SCIENCE , TECHNOLOGY AND INNOVATION IN LEBANON: GAPS AND RECOMMENDATIONS

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OUTLINE

- Vision
- Major Challenges in the Arab World
- The Reality of Innovation in Lebanon
- Recommendations
  - Law on Innovation and Technology Transfer
  - Science and Technology Parks
  - Science, Technology and Innovation Observatory
    - Key Performance Indices (KPIs) for NIS
  - Arab Fund for Innovation

LEBANON'S ECOSYSTEM PERFORMANCE

GLOBAL ENTREPRENEURSHIP INDEX

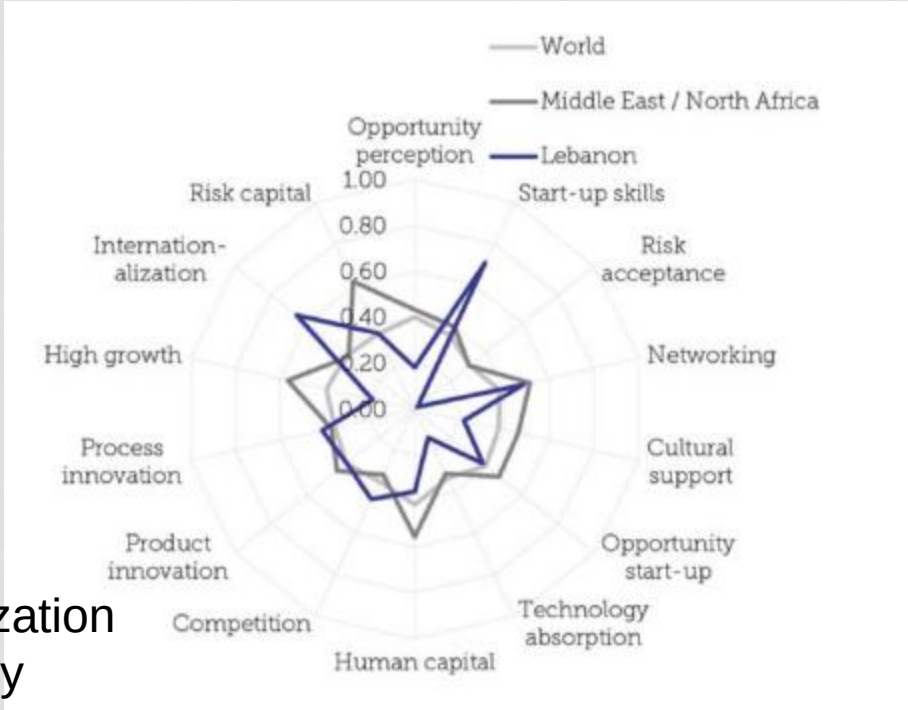
Improving the conditions for entrepreneurship by 10% could add

$ 13 billion

to the economy

#63 of 137 countries **globally**

#10 of 15 in the **Middle East / North Africa** region



Strongest Area: Startup Skills; Internationalization
Weakest Area: Risk Acceptance , Technology Absorption

LEBANON'S PROFILE

Population: 4.6 million **(2015)**

GDP: $51.2 billion **(2015)**

GDP per capita: $11,239 **(2015)**

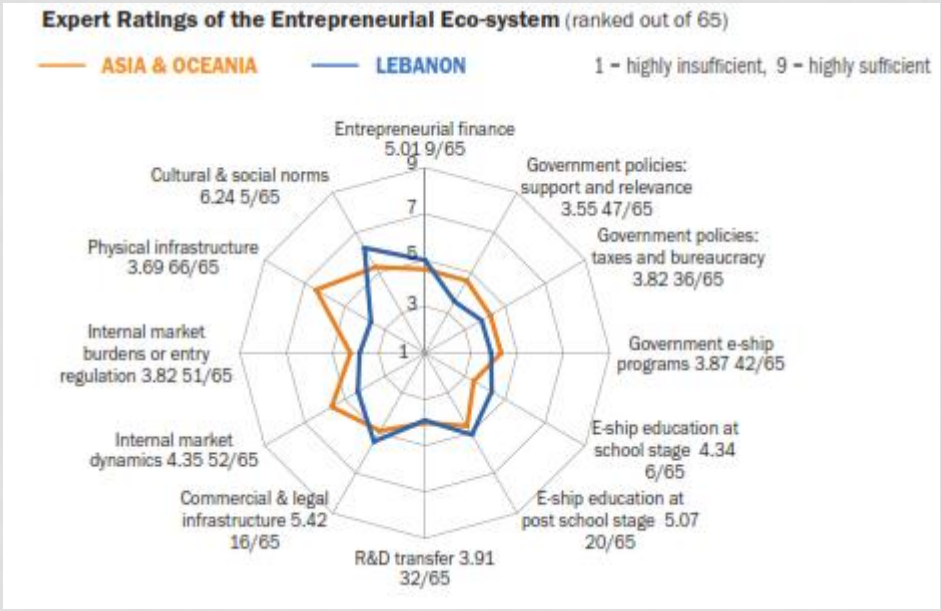
SME contribution to GDP: 99% **(2014)**

World Bank Doing Business *Rating* (2015): 56/100; ***Rank:*** 126/190

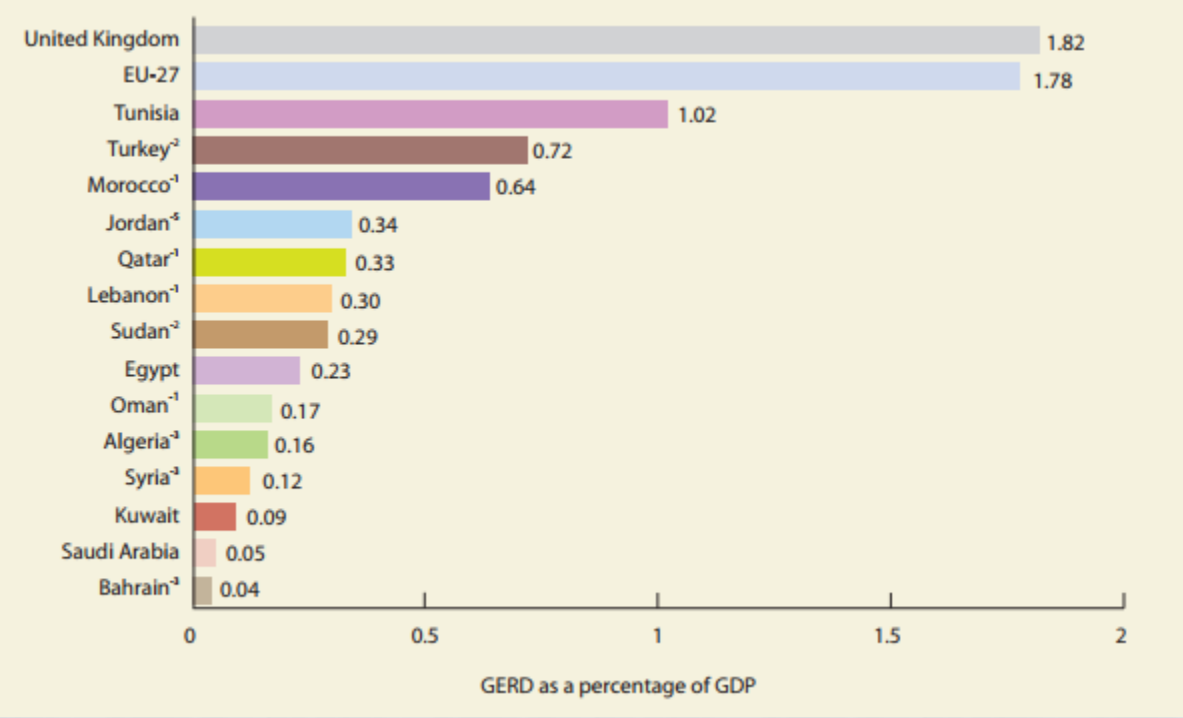
World Bank Starting a Business *Rating* (2015): N/A; ***Rank:*** 139/190

