

# **Bahrain International SME's Empowerment Conference**

## **Government Policy Enabling Knowledge Based Industries**

**Empowering SME's by adding Knowledge**

**Feb. 2014**

Adding value (GDP) and Knowledge Based Industries (KBI)

SME's in GCC Countries from Knowledge Based Industry

Government Policy enabling knowledge in production & services

Knowledge Based Economy (KBE) is the Economy that knowledge adds values to its products, services and skills.

- Globalization (flow) & ICT (tool) are vehicle toward KBE
- Knowledge Economy utilizes knowledge to generate tangible and intangible values (Wikipedia.org).
- In consequence, KBE will enhance performance of individuals & enterprises and will contribute effectively in the value addition of the GDP
- **KAM** (knowledge Assessment Methodology) is benchmark tool helps to identify level of knowledge –based Economy of per country. It has four parameters: Economic & institutional regimes , ICT, Education & Innovation systems and infrastructure
- **KEI** (Knowledge Economy Index) is derived index from KAM measuring degree of a country to generate, adopt and diffuse knowledge and use it effectively in its activities

# Main parameters of Knowledge Assessment Methodology 'KAM' & Knowledge Economic Index (KEI), World bank. KEI is an indicator measuring environmental readiness of a country to utilize knowledge in its business activities

## ➤ The Economic Incentive and Institutional Regime

- Tariff & Nontariff Barriers (the Heritage Foundation's Trade Policy index)
- Regulatory Quality (Governance indicators WB). (the incidence of market-unfriendly policies such as price controls or inadequate bank supervision)
- Rule of Law (Governance indicators WB). (perceptions of the incidence of both violent and non violent crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts)

## ➤ Education and Human Resources

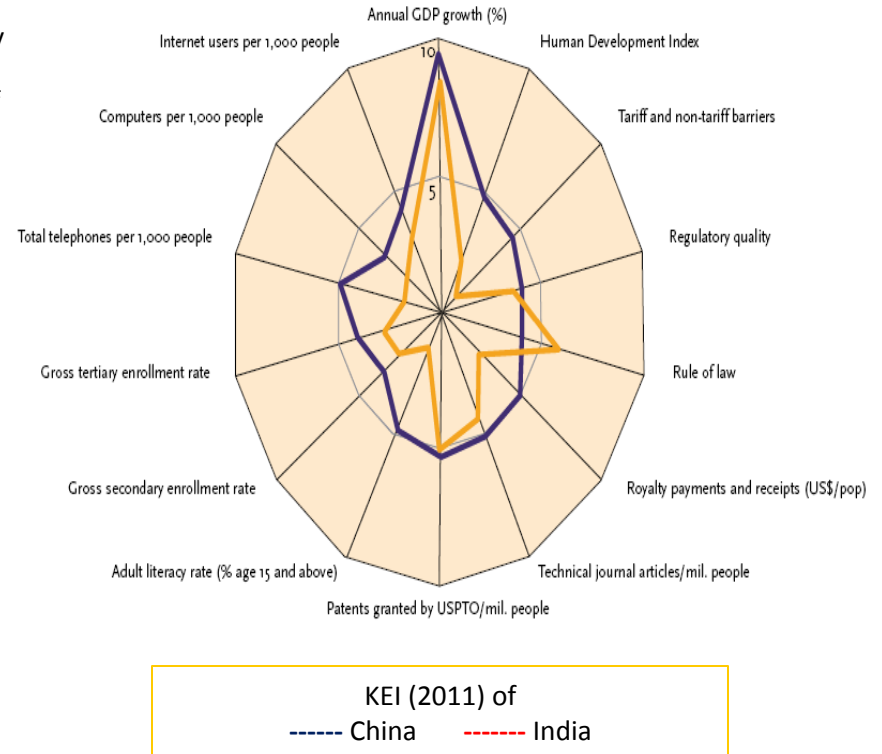
- Adult Literacy Rate
- Secondary Enrolment
- Tertiary Enrolment

## ➤ The Innovation System

- Researchers in R&D
- Patent Applications Granted by patent and Trademark Office
- Scientific and Technical Journal Articles

## ➤ Information and Communications Technology (ICT)

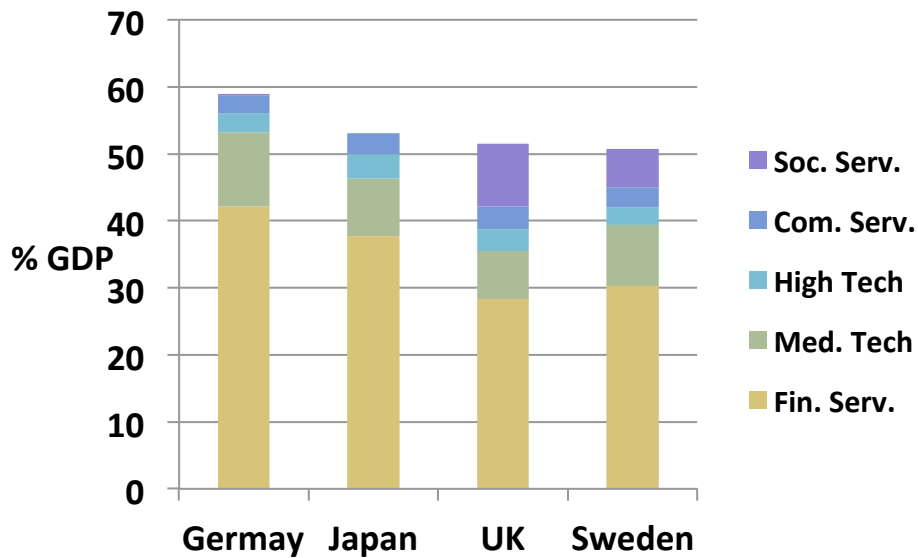
- Telephones per 1,000 people
- Computers per 1,000 people
- Internet Users per 1,000 people



The KAM Knowledge is an indication of a country's ability to generate, adopt and diffuse knowledge

The Knowledge Economy Index (KEI) is environmental preparedness to utilize knowledge in Economic development

# Share of Knowledge Based Industries (KBI) in GDP, current prices; STI scoreboard indicator, OECD 1999



**Knowledge-based industries (KBI)** and services are the business activities utilizing intensively high technology and skilled workforce. It consists of the following activities:

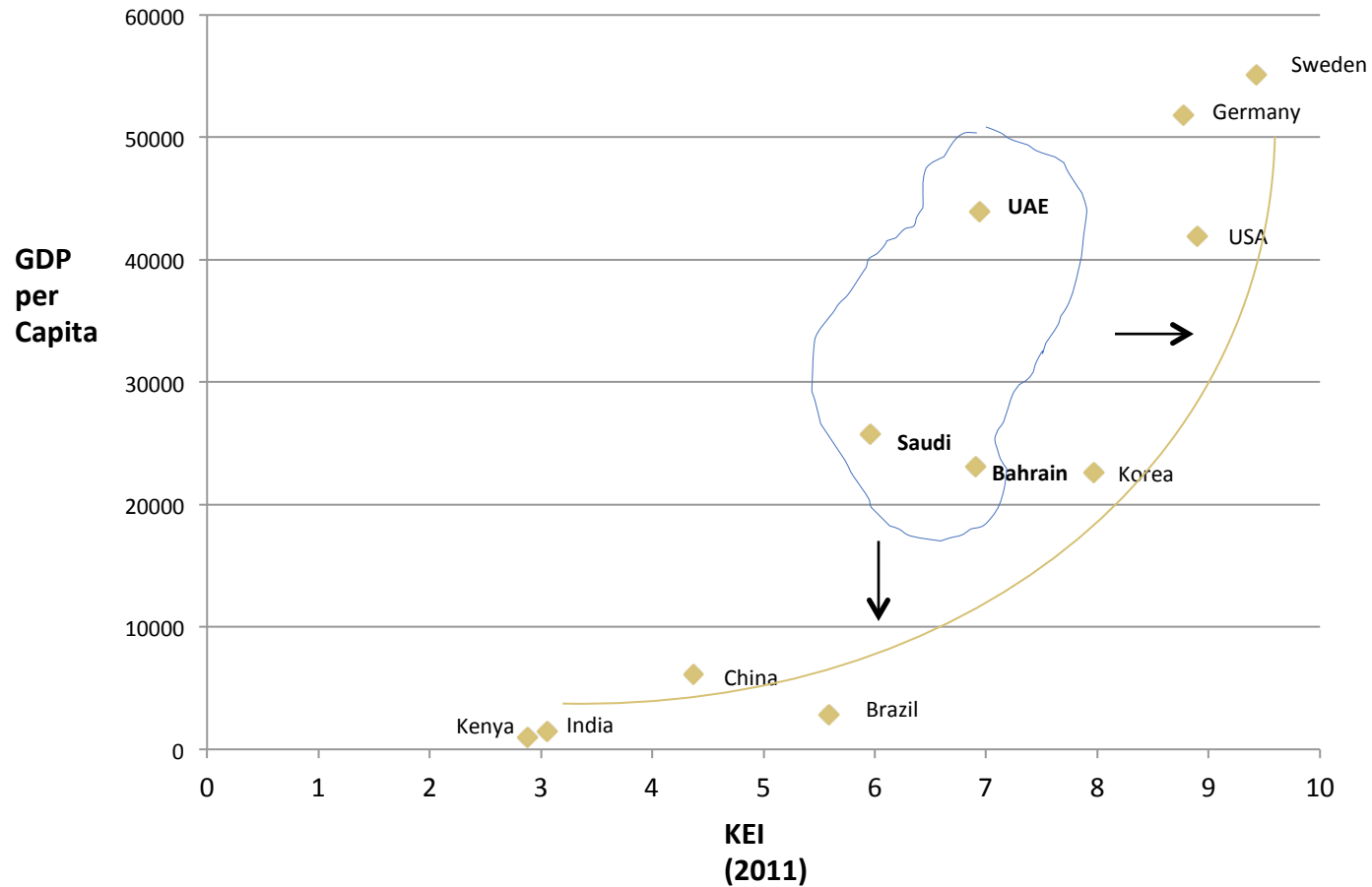
- High technology manufacturing (HS)
- Medium – high technology manufacturing (MS)
- Finance, insurance and other business services (FS)
- Communication services (CS)
- Community, social and personal services (SS)
- Combination of the others (OS)

