Role of green Industry in Promoting Socio-Economic Development in Arab Countries

Role of universities and research centers in technology transfer and enhancing shift to green economy

Afif Hasan, Birzeit University
Palestine
ahasan@birzeit.edu
Outline

- Palestinian industry
- Green industries
- Engineering and technology programs
- Curriculum of programs
- Projects & research
- Role of universities & research centers
- Conclusions & recommendations
Industry – problems and obstacles

<table>
<thead>
<tr>
<th>Sector</th>
<th>Operating capacity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Food &amp; beverages</td>
<td>45%</td>
</tr>
<tr>
<td>2 Textile</td>
<td>32%</td>
</tr>
<tr>
<td>3 Clothes &amp; leather</td>
<td>40%</td>
</tr>
<tr>
<td>4 Non-metal (plastics &amp; rubber)</td>
<td>38%</td>
</tr>
<tr>
<td>5 Metal</td>
<td>55%</td>
</tr>
</tbody>
</table>
### Industry – problems and obstacles

<table>
<thead>
<tr>
<th>Israeli policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Import of equipment and machinery</td>
</tr>
<tr>
<td>➢ Import of raw materials</td>
</tr>
<tr>
<td>➢ Use of local resources</td>
</tr>
<tr>
<td>➢ Export of products</td>
</tr>
<tr>
<td>➢ Permits for new industries (security &amp; environment)</td>
</tr>
</tbody>
</table>
Industry – problems and obstacles

Palestinian – internal

- Control of market and protection of local products
- Enforcing standards (testing labs.)
- Experience and expertise in designing production lines and products (e.g. molds)
- Experience and expertise in operation and maintenance (international experts)
Green industries

Building insulation
- Hollow brick
- Polystyrene boards and blocks
- Double glassing and aluminum frames
Polystyrene blocks & boards
Green industries

Electric equipment
- Electric boilers & water heaters
- Electric space heaters
- Electric ovens
- Gas ovens
Green industries

- Home refrigerators
- Commercial refrigerators
- Solar heaters
- Wood stoves
- Wood water heaters & boilers
- Polyethylene sheets and rolls for green houses
Wood stoves – Royal industry
Solar water heaters
## Engineering & technology B.S. programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Universities</th>
<th>number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 B.S. mechanical engineering</td>
<td>Birzeit, Polytechnic, Al-Quds, An-Najah</td>
<td>4</td>
</tr>
<tr>
<td>2 B.S. mechatronics engineering</td>
<td>Birzeit, Polytechnic, An-Najah, Azhar U.</td>
<td>4</td>
</tr>
<tr>
<td>3 B.S. electrical engineering</td>
<td>Birzeit, Polytechnic, An-Najah, Islamic U.</td>
<td>4</td>
</tr>
<tr>
<td>4 B.S. communication engineering</td>
<td>Palestine Technical, Al-Quds, An-Najah</td>
<td>3</td>
</tr>
<tr>
<td>5 B.S. computer engineering</td>
<td>Birzeit, Polytechnic, Arab American U., Islamic, Azhar</td>
<td>5</td>
</tr>
<tr>
<td>6 B.S. chemical engineering</td>
<td>An Najah</td>
<td>1</td>
</tr>
</tbody>
</table>
## Engineering & technology B.S. programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Universities</th>
<th>number</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.S. surveying engineering</td>
<td>Polytechnic, An-Najah</td>
<td>1</td>
</tr>
<tr>
<td>B.S. building engineering</td>
<td>Polytechnic, An-Najah</td>
<td>2</td>
</tr>
<tr>
<td>B.S. multimedia technology</td>
<td>Polytechnic</td>
<td>1</td>
</tr>
<tr>
<td>B.S. industrial automation engineering</td>
<td>Palestine Technical, Polytechnic</td>
<td>2</td>
</tr>
<tr>
<td>B.S. medical equipment engineering</td>
<td>Polytechnic</td>
<td>1</td>
</tr>
<tr>
<td>B.S. automotive engineering</td>
<td>Polytechnic</td>
<td>1</td>
</tr>
</tbody>
</table>
## Engineering & technology B.S. programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Universities</th>
<th>number</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 B.S. electronics engineering</td>
<td>Al-Quds</td>
<td>1</td>
</tr>
<tr>
<td>14 B.S. industrial engineering</td>
<td>An-Najah, Islamic U.</td>
<td>1</td>
</tr>
<tr>
<td>15 B.S. architectural engineering</td>
<td>An-Najah, Birzeit, Islamic U.</td>
<td>3</td>
</tr>
<tr>
<td>16 B.S. Environmental Engineering</td>
<td>Polytechnic, Islamic U.</td>
<td>2</td>
</tr>
<tr>
<td>17 B.S Civil engineering</td>
<td>Birzeit, Polytechnic, Al-Quds, An-Najah, Islamic U.</td>
<td>5</td>
</tr>
</tbody>
</table>

**Traditional programs**

**Few new disciplines and programs**

**Few related to green industries**
# Engineering & technology M.S. programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Universities</th>
<th>number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Water &amp; environment engineering</td>
<td>Birzeit, An-Najah, Islamic U.</td>
<td>3</td>
</tr>
<tr>
<td>2 Urban planning engineering</td>
<td>Birzeit, An-Najah</td>
<td>2</td>
</tr>
<tr>
<td>3 Clean energy and energy conservation</td>
<td>An- Najah</td>
<td>1</td>
</tr>
<tr>
<td>4 Mechatronics engineering</td>
<td>Polytechnic</td>
<td>1</td>
</tr>
<tr>
<td>5 Informatics</td>
<td>Polytechnic</td>
<td>1</td>
</tr>
<tr>
<td>6 Computing</td>
<td>Birzeit</td>
<td>1</td>
</tr>
<tr>
<td>7 Management engineering</td>
<td>An-Najah, Islamic U.</td>
<td>2</td>
</tr>
</tbody>
</table>