World Economic Forum Global Competitiveness *Rating* (2015): 3.8/7; ***Rank:*** 101/138

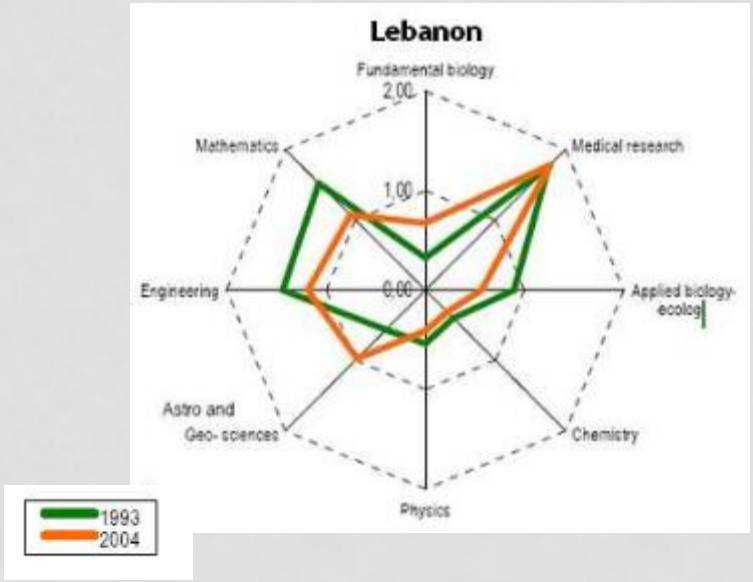
Economic Development Phase: Efficiency-Driven