Country	% of KBI of total GDP	High Tech Industries	Medium – high Tech Industries	Communicat. services	Fin., Ins., and other Bus. Serv.	Community, social services
Germany	58.6	2.9	11.1	2.6	42.1	0.2
USA	55.3	3.0	6.1	2.9	30.8	12.5
Japan	53.0	3.7	8.6	3.0	37.7	0.0
UK	51.5	3.3	7.2	3.3	28.3	9.4
Canada	51.0	2.2	6.1	3.3	24.1	15.3
Sweden	50.7	2.6	9.1	3.0	30.3	5.7

GCC countries scored relatively high KEI (conducive environment to knowledge) comparing to developed countries (2011)

country	KEI	KI	Economic Incentive	Education & HR	Innovation system	ICT	GDP per capita
<b>Sweden</b>	9.43	9.38	9.58	8.93	9.70	9.49	55,041
<b>Germany</b>	8.90	8.83	9.10	8.20	9.11	9.17	41,862
<b>USA</b>	8.77	8.89	8.41	8.70	9.41	8.51	51,748
<b>Korea</b>	7.97	8.65	5.93	9.09	8.80	8.05	22,590
<b>Brazil</b>	5.59	6.05	4.17	5.61	6.31	6.24	2,810
<b>China</b>	4.37	4.57	3.79	3.93	5.99	3.79	6,091
<b>India</b>	3.06	2.89	3.57	2.26	4.50	1.9	1,489
<b>UAE</b>	6.94	7.09	6.50	5.80	6.60	8.88	43,908
<b>Saudi</b>	5.96	6.05	5.68	5.65	4.14	8.37	25,707
<b>Bahrain</b>	6.90	6.98	6.69	6.78	4.61	9.54	23,039

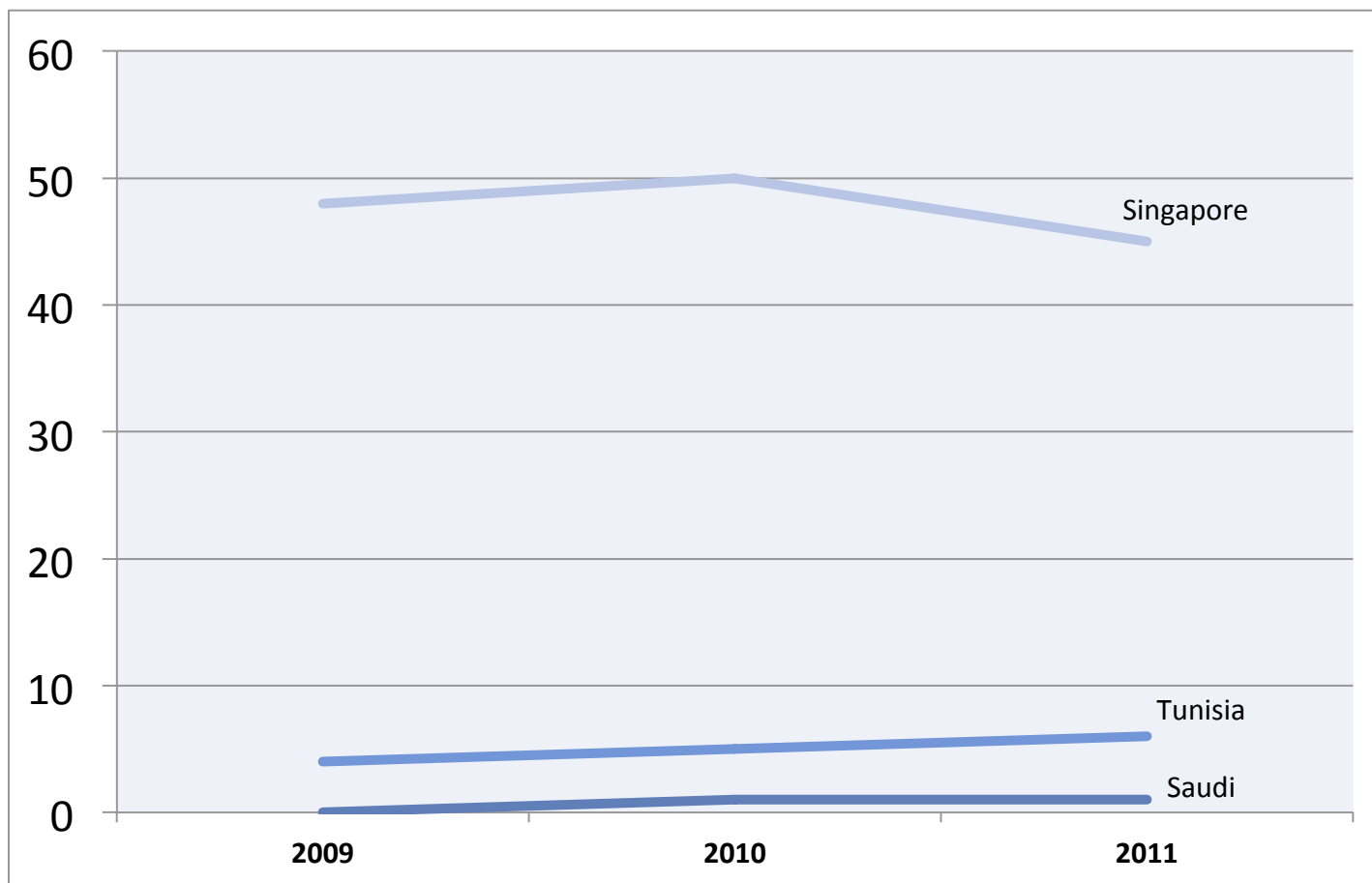
GCC countries scored high Knowledge Economic Index (KEI) and GDP per capita; but it does not fit with the rest of the world's countries of GDP & KEI performance



GCC countries have conducive environment and high GDP but un able to match the rest of the world in terms of low knowledge based industries

High tech. Exports (high-technology exports or products that have high R&D intensity such as aerospace, computer, pharmaceutical, scientific instrument and electrical machine), World Development Indicator, high tech (% manufacturing), World Bank, 2013

% of high tech Export



Country	KEI	KI	EC.	Ed.	In.	ICT
Tunisia	6.94	7.09	6.50	5.80	6.60	8.88
Saudi	5.96	6.05	5.68	5.65	4.14	8.37
Singapore	6.90	6.98	6.69	6.78	4.61	9.54



