research Excellence, Innovation, and Technology
- The Saudi Government has funded and encouraged Universities to establish centers for research excellence
- KFUPM
  - Setup four CoE’s in the areas of nanotechnology, corrosion, renewable energy, and refining and petrochemicals
  - Various internally funded research modes for developing research culture
  - Examples:
    - research grants, internally funded research, fast track research, research funds for junior faculty, etc.
- In 2008, the Saudi government put out requests for 67 distinct research projects and asked faculty at the country’s universities to submit proposals
- In all, 37, or more than half of the proposals, were awarded to faculty at KFUPM, the nation’s smallest university

Strategic Planning directives and Governance

- It was determined from the beginning that KFUPM should strive to achieve global excellence in the shortest possible length of time
- Consecutive strategic plans have been prepared and implemented
- The five-year strategic plan for 2006-2011 laid out goals for tackling 24 specific issues, some of them are
  - Improve motivation of students, faculty and staff
  - Policy and procedure for recruiting, retaining and developing qualified faculty and staff
  - Interaction and strategic alliance and collaboration with industries
  - Market-driven, value-added and interdisciplinary programs
  - Collaborative research with other research institutes and universities
  - Quality of services and better facilities for the internal community (faculty, staff, students and dependents)
  - Expansion of outreach public-relation programs, media awareness and leverage of the University image
- RI at KFUPM was awarded the AAFAQ project
AAFAQ Plan

- The Ministry of Higher Education in Saudi Arabia launched an initiative to prepare a modern and a long term plan for university education
- The Strategic Planning unit of KFUPM/RI was awarded the project.
- Among these challenges were:
  - Academic excellence, High population growth rate, Global influence on education principles, Ever-increasing funding demands, Labor market needs for highly qualified graduates and faculty, etc.
- The project made available the necessary data and information required to prepare a long-term effective and efficient plan
- It also advocated pivotal criteria for producing progressive five-year plans

International Advisory Board

International Corporations
- Saudi Aramco
- SABIC
- BP
- GE
- Schlumberger
- Chevron
- JPEL

& Leading Universities
- Harvard
- Stanford
- Georgia Tech
- Kyoto
- Purdue
- NUS
- Chicago
- IFP
- KAUST
- KAIST
- TUM-Germany
Endowment Fund

- Managed by a highly qualified Board.
- Currently, SR 500 Million
- Target: SR 3 Billion in the next 5 years.
- Building a Business Park

Collaboration with World class institutions

- A strong emphasis of the Higher Education Ministry is to have research and academic collaboration between highly acknowledged institutions and the Kingdom’s Universities
- As an example of Industry-Academia joining hands, a trilateral collaboration agreement between Saudi Aramco, KFUPM, and Stanford University
  - To establish a strategic relationship in education and scientific research in petroleum engineering and geosciences
  - The University also signed a research collaboration agreement with MIT in June 2008
  - The accord signed with MIT is for a period of seven years to conduct joint research
    - Areas: Clean energy, clean water, desalination, solar energy, manufacturing and nanotechnology, and to work on educational projects
- Results of such engagements?
International Academic Partnership

Objectives

- Faculty and student exchange programs
- Research collaboration and support
- Programs and curricula Development
- Faculty and staff development programs

Student Exchange Program

Massachusetts Institute of Technology
Georgia Institute of Technology
University of Houston
University of North Texas
Texas A&M University
Colorado School of Mines
Lehigh University
Korean Advanced Institute of Science and Technology
Science parks and Techno Valleys

- Dhahran Techno-Valley (KASP, Liaison Office, Consultancy Center, Innovation Center, Incubator, and a Science Museum (SciTech))
  - A high-tech park in the campus based on the decision of Higher Education Ministry
  - Attracted many of the world’s leading corporations to establish their R&D centers
  - Schlumberger has opened a research center on the site and since has doubled its business with Saudi Aramco
  - Yokogawa also has built a research facility and plans to double that space
  - Baker Hughes, has signed an agreement to build a research facility with plans to collaborate with Saudi Aramco
  - Around 10 other multinational corporations have long-term lease contracts in university built facilities in the Valley
- Main Goal
  - To encourage industry-academia interaction so as to focus on core research: Key word COLLABORATION

Dhahran Techno-Valley

King Abdullah Science Park (KASP)

Sultan Science & Technology Center (SciTech)

Consultancy Services

Innovation Center

Liaison Office

Technical & Business Incubators

Dhahran Techno-Valley Entities
King Abdullah Science Park at DTV

Partners Companies:

- Schlumberger, USA
- Yokogawa, Japan
- Intel Corp, USA
- Naizak, SA
- MSSAK, SA
- TENARIS, Argentina
- Al-Shoaibi Group, SA
- AR-PEC, SA
- UOP, USA
- General Electric
- Optimind, SA
- Amiantit, SA
- Baker Hughes, USA
- Sipchem, SA
- Honeywell, USA
- Halliburton, USA
- Weatherford, USA
- Rosen Insp., SA
- Siemens, Germany