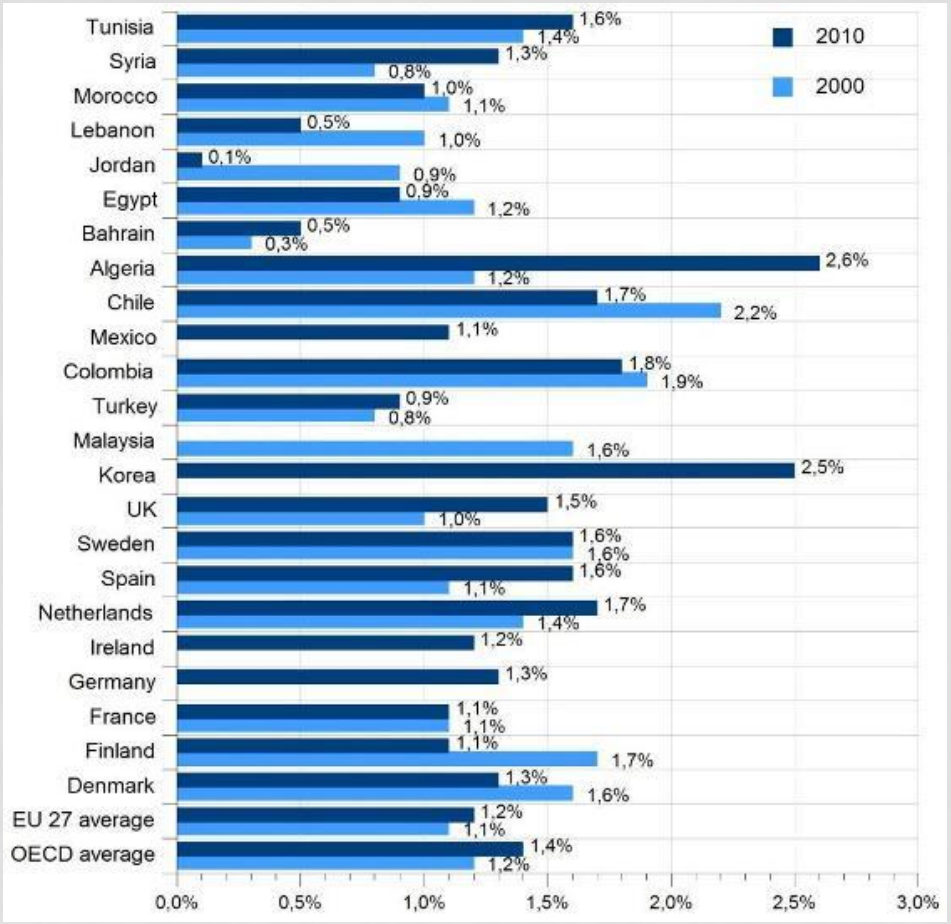
GERD AS A PERCENTAGE OF GDP



SPECIALIZATIONS PATTERN 1994-2004



TOTAL SPENDING ON TERTIARY EDUCATION AS A PERCENTAGE OF GDP

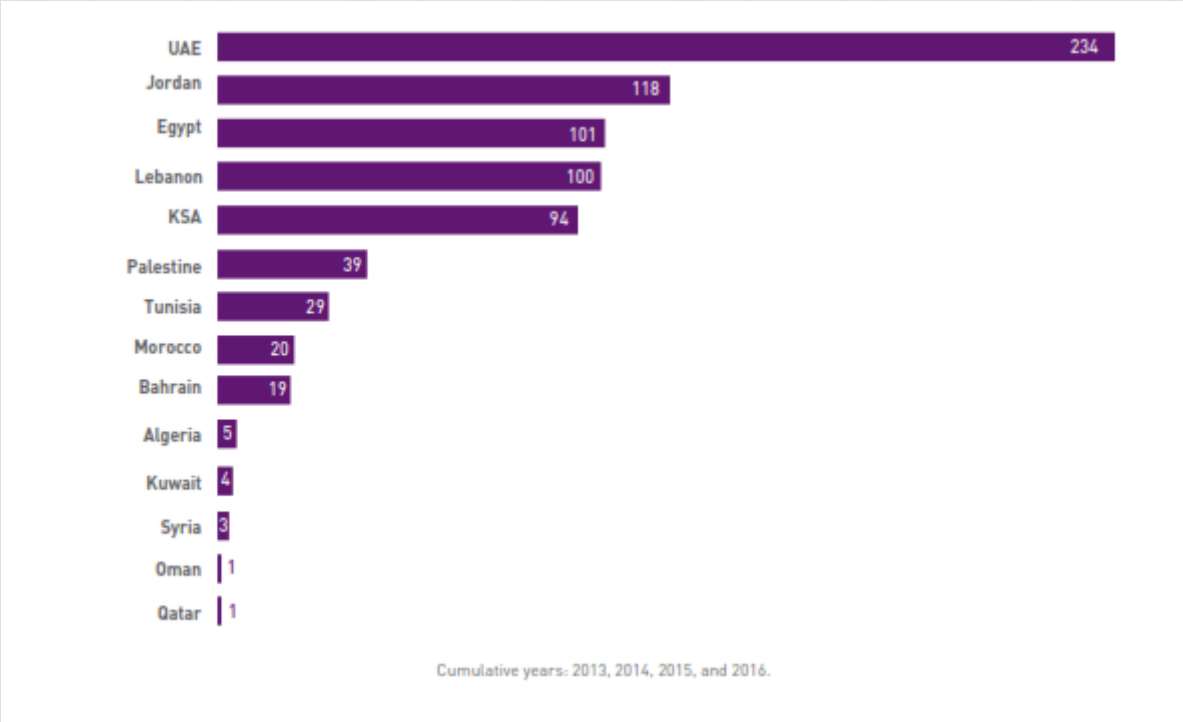


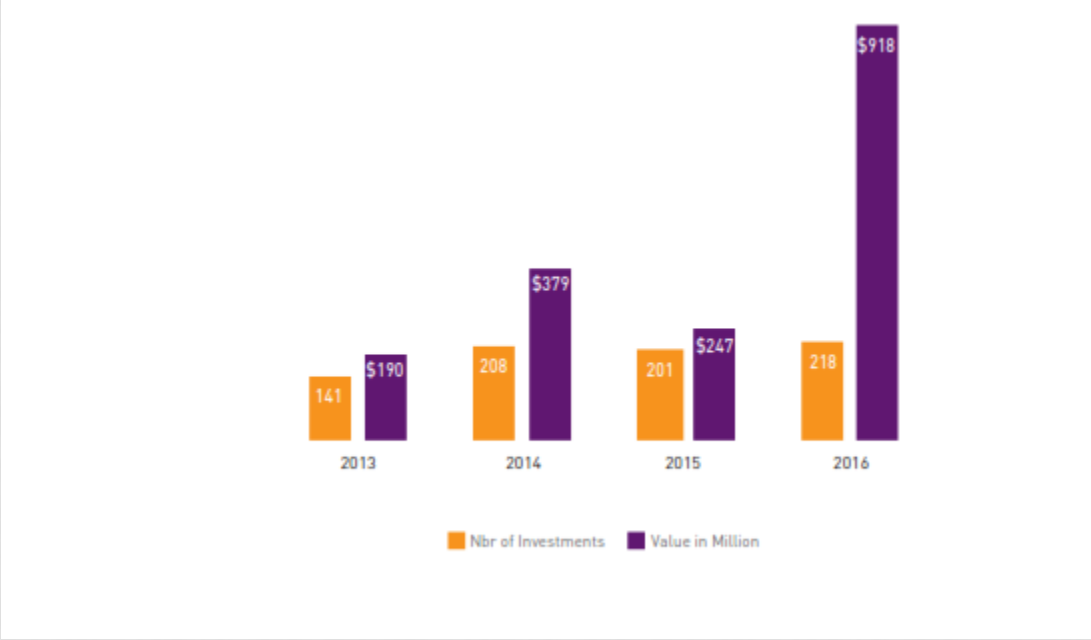
MARKET SOPHISTICATION 2013-2017

Country	Global Rank 2017	Year 2013	2014	2015	2016	2017	Data Trend
United Arab Emirates	33	47.3	46.2	48.1	48.7	52.9	
Saudi Arabia	51	53.5	59	50.3	49.6	49.4	
Kuwait	58	45.4	47	43.7	46	47.8	
Oman	72	44.1	48.1	40.7	39	44.2	
Bahrain	84	47.6	48.5	46.8	38.7	42.7	
Qatar	85	47.4	46.3	45.9	42.8	42.6	
Morocco	89	41.5	42.8	45.1	38	42.1	
Lebanon	96	48.1	44.6	42.4	37.9	39.4	
Tunisia	98	38.3	39.9	35	29	38.7	
Egypt	107	35.8	35.4	35.9	34.2	36.7	
Jordan	116	46.5	39.9	38.8	32	32.3	
Yemen	117	34.3	40.7	35.3	33.8	32.1	
Algeria	122	38.4	36.2	36.8	31.7	29.5	

Source: Global Innovation Index Reports 2013-2017.