# High and high-Medium technology industries require high value of R&D.

## R&D Intensity varies depending on type of industries

Industry name	Total R&D-intensity (1999, in %)	ISIC Rev. 3
<b>High-Technology</b>		
Pharmaceuticals	10.46	2423
Aircraft & spacecraft	10.29	353
Medical, precision & optimal instruments	9.69	33
Radio, television & communication equipment	7.48	32
Office, accounting & computing machinery	7.21	30
<b>Medium-High-Technology</b>		
Electrical machinery & apparatus	3.60	31
Motor vehicles, trailers & semi-trailers	3.51	34
Railroad & transport equipment	3.11	352+359
Chemical & chemical products	2.85	24 (excl. 2423)
Machinery & equipment	2.20	29

### Knowledge based industries (KBI)

#### Different activities with main input 'Knowledge'

#### ➤ Creative industry (CI)

Business activities based on skills and talent (Advertisement, Architectural, Arts, Antiques, Crafts, Design, Film, Photo, Graphics, Software, Music, Publishing, Television/Radio)

#### ➤ Knowledge Intensive Business Services (KIBS)

Business operation heavily reliant on professional knowledge & human resources such as engineers, scientist, experts (exploration, power generation, space industry, electronic hardware, etc)

#### ➤ Technology Intensive Industry (TII)

Industries implement high degree of research or produce products/system depend on high R&D intensity (Artificial intelligent, Biotechnology, Instrumentation, Telecommunication, Nanotechnology, Optoelectronic, Robotics, Nuclear physics, Aerospace, etc)

Adding value (GDP) and Knowledge Based Industries (KBI)

SME's in GCC Countries from Knowledge Based Industry

Government Policy enabling knowledge in production & services

SME's are cross sectors business activities range from micro to medium size. In GCC, contribution of MSME (Micro, Small & Medium Enterprises) on GDP, employment, exports are low. Performance of SME's in Bahrain is similar to those in GCC countries due to similarity in Governance and economic structure

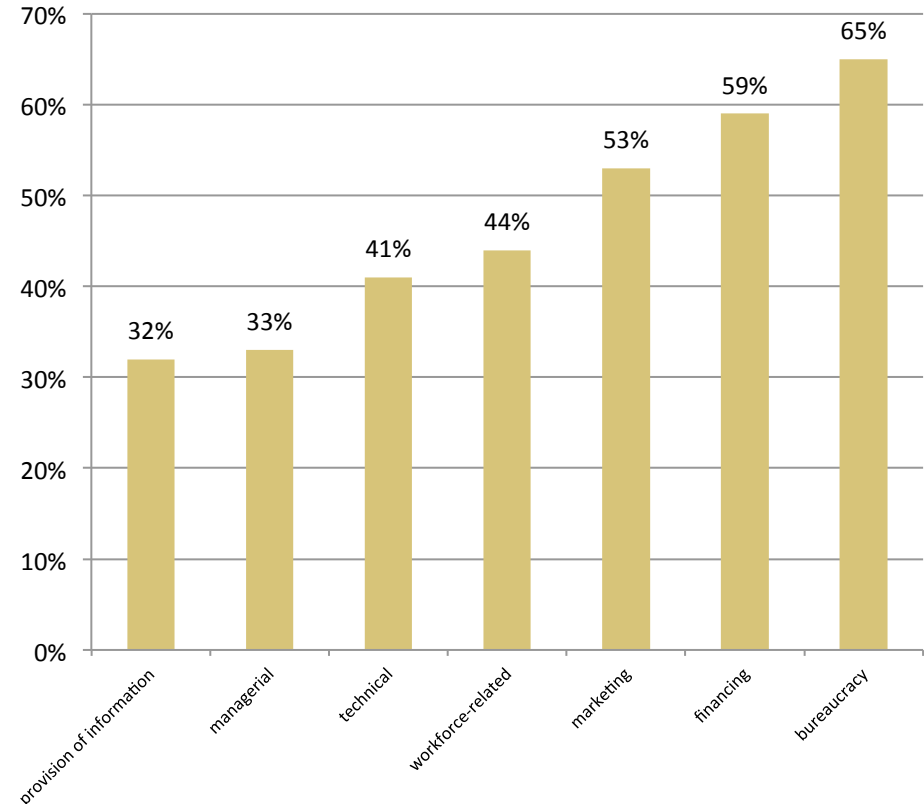
	<b>Bahrain*</b>	<b>Europe</b>	<b>S. Korea</b>
No. of Enterprises	99.4% of 46,882	99.7% of 20,752,000	99.9% of 3,020,000
No. of Employees	74% of 447,780 (only 14% Bahrainis)	67% of 133,362,000	87% of 10,880,000
Contribution to GDP %	28	58	(Est.) 56
Export %	8	-	32 (of \$ 325 billion)
% Micro (Enterprise / Employees)	87 28	91.8 29.7	94.3
% Small (Enterprise/ Employees)	10 25	6.9 20.7	5
% Medium (Enterprise/ Employees)	1.7 21	1.1 17	0.7
% Manufacturing	14	11.3	-
% Construction	14	14.4	-
% Trading / Services	42	31.5	-
% Real Estate	-	28.1	-

- SME's contribute about 10% to local employment and less to exports
- Local SME's has low contribution to GDP
- Distribution of micro, small & medium enterprises (MSME) follow similar international pattern
- MSME's in GCC have low value addition of activities

## In GCC, SME's support programs should shift toward enabling environment by supporting knowledge based production & services and building the required infrastructure (Policy)

### Main findings and recommendations of study conducted by FGCCC (Federation of Chamber of Commerce of GCC countries), 2009

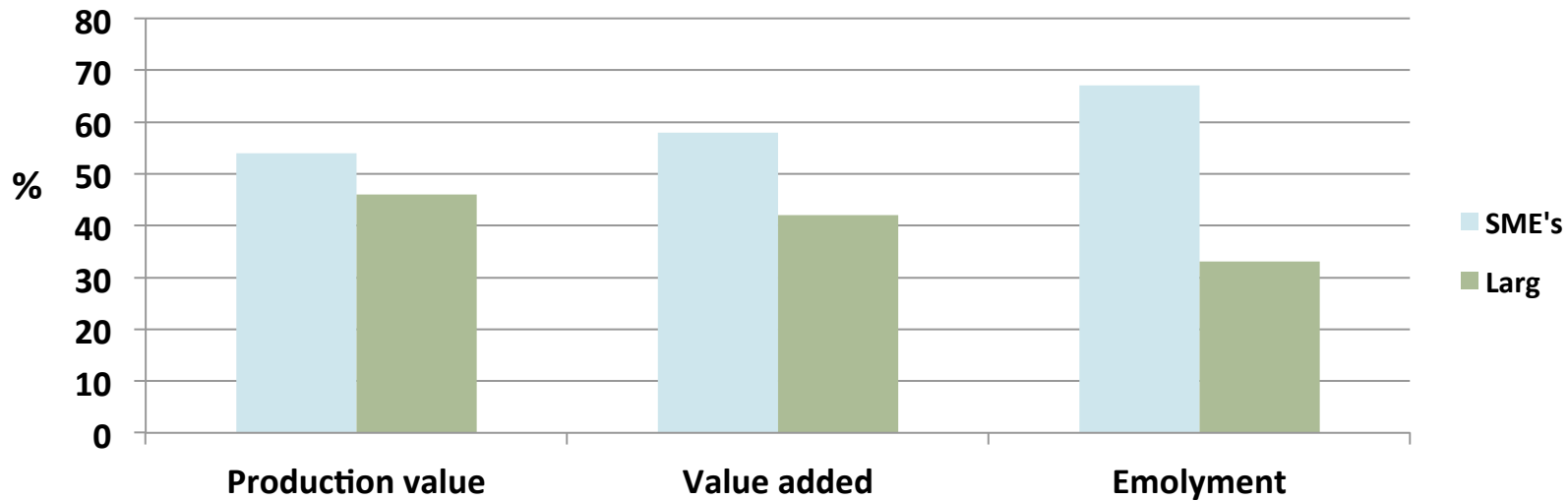
- Simple contracting and trading operations, other sectors tend to be under-represented
- offer very little employment to Gulf citizens
- Existing SME support programs are fragmented and have not seen a systematic evaluation of their results
- SME support programs are not enabling environment (subsidise )
- No cooperative structures among SMEs
- SME's remain domestically oriented