King Abdullah Science Park at DTV

Red: Existing Building
Green: Under Construction
Brown: Under Design
Blue: Under Discussion
Black: Planned
P: Parking
Phase I & Phase II

DVT Building
Amenities Building

ABB
Siemens
Honeywell
Baker Hughes
GE
Weatherford
Yokogawa (expansion under process)
Rosen Insp.
Smart Campus

- State-of-the art IT
- Wireless campus
- ERP system
- Student and Registration systems
- e-Learning and online courses
- e-Library
- Smart classrooms

IT as an enabler

- The Kingdom policy realizes the importance of Information Technology as an enabler of advanced learning and research has to be emphasized.
- KFUPM realized that a high-end research environment is a must for a University of the size and quality of KFUPM.
- A scalable High Performance Computing (HPC) cluster has been made available to the faculty to perform advanced research.
- Some of the Advanced learning and research initiatives are:
  - E-Learning
  - University Course management Systems
  - University open access initiative
  - Deployment of two ERP systems
IT as an enabler

- Network connectivity is provisioned to student’s right up to their rooms and dormitories
- Network storage space is provided to the community for uninterrupted access to their valuable data.
- Faculty members have round the clock access to computing resources through high speed campus network, ADSL home network and VPN for extranet access.
- Students can register for courses online from anywhere conveniently
- High percentage of Smart Classrooms with internet connectivity
- Student’s involvement in Industry projects.
- A key factor in fostering a **True digital campus** is the provisioning of services through one window like a portal.
- The availability of Library services digitally

New Hiring Instruments

- The university has recently embarked on improving its faculty profile by attracting high level scientists from all over the world based on the Ministry’s direction
- Different schemes have been created under the titles of Joint Professors, Chair Professors, and Research Chair Professors
- Faculty under the “Research Chair Professor” category is generally selected from the Highly Cited list provided by Thomson Reuters
- HiCi faculty are expected to build teams via hiring recommendations: A new model.
New Hiring Instruments

- The total number of Highly Cited faculty attracted thus far to KFUPM is 30
- The breakdown of these scientists as per disciplines is Chemistry (3), Computer Sciences (2), Environment (1), Engineering (3), Material Sciences (6), Mathematics (6) and Physics
- Increase in number of Post Docs and Graduate Students has been seen with the announced increased stipend
- This measure has been immensely successful in attracting and nurturing talent pool
- $h$ and $g$ indices are also being used

Research, Community Development and Research Cloud

- Realizing its community obligations based on national directives, KFUPM extended a research dimension to serve the R&D demands of the nation’s industrial, business, and governmental sectors
- The 30-year old Research Institute has been the most famous applied research facility in the region
- An interesting development is the formation of Research cloud wherein researchers across the Kingdom’s premier universities (KFUPM, KAUST and KACST) can collaborate and use each other’s resources electronically through a high speed education network called SAAREN
Institutional Accreditation

- An important issue that needs consideration is the **accreditation** of the University’s academic programs as requirement of the national policy on educational excellence
- KFUPM has 18 programs in engineering, including civil, mechanical, petroleum, aeronautical, architectural and computer
- The Accreditation Board for Engineering and Technology (ABET) in the United States has declared King Fahd University’s engineering programs “**substantially equivalent**” to similarly accredited programs in America
- The institution recently has also been accredited to the NCAAA
- Science and Management Programs also have been accredited

---

Accreditation/Assessment

<table>
<thead>
<tr>
<th>Accrediting Body</th>
<th>Programs Accredited</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ABET)</td>
<td>All Engineering Programs</td>
<td>1993</td>
</tr>
<tr>
<td>(Berkeley Team)</td>
<td>College of Science Programs</td>
<td>1996</td>
</tr>
<tr>
<td>(UNESCO)</td>
<td>Research Institute</td>
<td>1997</td>
</tr>
<tr>
<td>(ABET)</td>
<td>Engineering Programs</td>
<td>2001</td>
</tr>
<tr>
<td>Association to Advance Collegiate Schools of Business (AACSB)</td>
<td>College of Industrial Management</td>
<td>2002</td>
</tr>
<tr>
<td>(ABET)</td>
<td>Applied Engineering Programs</td>
<td>2003</td>
</tr>
<tr>
<td>Self Assessment</td>
<td>7 Programs</td>
<td>2003</td>
</tr>
<tr>
<td>Self Assessment</td>
<td>11 Programs</td>
<td>2005</td>
</tr>
<tr>
<td>(ABET)</td>
<td>All Engineering Programs</td>
<td>2007</td>
</tr>
<tr>
<td>Self Assessment</td>
<td>Research Institute</td>
<td>2009</td>
</tr>
<tr>
<td>(ABET)</td>
<td>All Engineering Programs (18)</td>
<td>2010</td>
</tr>
</tbody>
</table>
## Quality of Academic Programs