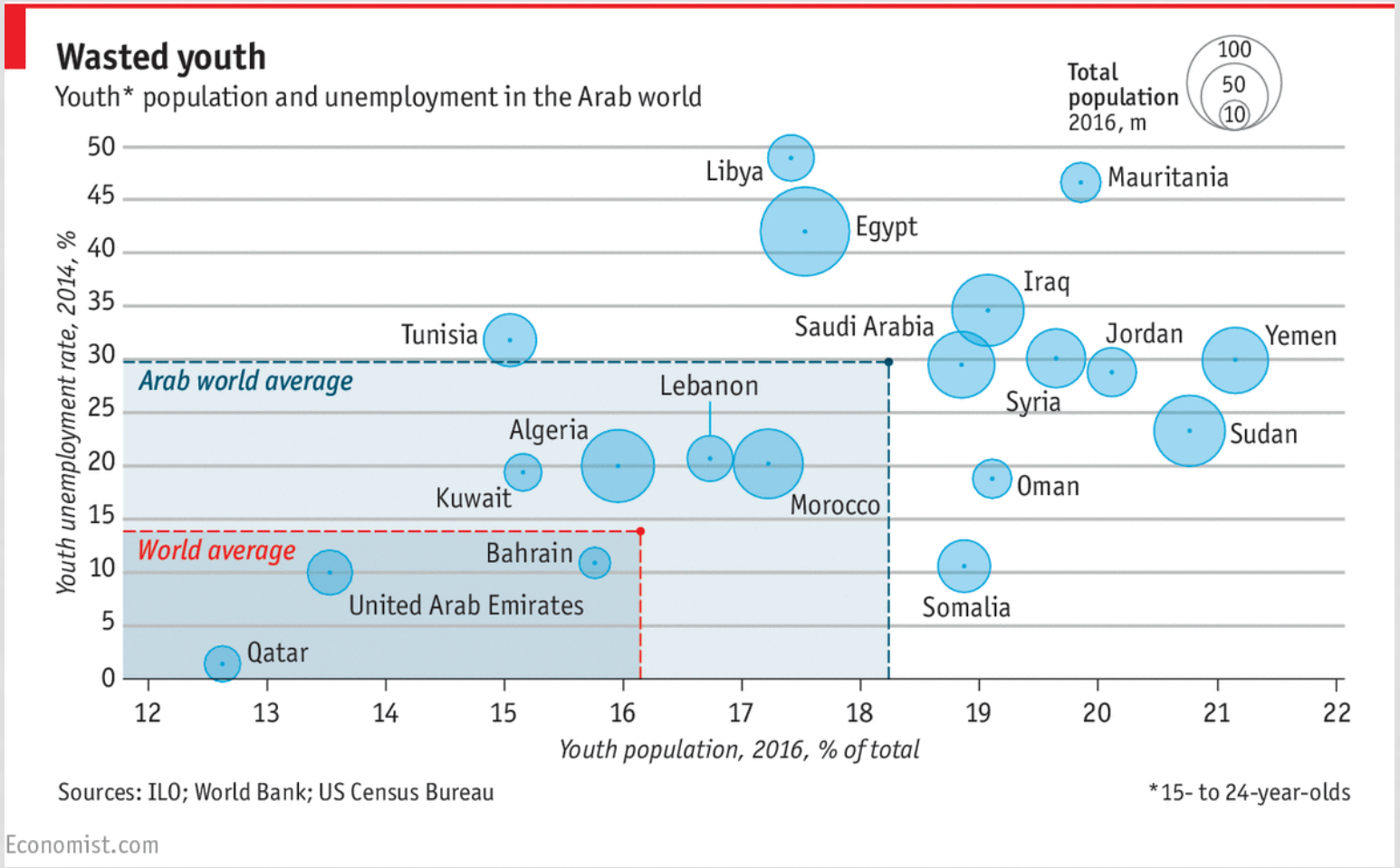
CUMULATIVE NUMBER OF DISCLOSED DEALS BETWEEN 2013 AND 2016 BY COUNTRY




$918
$379
$247
$190
141
208
201
218
2013
2014
2015
2016
Nbr of Investments
Value in Million