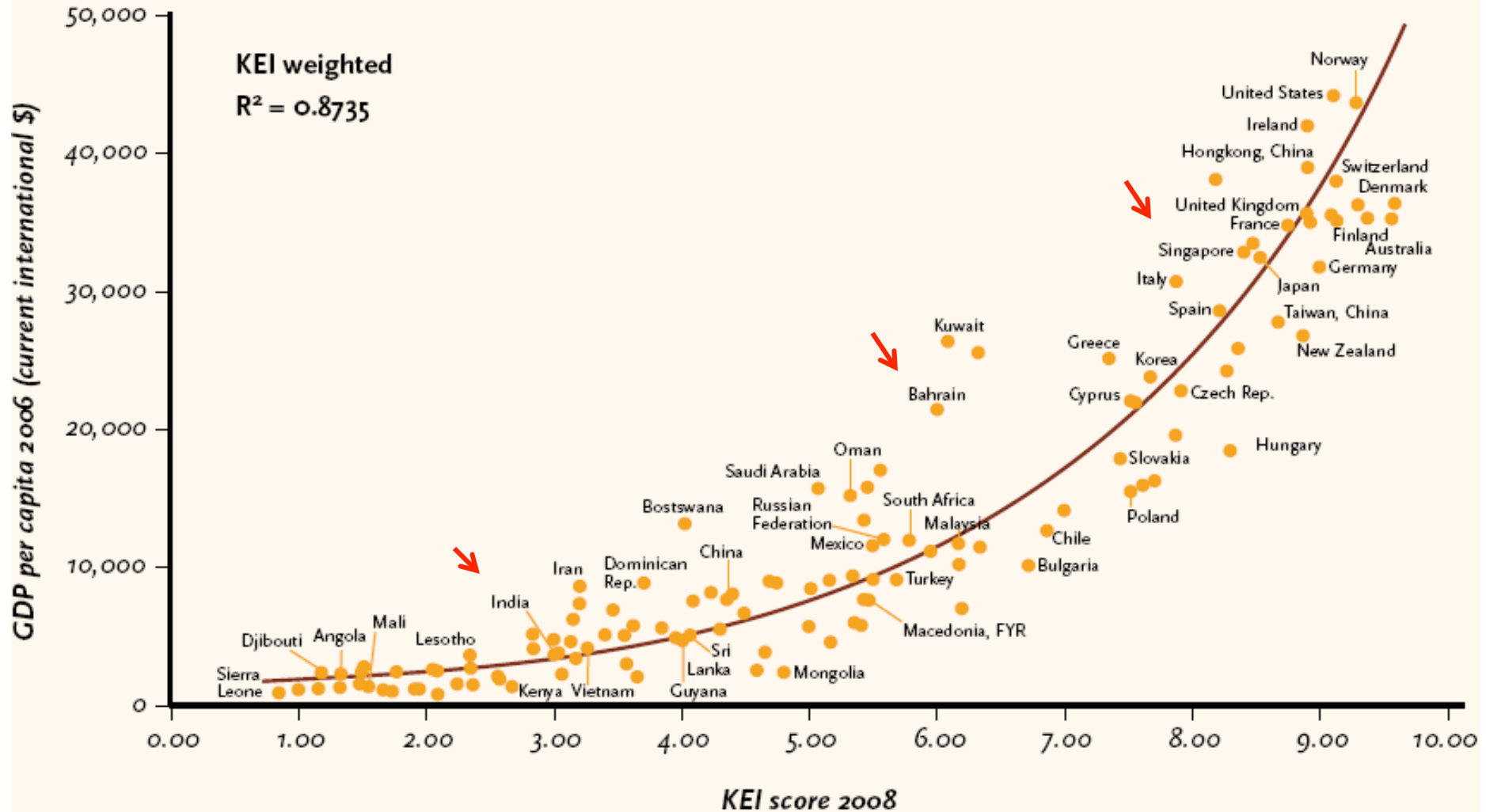
- Banks in GCC countries reject 50% – 70% of MSME's credit applications. In Europe, over 70% of their applications are accepted (2009)
- Local Credit bureau is needed supporting local SME's

In EU, SME's contribute more than large enterprises to GDP. Annual Report on EU small & medium sized enterprises 2009, European Commission, Directorate General for Enterprise and Industry

	Euro (Billion)	% SME	% Large
Production	17,122	54	46
Value added	6,126	58	42
No. Employee	133.3 million	67	33



Level of Economy development performance: (GDP) vs. preparedness (KEI) to knowledge based economy, World Bank 2008. SME's in GCC have conducive environment toward KBA



Government policies in GCC should help in changing SME's business model toward employability of local citizen, higher added value production and international networking

### Main findings and recommendations of SME's in GCC

- Proportional relationship between added value services / products and employability of local. SME's in GCC are not able to attract local employees due to its un ability to provide high salaries and high skill job
- Business model of employment in SME's should be changed (local owner and expatriate employees) to impact growth of local employment
- Current SME's development programs and initiatives are not affective enough to change (increase) value addition of products / services and skills of local SME's
- Government should develop innovation and knowledge content systematically into SME's performance (long term process: infrastructure, incentives, training, employment policies). In short term (leapfrog), Government should focus on developing certain activities of selected cluster/s (directive incentives)

Adding value (GDP) and Knowledge Based Industries (KBI)

SME's in GCC Countries from Knowledge Based Industry

Government Policy enabling knowledge in production & services



# Policies of Science & Technology (S&T) of selected countries: Korea, Singapore, & Malaysia

Source: Science & Technology Policies in South Asia: Brussels, European Commission, Directorate-General for Research unit RTD – K.2 – June 2002

**Korea S&T policy** is depending on financial subsidies of all sectors (SME's) and large enterprises

- **Enabling large industries** (Chaebel) to develop their products and services (outsourcing skills, transfer technology, R&D support)
- **Encouraging FDI** (Volvo acquired 730 million of Samsung construction, Philip purchased 50% of LG at \$ 1.4 billion)
- **Supporting SME's** with loans at low interest and up to 100% of the total investment, encouraging subcontracting by large industries
- **Attracting high venture capital industry** (more than 60) and technology credit guarantee
- **Supporting industrial patent** (increase international competitiveness)

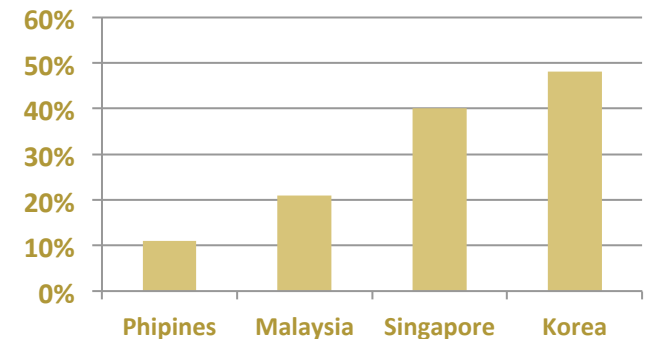
**Singapore S&T policy** is depending on increasing competitiveness and value add products & services

- **Government intervene** to encourage target industry (niche industries)
- **Orienting Education** toward industries and skill development funds (SIDF) and encouraging SME's to trained its employees
- **Encouraging clustering, modernizing SME's** and developing networking
- **Encouraging FDI's** (second FDI destiny after China) in Asia
- **Encouraging high tech entrepreneurial start ups** (Biotechnology, ICT, software, life science)

**Malaysia S&T policy** is depending on integrating its knowledge industries and increasing its competitiveness and FDI's

- **Developing production capabilities**
- **Encouraging FDI's with export oriented**
- **Developing in-house training and reorienting education** toward market needs
- **Encouraging heavy industry with export orient**
- **Developing R&D infrastructure** such as technology parks (ISMIDEC), Microelectronics institution (MIMOS), standard and industrial research institute (SIRIM)

Share of Med. & High Tech Manuf. Exports



**KACST** (King Abdul-Aziz City for Science & Technology) in Saudi and **SERST** (Secreriate d'Etat aLa Recherch Scientifique La Technologie) in Tunisia are the S&T body ... No proactive industrial involvement of policy makers in Arab world..