- Few graduate programs
- Few related to green industries
- Absence of research & development
- Non thesis
Centers and research institutes

**Unit of renewable energy and environment – Polytechnic**
- Renewable energy
- Energy efficiency in public and industrial buildings
- Lab for testing solar energy equipment
- Partner in Al-ahly hospital wind energy project
Centers and research institutes

**Energy research center An- Najah University**

- Renewable energy resources
- Photovoltaic for lighting and rural electrification
- Wind speed and solar radiation measurements
- Energy efficiency
- M.S. program in clean energy and energy conservation.
Centers and research institutes

Institute for water and environment – Birzeit

- Studies and research in waste water treatment
- Water aquifers and wells
- M.S. water technology and M.S. water engineering
- TEMPUS project environment education for B.S and M.S. programs
Centers and research institutes

**Technology & Applied research Center – Palestine Technical University**

- Area of agriculture and biotechnology
- Environment including water, energy, soil and solid waste.
- Remote sensing

**Water and Soil Environmental Research Unit (WSERU) – Bethlehem University**

- Water quality issues
- Ongoing data base on the water quality of the West Bank and Gaza.
- Developed a program for water and soil analysis
Engineering curriculum & green industry

**B.S. programs at Birzeit, An-Najah, Polytechnic U.**
- Courses such as renewable energy, energy conservation, environmental engineering, solid waste management, production engineering,
- Industrial engineering.
- Graduation projects

**B.S. Program environment engineering- polytechnic University, Islamic University**

**M.S. programs**
- Water & environment degree at Birzeit, An-Najah U.
- Clean energy & energy conservation An-Najah U.
# M.S. thesis & B.S. graduation projects

<table>
<thead>
<tr>
<th>University</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.S project- Birzeit U.</td>
<td>Solar absorption refrigeration system</td>
</tr>
<tr>
<td>B.S project- Birzeit U.</td>
<td>Solid waste power station</td>
</tr>
<tr>
<td>B.S project- Birzeit U.</td>
<td>Solar water heaters testing</td>
</tr>
<tr>
<td>B.S project- Birzeit U.</td>
<td>Energy conservation in buildings</td>
</tr>
<tr>
<td>B.S project- Birzeit U.</td>
<td>Wind energy potential in the West Bank</td>
</tr>
<tr>
<td>M.S thesis – ERC – AnNajah U.</td>
<td>Design, building and technoeconomic evaluation of biogas digester</td>
</tr>
<tr>
<td>M.S thesis – ERC – AnNajah U.</td>
<td>Operation strategy and economic analysis of rural electrification of Atouf Village</td>
</tr>
<tr>
<td>M.S thesis – ERC – AnNajah U.</td>
<td>Oxygen enriched combustion of high emission fuels (biodiesel)</td>
</tr>
<tr>
<td>M.S. thesis- Urban Planning and Landscape – Birzeit U.</td>
<td>Urbanism impact on the environment- Ramallah landfill as case study</td>
</tr>
</tbody>
</table>
B.S. graduation projects

Solar heater testing
Research & projects at universities

**Palestine for European Research Area- PERA**

- FP7 project
- Capacity building at Technical U. as Center of Excellence in water and energy.
- Participating in EU research activities
- Networking of Palestinian researchers and European partners.
Research & projects at universities

Middle Eastern Partnership in Sustainable Engineering

- TEMPUS program starts October 2011.
- Partners: Birzeit, An-Najah, polytechnic University, Jordanian U. & European partners.

- Develop sustainable production process in partner countries
- Establish an M.S. program in sustainable production at Birzeit.
- Establish a technology training center at An –Najah University.
Research & projects at universities

**Stone powder project**
- Birzeit University & Nassar Stone industry
- Stone powder is a source of pollution to soil and water
- Solve environmental problem and efficiently utilize local natural resources.
- Carry out experiments on powder additive to concrete.
- Produce new concrete with better workability and strength.
Role of Universities and cooperation with industry

Current situation

- Students visits to industries
- Student practical training _ internship
- Participation in graduation project supervision and examiners.
- Employment of University graduates.
- Consultation by faculty members to local industry.
- Carrying out testing at university labs.
Role of Universities and cooperation with industry

Objectives

- Universities as scientific and professional reference to industry.
- Selecting and supervision of B.S. projects & M.S. thesis in coordination with industry
- Joint research
- Joint applications of projects for financial support
- Development of new products and production processes.
- Joint technology transfer.
- Equipment design and production layout and control.
- Training of engineers and technicians from industry.
Recommendations

Universities shall work for

➢ Capacity building of its staff in green industry
➢ Develop programs and curriculum and training courses related to green industry
➢ Establish link and mechanisms for cooperation with industry (incubators, research centers,)

Industry work for

➢ Support and partnership with universities and research centers
➢ Apply jointly for international funded projects
➢ Financial support of activities and projects from universities.
Recommendations

- Universities active role in awareness of importance of green industries
- Involve universities in capacity building and developing expertise.
- Support of pilot projects in cooperation with universities in green industries.
- Partnership between universities and research centers and private sector in developing green industries & technology transfer.
Thank you
ahasan@birzeit.edu