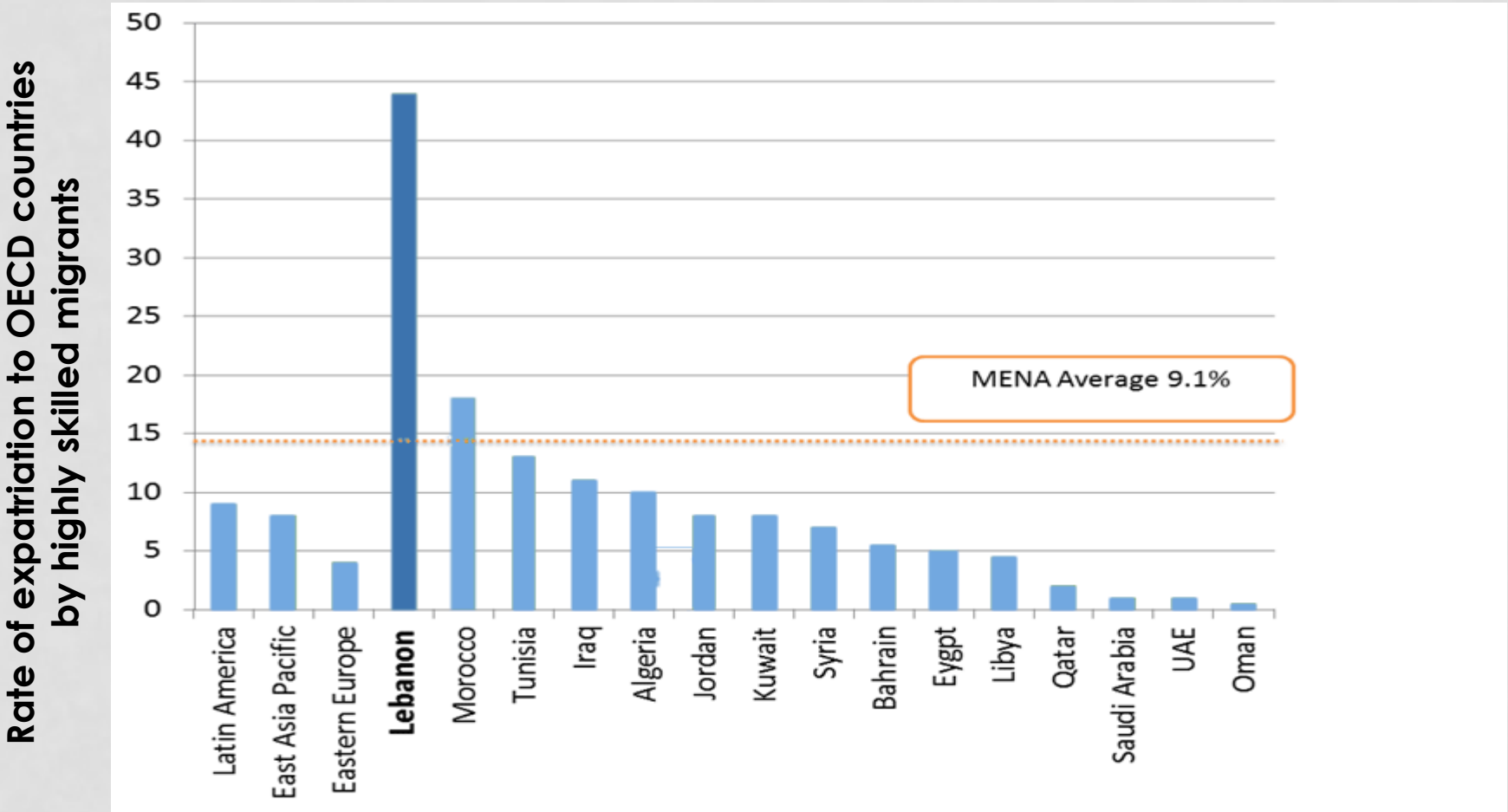
MAJOR CHALLENGES IN THE ARAB WORLD

HIGHEST PERCENTAGE OF YOUTH UNEMPLOYMENT IN THE WORLD



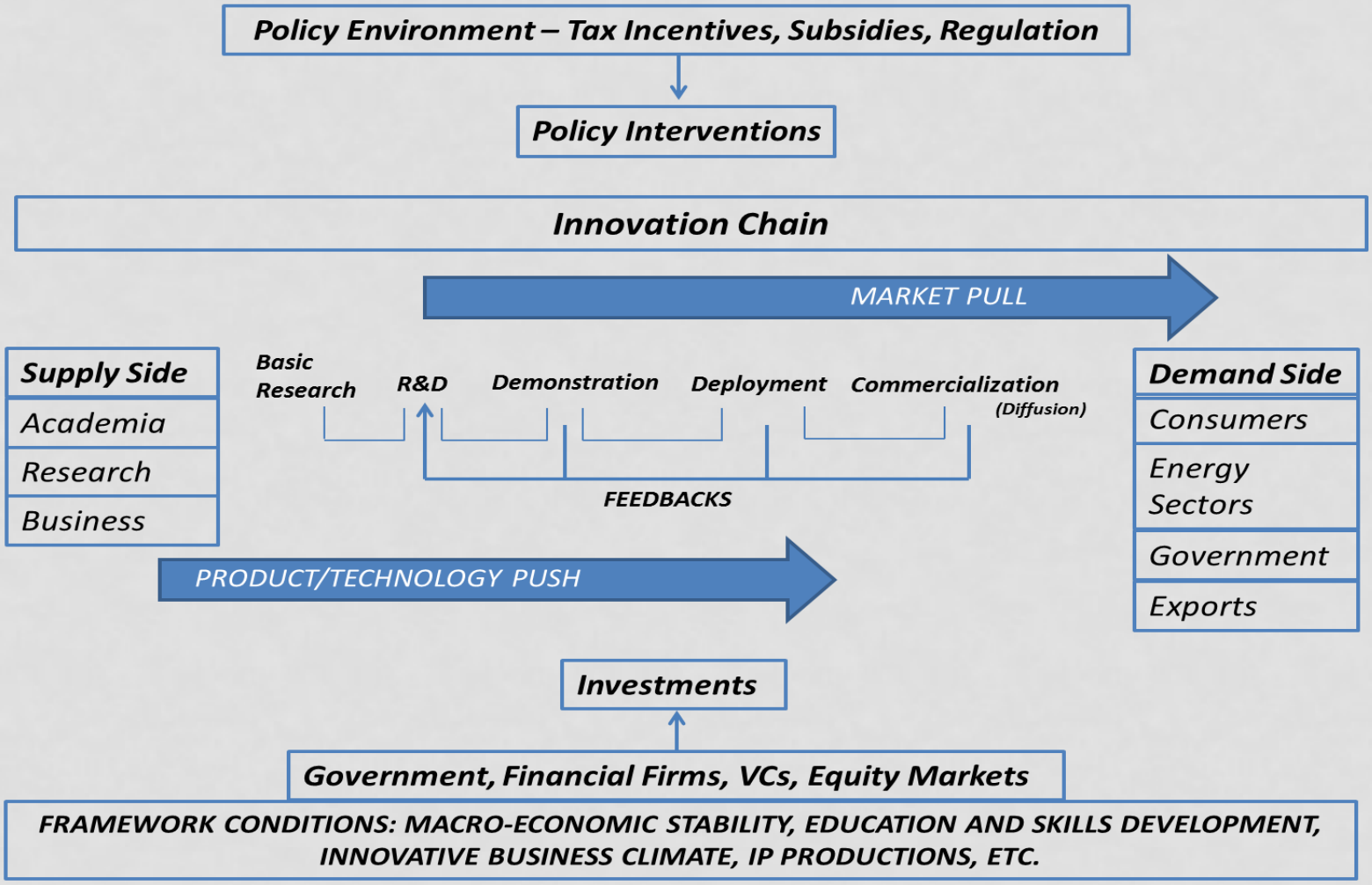
THE REALITY OF INNOVATION IN LEBANON

UNPRECEDENTED NUMBER OF BRAIN DRAIN



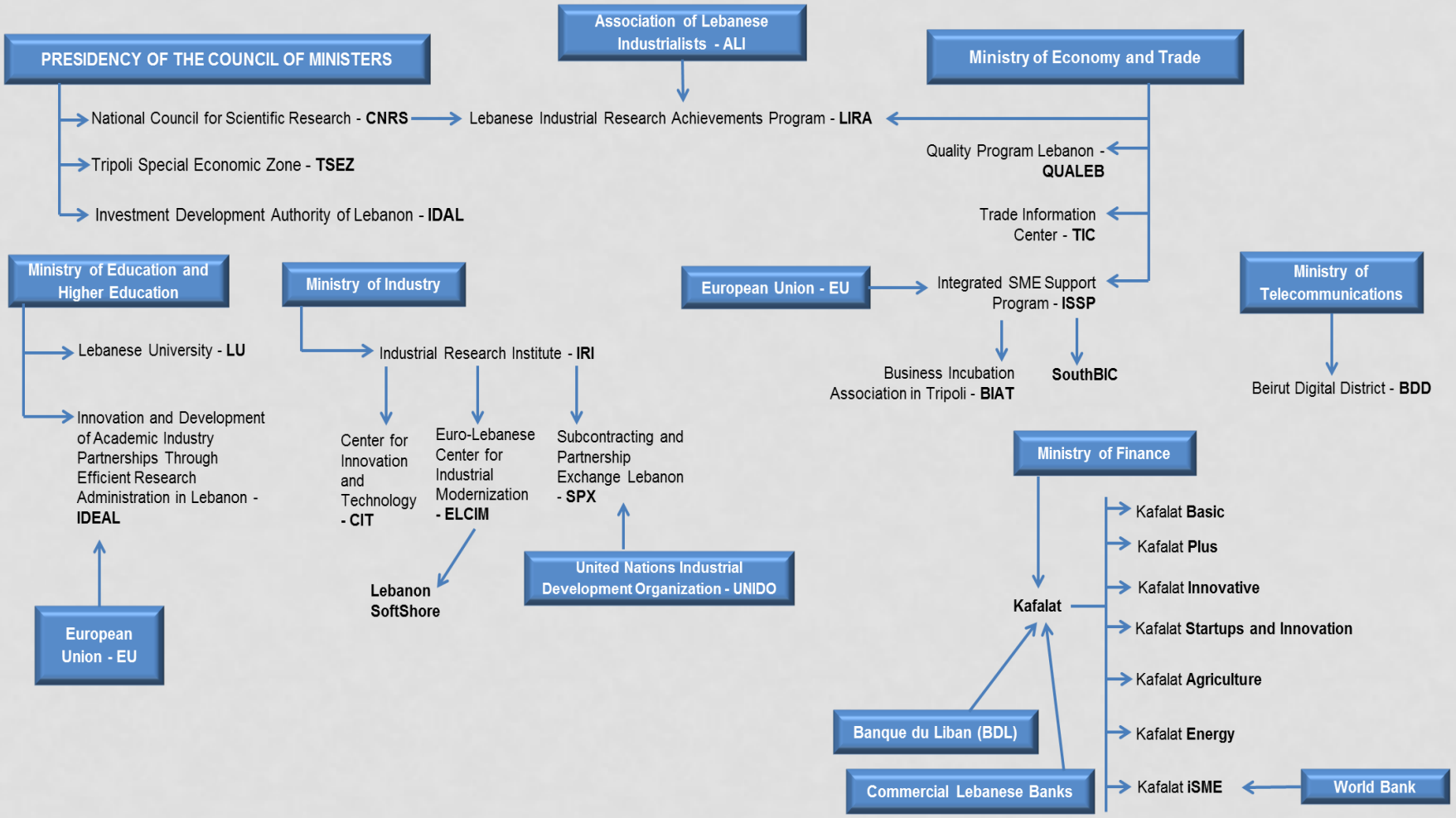
THE REALITY OF INNOVATION IN LEBANON

NEED FOR AN INTEGRATED NATIONAL INNOVATION SYSTEM



THE REALITY OF INNOVATION IN LEBANON

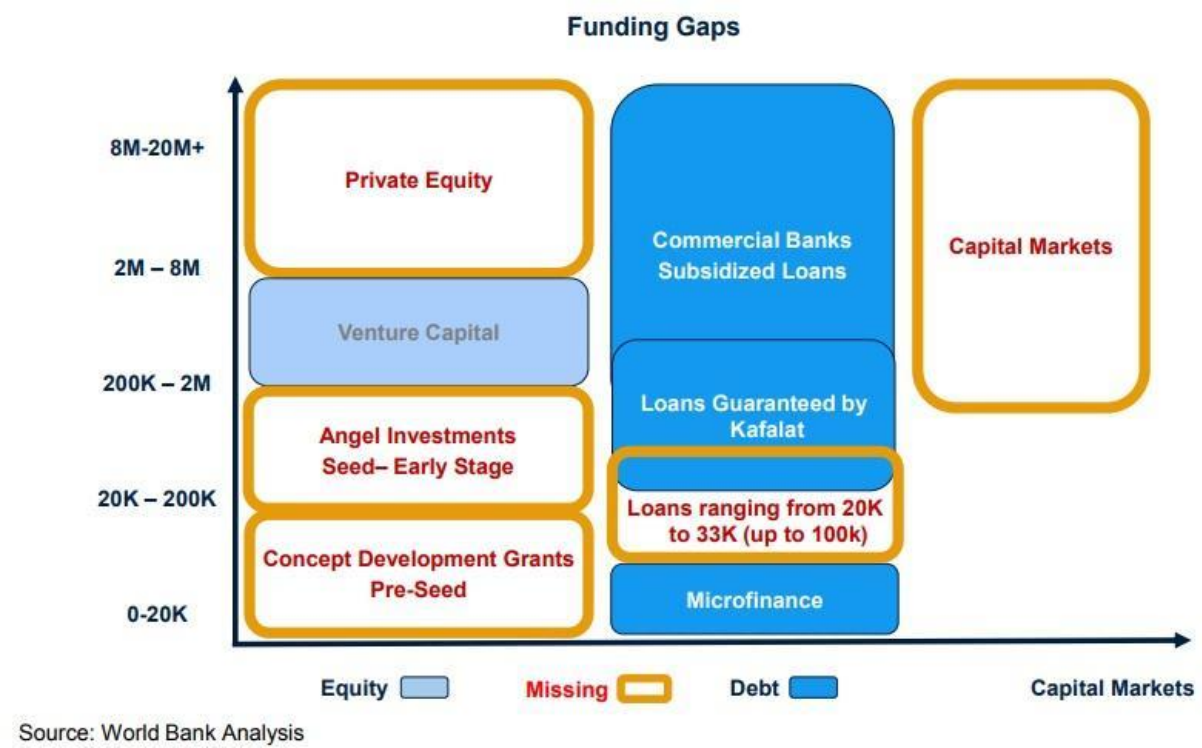
DISCONNECTED NETWORK ACROSS THE INNOVATION STAKEHOLDERS



THE REALITY OF INNOVATION IN LEBANON
GAP IN TECHNOLOGY TRANSFER

	Knowledge Generation and Technological Production	Technology Transfer	Using Technology to Meet the Needs of Society and Economy	
Science and Technology	Universities, CNRS, Research Centers, IRI, LIRA	**BRIC**		
Support Intensity	Industries		**ACCELERATORS** AltCity, Speed@BDD, UK Lebanon Tech Hub **SCIENCE/TECH PARKS** BDD, LSTP	**INCUBATORS/TECHPARKS** Berytech, BIAT, SouthBIC, BDD
Business		World Bank – iSME	BDL Circular 331 (600M$) Kafalat – iSME **FACILITATORS** IDAL, MOET, MOT	**VENTURE CAPITAL FUNDS** Berytech Fund II, IM Capital, Leap Ventures, B&Y Venture Partners, Cedrus Mundi, MEVP, Phoenician Fund I, Wamda Capital Fund
	Research Development	**Early Stage Innovation**	**Startup**	**Growth**