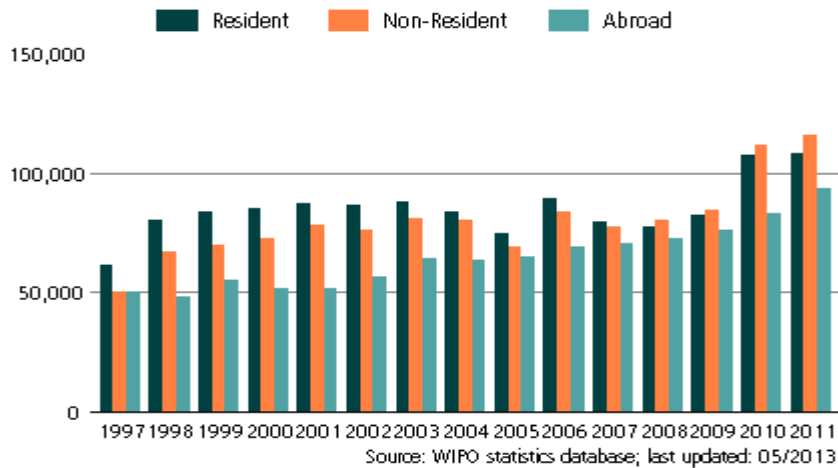
## Current status of Science & Technology (S&T) policies of Arab countries

- S&T policies of Arab world in general and in GCC countries in specific are not intervening in developing knowledge value addition of their industries
- FDI's in GCC countries are derived by resources & incentives (FDI's concentrate on oil/gas upstream, refinery, petrochemical industries)
- Incentive policies of GCC countries depend on subsidized land, gas, taxes and labors (expatriates), There is no directive incentive toward certain industries
- GCC countries have low venture capital (VC) banks. Most of the VC activities concentrate on Real Estate
- Ministries of Education (higher Education) are the responsible body of S&T policies. Industries have no leading role. The S&T policies of GCC countries concentrate on developing R&D with no coordination with industrial and trading strategies
- GCC education systems and curriculums need to be oriented toward certain development policy (for example, innovation and entrepreneurships)
- SME's business model depends on foreign low wage & under skilled labor. Local SME's & entrepreneurs have low business innovation (patents, researches, new ideas or products or services, etc.)

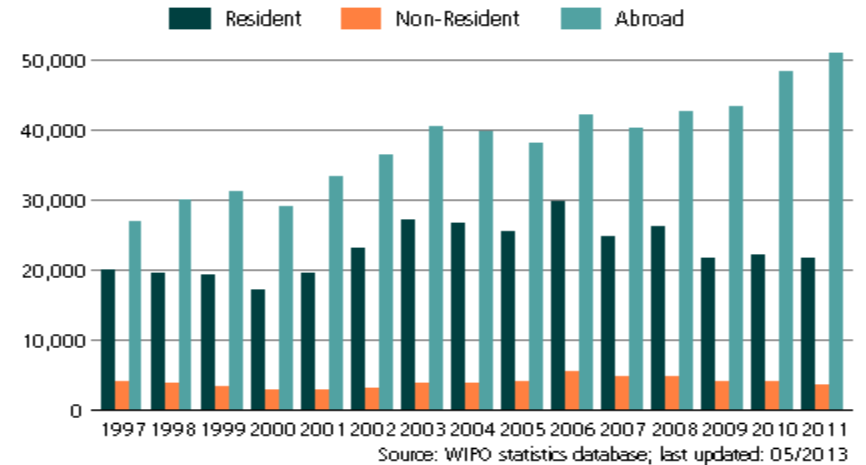
# Industries in GCC and Arab countries have low patent registrations

## Patent Grants, WIPO 2011

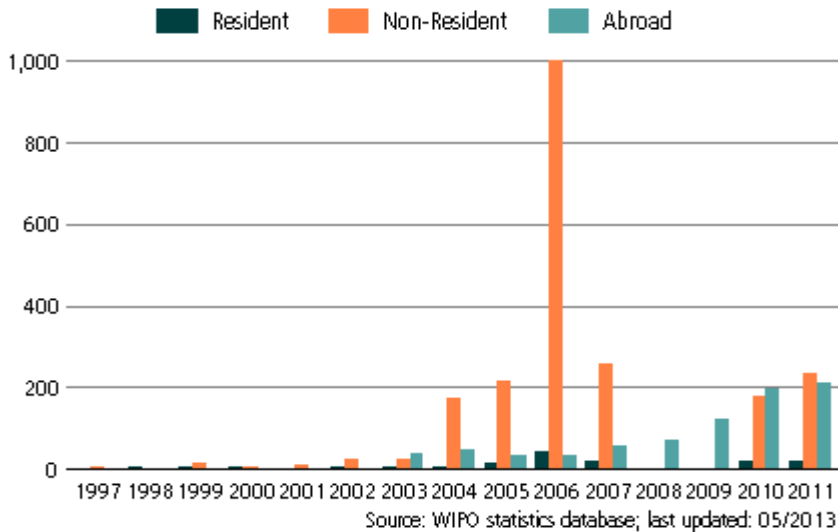
### USA



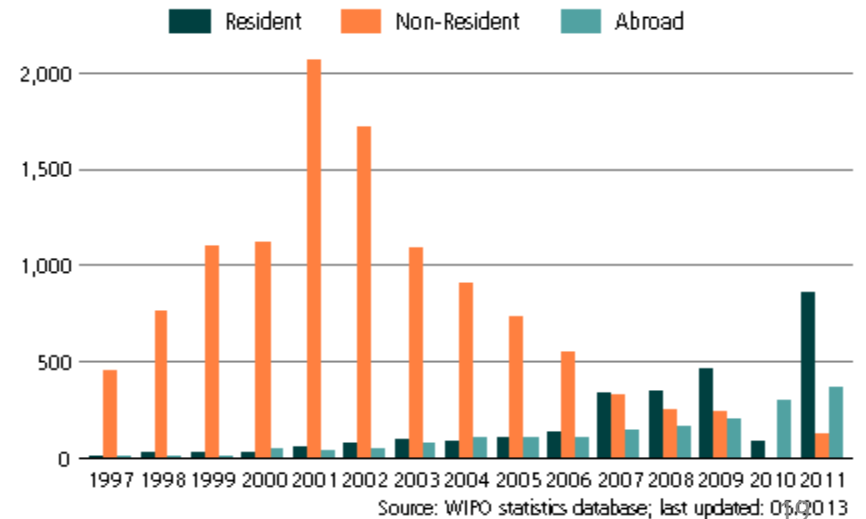
### Germany



### Saudi



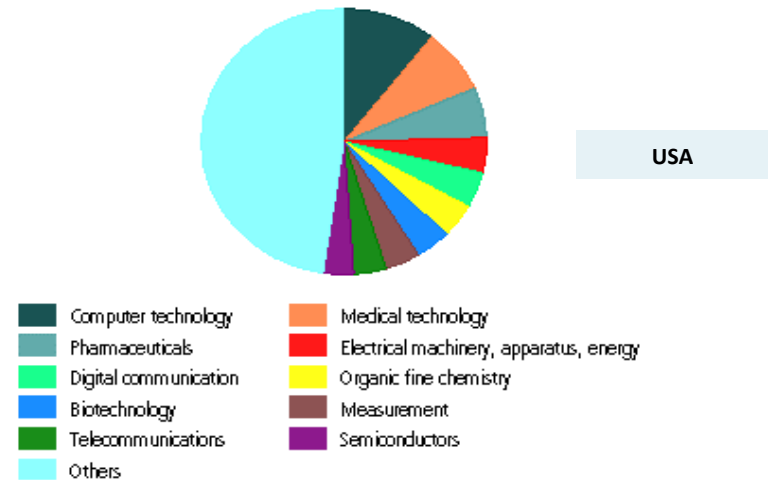
### Turkey



# Arab world showed low patents; in consequence little contribution to knowledge based services and products; Patent Grants, 2011, WIPO

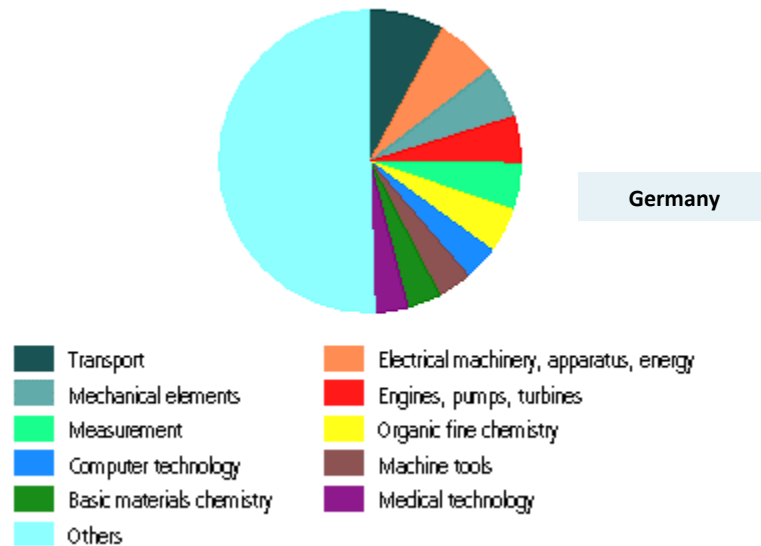
Country	Patents (2011)
China	112,347
USA	108,626
Germany	21,789
Turki	865
Singapore	484
Egypt	61
Saudi	17