The Highest Number of ABET Accredited Programs in 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Program</th>
<th>Accredited by</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>All Engineering Academic Programs (18 Program)</td>
<td>ABET</td>
</tr>
</tbody>
</table>
Leadership Workshops

- The Ministry of Higher Education and leading Saudi universities recognized the fact in their pursuit to enhance the quality of higher education leadership plays a significant role in the success and effectiveness of higher education institutions.
- In line with the above, the Ministry established in 2009 the Academic Leadership Center (ALC) to give focus and emphasis to this critical issue.
- Based on an initial plan, the ALC organized numerous developmental activities serving some of the needs of Saudi higher education institutions and administrators.

Results: Patent Applications

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>263</td>
<td>194 Pending</td>
<td>186 U.S.</td>
<td>176 KFUPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 each in Japan, Korea, Eurasia and Norway and 2 each in Europe and China</td>
<td>4 KFUPM &amp; Saudi Aramco (S.A.)</td>
</tr>
<tr>
<td></td>
<td>10 Abandoned</td>
<td>U.S.</td>
<td>KFUPM</td>
</tr>
<tr>
<td></td>
<td>5 Allowed</td>
<td>U.S.</td>
<td>KFUPM</td>
</tr>
<tr>
<td></td>
<td>54 Patents Issued</td>
<td>49 U.S.</td>
<td>KFUPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Japan</td>
<td>KFUPM &amp; JTCP Japan</td>
</tr>
</tbody>
</table>

Pending: Application is pending with the country’s Patent Office.
Abandoned: Failure of inventor to timely respond to the application review or to file a continuing application.
Allowed: Application accepted by the Patent Office and due for a patent issue.
Issued: A patent is issued by the Patent Office if all the requirements have been met.
Progress of IP Generation

Filing of Non-Provisional Patent Applications Assigned to KFUPM

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>1</td>
</tr>
<tr>
<td>1996</td>
<td>0</td>
</tr>
<tr>
<td>1997</td>
<td>2</td>
</tr>
<tr>
<td>1998</td>
<td>0</td>
</tr>
<tr>
<td>1999</td>
<td>1</td>
</tr>
<tr>
<td>2000</td>
<td>2</td>
</tr>
<tr>
<td>2001</td>
<td>3</td>
</tr>
<tr>
<td>2002</td>
<td>3</td>
</tr>
<tr>
<td>2003</td>
<td>3</td>
</tr>
<tr>
<td>2004</td>
<td>8</td>
</tr>
<tr>
<td>2005</td>
<td>2</td>
</tr>
<tr>
<td>2006</td>
<td>20</td>
</tr>
<tr>
<td>2007</td>
<td>16</td>
</tr>
<tr>
<td>2008</td>
<td>50</td>
</tr>
<tr>
<td>2009</td>
<td>78</td>
</tr>
<tr>
<td>2010</td>
<td>44</td>
</tr>
</tbody>
</table>

Patents Issued

<table>
<thead>
<tr>
<th>Year</th>
<th>KFUPM Researchers</th>
<th>KFUPM Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>
U.S. Patents assigned to higher educational institutions in the Arab world (18 Countries)

<table>
<thead>
<tr>
<th>Patents</th>
<th>Under Processing</th>
<th>Issued</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>278</td>
<td>78</td>
</tr>
</tbody>
</table>

The relative distribution of U.S. patents assigned to higher educational institutions in the Arab world

The relative distribution of U.S. patents assigned to higher educational institutions in the Arab world (18 Countries)
The relative distribution of U.S. patents assigned to higher educational institutions in the Arab world

- KFUPM 58%
- Other Arab Universities 42%

- KFUPM 92%
- Other Saudi Universities 8%

Areas of Research Excellence

- Energy (Fossil Fuel & Renewable)
- Oil & Gas
- Refining & Petrochemicals
- Water & Environment
- Nanotechnology
- Advanced Materials
- Corrosion
- Information Technology
Faculty Journal Publications Reported in Science Citation Index & Social Sciences Citation Index

<table>
<thead>
<tr>
<th>Year</th>
<th>Total no. of Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-2007</td>
<td>297</td>
</tr>
<tr>
<td>2007-2008</td>
<td>314</td>
</tr>
<tr>
<td>2008-2009</td>
<td>342</td>
</tr>
<tr>
<td>2009-2010</td>
<td>412</td>
</tr>
<tr>
<td>2010-2011</td>
<td>498</td>
</tr>
</tbody>
</table>

- Increase in publications in the last two years. (In some areas published in the last two years is 50% more than those published in the previous four years.)
- Published papers in Nature and Science.
- The Mathematics and Statistics Department has been ranked 58th in the World by Shanghai Rankings. (Most of publications are in top Q1 and Q2 high impact factor ISI journals.)
Thank You