Gaps in Accessing Funds



VC LANDSCAPE IN LEBANON

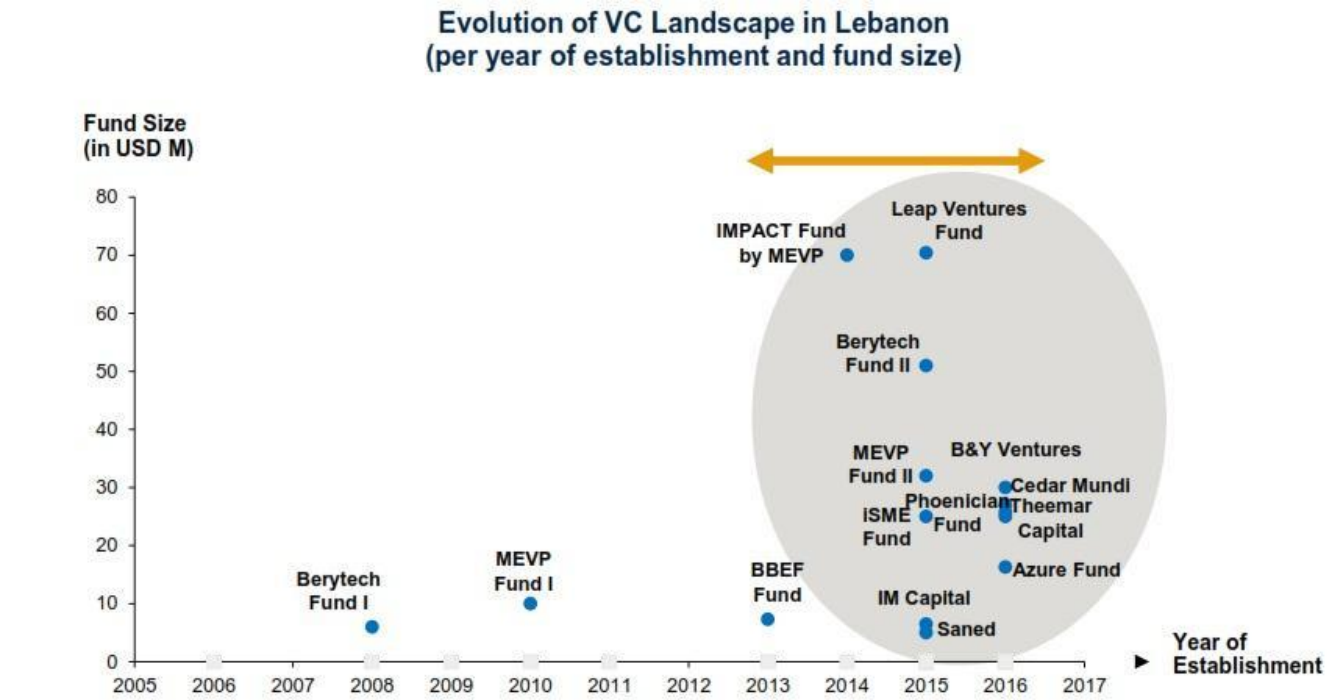


Figure does not include funds that stopped operating: BBF Fund in 2006 and Lebanon Growth Capital Fund in 2011. It also does not include Angel Funding: LBA - Business Angels in 2009, Seeders in 2016. It does not include funding made available by accelerators such as SPEED.
Source: Funds Websites, World Bank analysis

GUIDING PRINCIPLES

- Promoting collaboration Between Universities, Universities industries ,at the national regional and international level
- Transfer of technology is the critical issue .Put in place TTOs (ESCWA initiative across the Arab countries), sustain and maintain
- Protect by a legal framework to be enforced
- Provide the financial support (BDL)

SATT – Sociétés D'Accélération du Transfert et de Technologies

SATT essentially translates to Technology Transfer Accelerators, whose objectives are to "simplify and professionalize the transfer of innovations from academic research to socio-economic markets" (SATT, 2014a).

The **main services** of the SATT reach across the entire innovation technology transfer chain, which includes:

•Protection of research results through the filing and maintenance of intellectual and industrial property titles

•Marketing to transfer into the economic market in the form of licensing and creation of start-ups.

•Detection of innovations with potential for valuation and identification of market needs

•Support for activities for the negotiation of partnership contracts relating to research projects with companies

•Actions to sensitize staff and students towards innovation, technology transfer and intellectual property

•Monitoring, studies and mapping of research themes, markets (needs, actors, regulations, etc.) and intellectual property

•Management of financing and support for the incubation of innovative companies

SOME RECOMMENDATIONS

- **Tackling the Disconnected Innovation Network and Lack of Coordination**
  - Collective law that encourages and organizes generation and transfer of advanced technologies (Read More)
- **Bridging the Gap in Early Stage Innovation**
  - Investing in Technology Incubators and not only incubators for technology companies (Read More)
- **Continuous M&E for the Effectiveness of the Innovation System, Effects and Investment Payoff** of this sector through the establishment of a Science, Technology and Innovation Observatory and a number of Key Performance Indices (KPIs) (Read More)
- **Establishing an Arab Fund for Innovation** to encourage cooperation and the formation of critical masses of specialists and sufficient material resources (Read More)

LAW ON INNOVATION AND TECHNOLOGY TRANSFER (1)

Objectives of the Law

1. To prioritize the development of high technologies and advanced technologies and the creation of places of employment in industry and the absorption therein of scientific and technological manpower, simultaneously with making investment in technological renewal
2. To strongly develop the technology market; to encourage and promote technology and technology business incubation; to step up the transfer of research results to production and business activities, for increased economic benefit
3. To encourage and create favorable conditions for technology transfer activities in all geographical areas, in the development of science-intensive industry whilst utilizing and expanding the technological and scientific infrastructure, and the existing human resources of the country
4. To improve international cooperation and create favorable conditions for organizations and individuals to enter into international cooperation in technology transfer activities

LAW ON INNOVATION AND TECHNOLOGY TRANSFER (2)

Means of Achieving Objectives

- For the purpose of achieving the objectives of the Law, grants, loans, exemptions, reductions and will be provided, which shall be given on the basis of an approved plan, all as set out in the Law.

Implementation

The Ministry of Economy and Trade and the Ministry of Finance are jointly charged with the implementation of the Law.

LAW ON INNOVATION AND TECHNOLOGY TRANSFER (3)

Contents of State Management of Technology Transfer Activities

1. Promulgating and organizing the implementation of propagating, disseminating and educating about the law on technology transfer
2. Formulating and directing the implementation of strategies, plans, programs, measures, mechanisms and policies to promote technology transfer and technological renewal
3. Managing technology transfer activities in a unified manner
4. Entering into international cooperation in technology transfer
5. Inspecting and examining the observance of the law on technology transfer; to settle complaints and denunciations, and handle violations of the law on technology transfer

INNOVATION INFRASTRUCTURE
SCIENCE AND TECHNOLOGY PARKS (1)

- **Objectives of an S&T Park**
  - To support and develop projects and companies working in the sphere of innovations and high technologies
- **Technology Infrastructure**
  - Administrative Center with ***Business Incubator***
  - Furnished Offices
  - Scientific Research Laboratories
  - Production Spaces, Exhibition and Conference Halls
  - Data Centers
  - ***Educational Training Centers***
  - ***Equipment Sharing Centers***