Patent Applications by Top Fields of Technology (1998 - 2012)



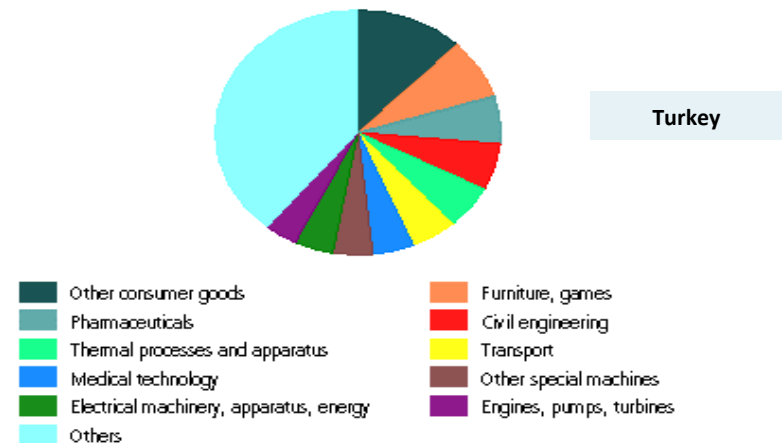
Source: WIPO statistics database; last updated: 01/2014

Patent Applications by Top Fields of Technology (1997 - 2011)



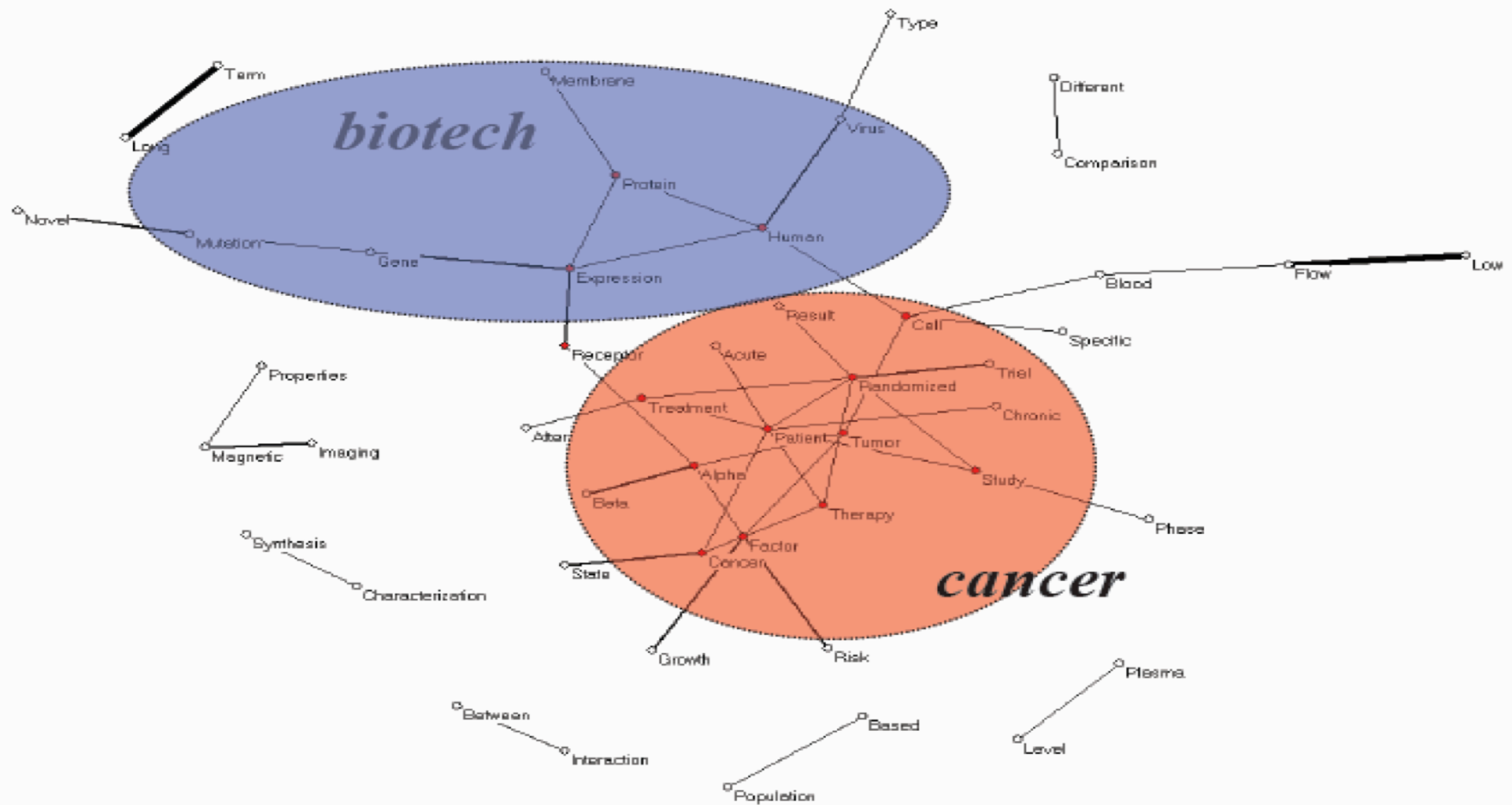
Source: WIPO statistics database; last updated: 05/2013

Patent Applications by Top Fields of Technology (1998 - 2012)