- ***Business Incubation Program***
  - Assistance in raising and gaining access to funds
  - Expenses subsidizing for innovative activities
  - Assistance in projects promotion
  - Establishment of business contacts
- ***Educational Training Center***
  - Staff training and professional development (adaptation) using innovative educational techniques
  - Organization and holding of all types of practical training for students on enterprises using S&T Park innovative and technological possibilities
  - Evaluation of competence level of personnel on enterprises and organizations
- ***Equipment Sharing Center***
  - SuperComputing Center
  - 3D Prototyping Center
  - Software Sharing

INNOVATION INFRASTRUCTURE

SCIENCE AND TECHNOLOGY PARKS (2)

FACTS AND FIGURES IN THE MENA REGION

Country	Name of S&T Park	Features
Egypt	Mubarak City for Scientific Research and Technology Applications (MuCSAT)	Hosts **12 research centers**
Israel* *around 4% of GDP is spent on R&D (2014), higher than average for OECD countries	MATAM/Haifa Industrial Park for R&D Centers	- Hosts **50 leading high-tech companies** (ex. Intel, Elbit Systems, Microsoft, Philips, Zoran, Google, and Yahoo, among others) - Has **6,000 employees**
	Ashkelon Technology Incubator	- Hosts **light manufacturing spaces** - Legally established projects covering **patents ,** salaries, etc**.**
Jordan	Royal Scientific Society	- Has **600 staff members** - Hosts **8 research centers**
Morocco	Casablanca Technopark	- Supports **800 companies per year in Casablanca, 80 in Rabat**, and **20 in Tangier Technopark** - Hosts **250 Moroccan companies**, startups and SMEs with **2,000 employees**
Oman	Knowledge Oasis Muscat	- Hosts **1 One-Stop-Shop facility** handling all administrative services and commercial registration requirements with relevant government entities
Saudi Arabia	King Abdul-Aziz City for Science and Technology	- Hosts **6 research institutes** - Hosts the **Saudi Patent Office**
Tunisia	Elgazala Technopark	- Has **2,950 employees** - Creation of **300 new jobs** - Includes **1 incubator** and **18 regional Cyberparks**
UAE	Dubai Techno Park	- Has **133,000 employees** - Has housing for **60,000 permanent residents**

INNOVATION INFRASTRUCTURE

SCIENCE, TECHNOLOGY AND INNOVATION OBSERVATORY (1)

- **Definition and Objective**
  - A tool to provide independent information (quantitative and qualitative) about the structure and development of science, technology and innovation in Lebanon, to both public and private stakeholders on a regular basis, as well as the contribution to key economic metrics including employment, productivity, export activity and macroeconomic linkages
  - This information is best presented as an online platform (website) and can be complemented by periodic outreach and dissemination events such as workshops and trainings
  - The range of subjects it could cover include SMEs and innovation, labor market studies, access to finance, access to infrastructure, academia-industry technology transfer, and sector studies
- **Means of Creating the Observatory**
  - This includes data collection, data housing, data analysis, and dissemination of studies
- **Stakeholders Involved**
  - Ministry of Economy and Trade, Banque du Liban, Ministry of Education and Higher Education, Ministry of Industry, Ministry of Finance Commercial Registry, Lebanese Chamber of Commerce, Central Administration of Statistics

INNOVATION INFRASTRUCTURE

SCIENCE, TECHNOLOGY AND INNOVATION OBSERVATORY (2)

- **Organization**
  - A cooperation framework should be signed between all the involved ministries and other governmental institutions
  - The framework should outline high-level principles related to the rationale and purpose of an Observatory
  - A steering committee should be created comprising all key stakeholders with the objective of overseeing the operationalization of the Observatory and playing an advisory role on subjects covered by the Observatory

INNOVATION INFRASTRUCTURE

SCIENCE, TECHNOLOGY AND INNOVATION OBSERVATORY (3)

- **Key Performance Indices (KPIs) for the National Innovation System**
  - **Absorptive Capacity**
    - Expenditures in education in % of GDP
    - Science and Engineering graduates
    - Population with tertiary level education
    - Employment in medium/high-tech industries
    - Employment in high-tech services industries
  - **R&D Capability**
    - Public R&D expenditures (% GDP)
    - Business R&D expenditures (% GDP)
    - R&D personnel per labor force
    - High-tech patents (per million population)
    - Resident patents per capita
  - **Diffusion**
    - Training enterprises as % of all enterprises
    - Continuous Vocational Training in % of labor costs of all enterprises
    - ISO 9000 certifications per capita
    - Internet users per 10,000 inhabitants
    - PC per 100 inhabitants
    - ICT expenditures (% GDP)
  - **Demand for R&D and Innovation**
    - Stock market capitalization in % GDP
    - Domestic credit provided by banking sector
    - Share of FDI in GDP
    - Share of trade in GDP
    - Index of patent rights
    - Registered unemployment
    - Consumer price index

Source: Kutlaca, D. (2008). *Measurement of National Innovation Capacity: Indicators for Serbia*

INNOVATION INFRASTRUCTURE

SCIENCE, TECHNOLOGY AND INNOVATION OBSERVATORY (4)

Type of Knowledge Flow	Main Indicator
Industry Alliances	
Inter-firm research cooperation	Firm Surveys Literature-based Counting
Industry-University-Research Institutes Interactions	
Cooperative R&D Co-patents Co-publications Industry use of university/research institute patents Cooperative information-sharing	University Reports Government Reports Patent Record Analysis Publications Analysis Citation Analysis Firm Surveys
Technology Diffusion	
Technology use by industry Embodied technology diffusion	Firm Surveys Input-Output Analysis
Personnel Mobility	
Movement of technical personnel among industry, universities and research institutes	Labor Market Statistics University/Institute Reports

Source: OECD, *National Innovation Systems*

INNOVATION INFRASTRUCTURE
ARAB FUND FOR INNOVATION (1)

- **Putting in place an Arab Fund for Innovation**
  - **Mechanism**: the Fund should be based on Public-Private Partnerships
  - **Objectives**
    - To invest in social and technological innovations that aim to improve the lives and opportunities of millions of people in the Arab World
    - To pool talent and expertise from the participating countries to form a collective and integrated network
    - To help in the integration of markets and resources (human capital, technology, infrastructure, etc.)
    - To support a collective innovation strategy for the Arab World

INNOVATION INFRASTRUCTURE
ARAB FUND FOR INNOVATION (2)

- **Principles of the Arab Fund for Innovation**
  - **Include but are not limited to:**
    - Transparency
    - Replicability
    - Fair Allocation
    - Shareholder Participation and Cooperation
    - Compliance
    - Periodic Review and Reporting

Source: Triodos Bank. *Principles of Fund Governance*