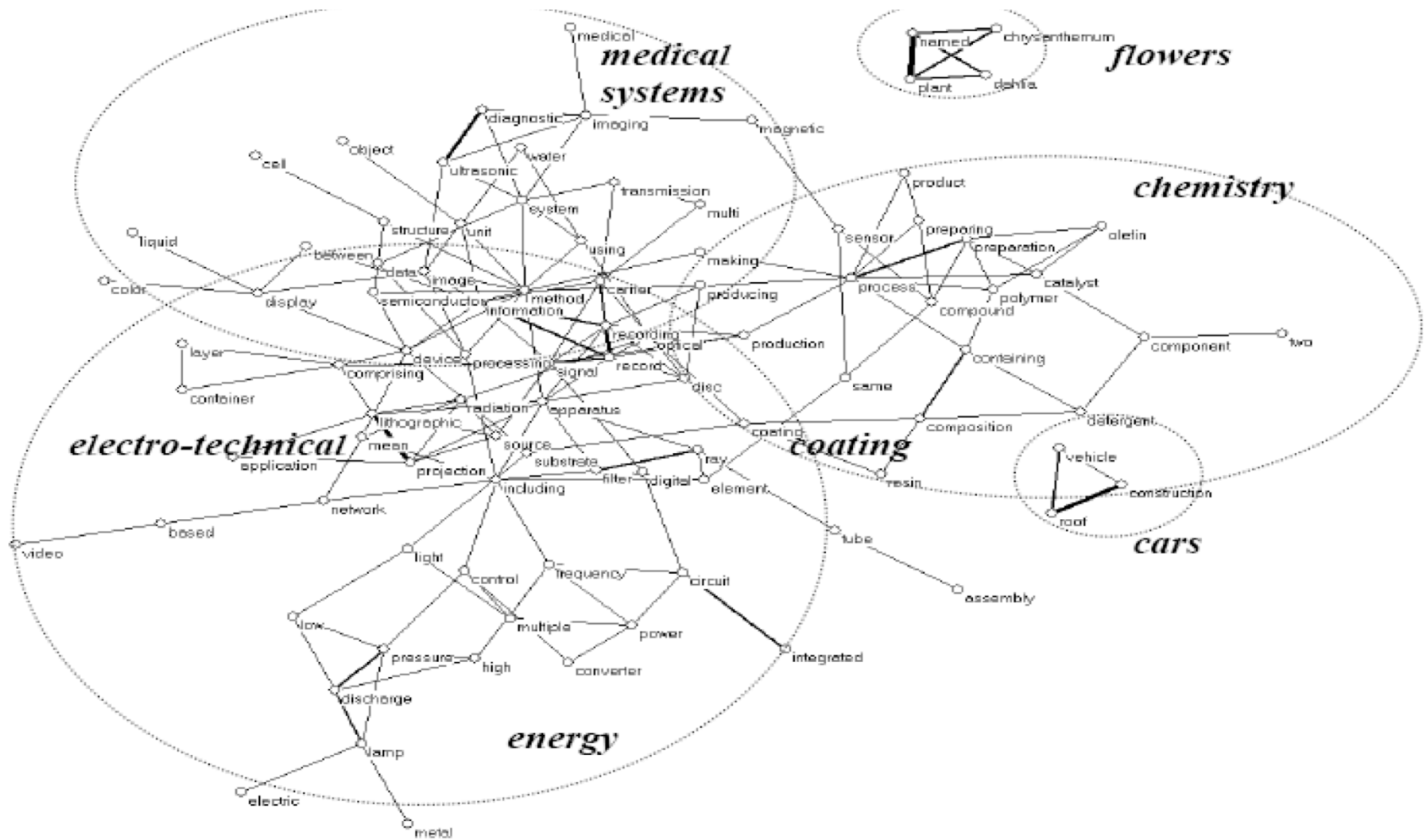


Source: WIPO statistics database; last updated: 01/2014

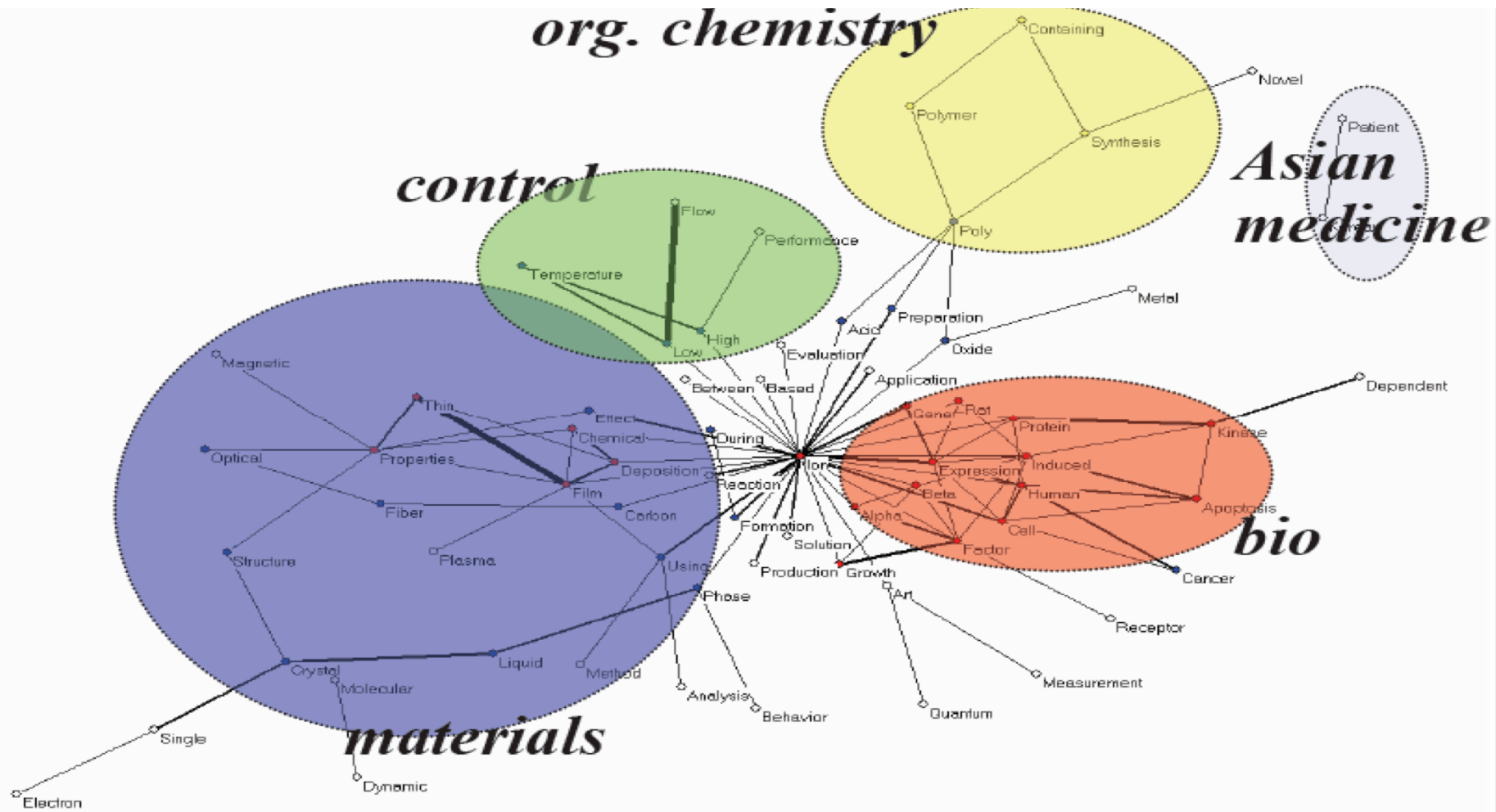
# Road map of Scientific citations Netherland (R&D Activities Toward Innovation; Netherland Set of Publications Covered by Science Citation Index, 2002)



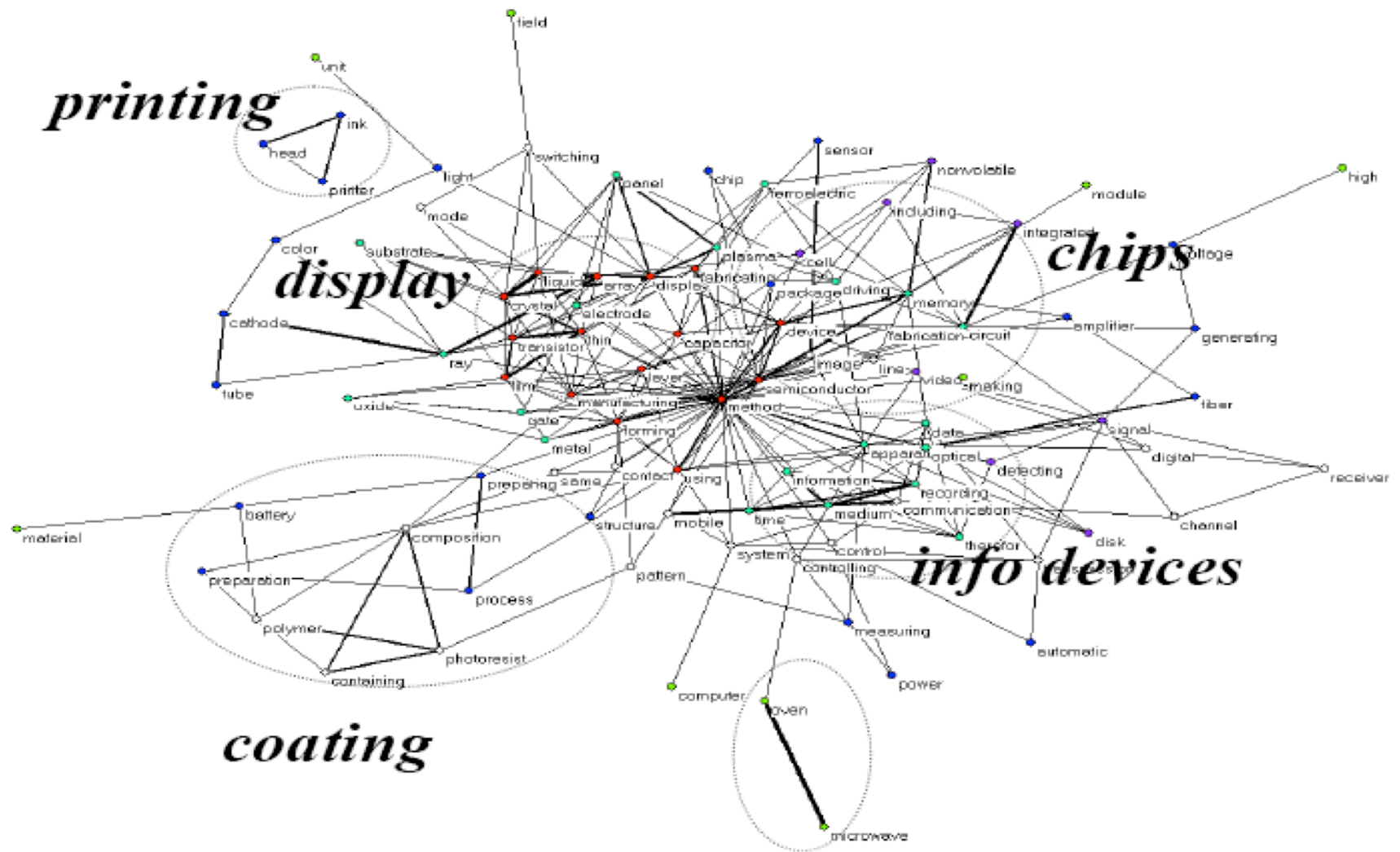
# Road map of industrial patents Netherland (Netherland set of patents of assignees or inventors, 2002)



Road map of Scientific citations South Korea (R&D Activities Toward Innovation; South Korea Set of Publications Covered by Science Citation Index, 2002)



Road map of industrial patents South Korea (R&D Activities Toward Innovation; South Korea set of Patents of assignees or inventors, 2002)





# Examples of Technology based Services & Products - high & medium technology business activities. GCC policy can target certain industries (selected as short term policy)

## Applied science

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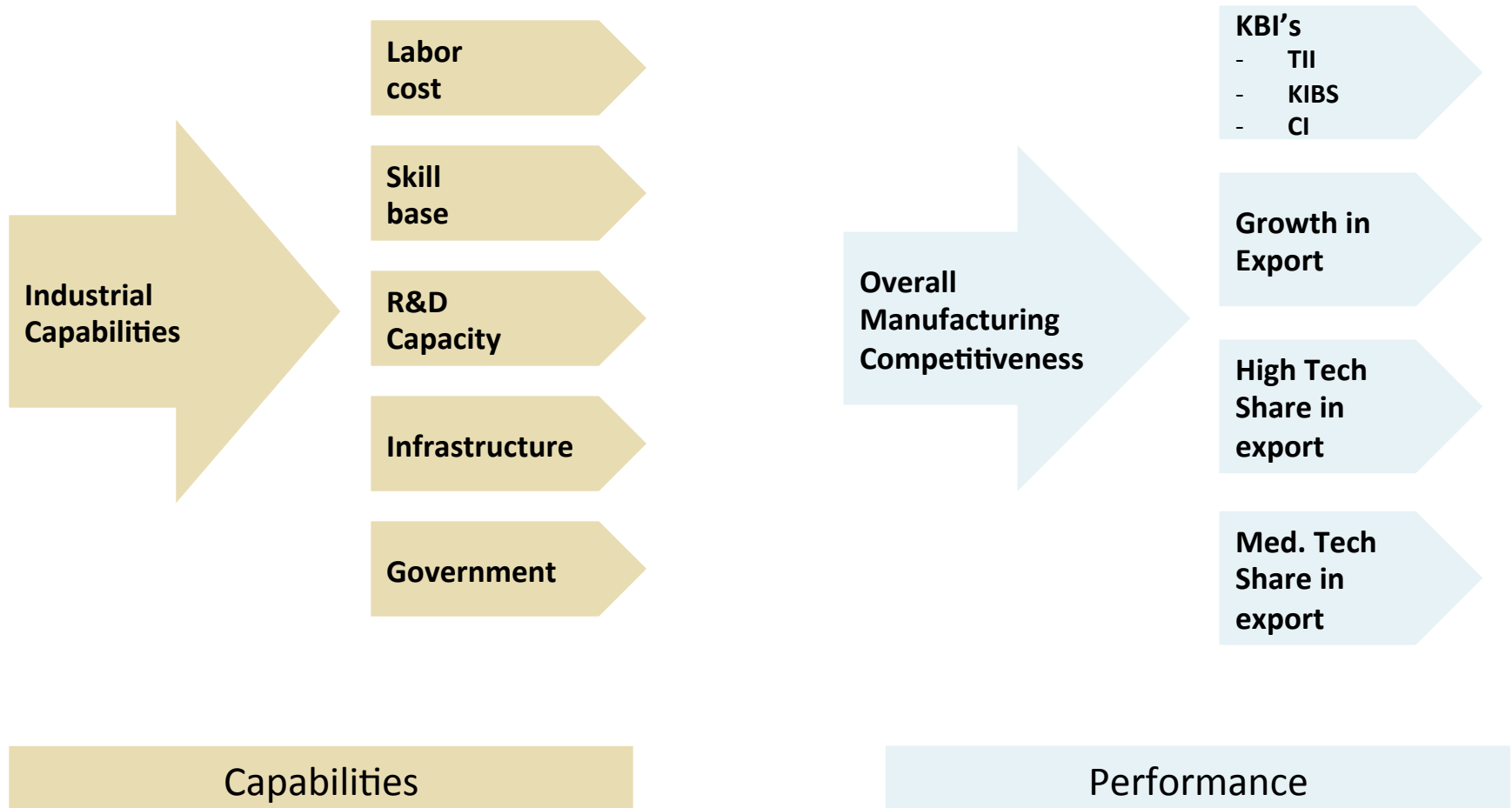
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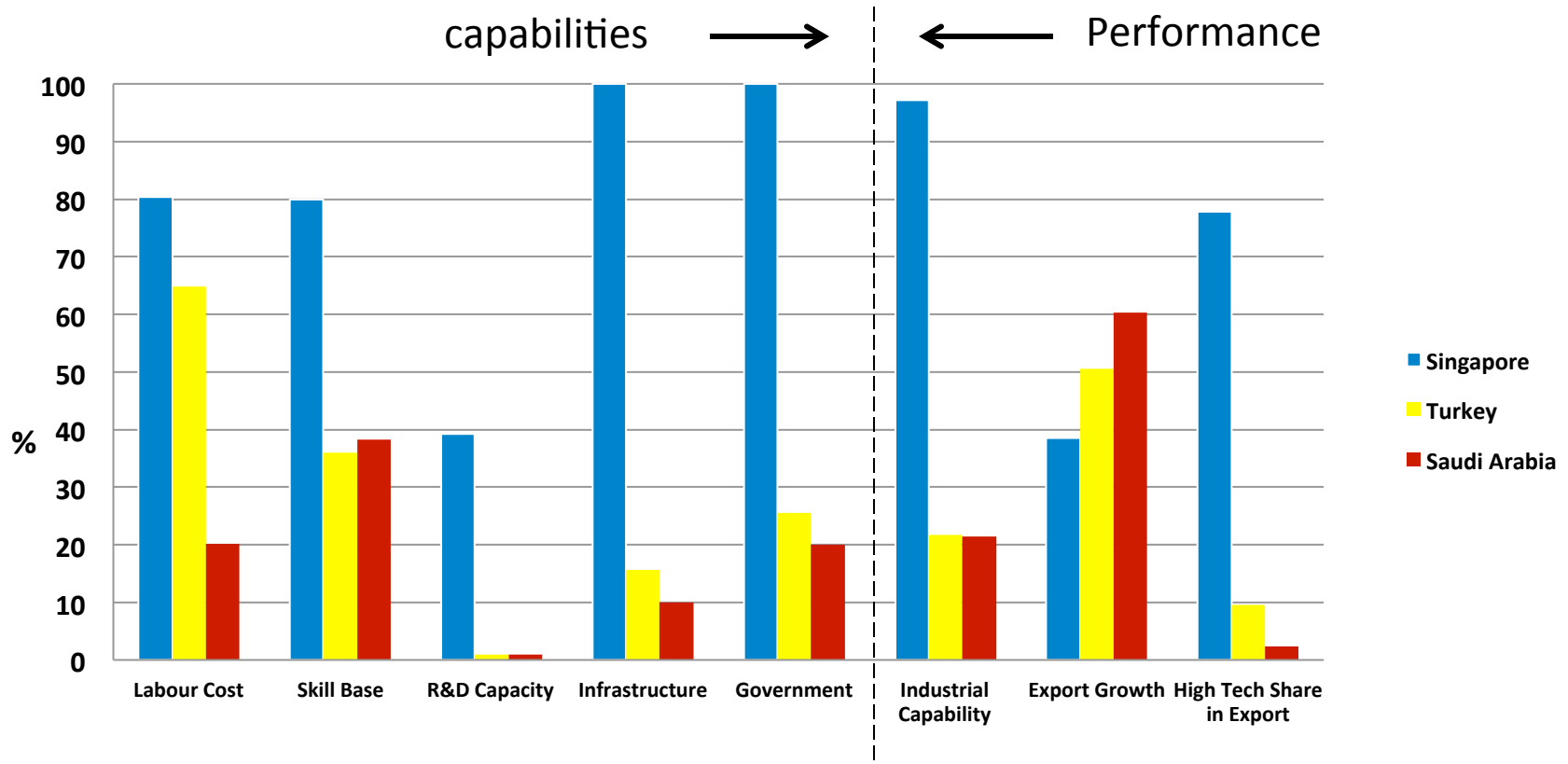
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GCC economic policies should develop capabilities and environment that assist private/ public sector to adapt knowledge services & products. Capabilities & performance parameters from: Global Production Score board

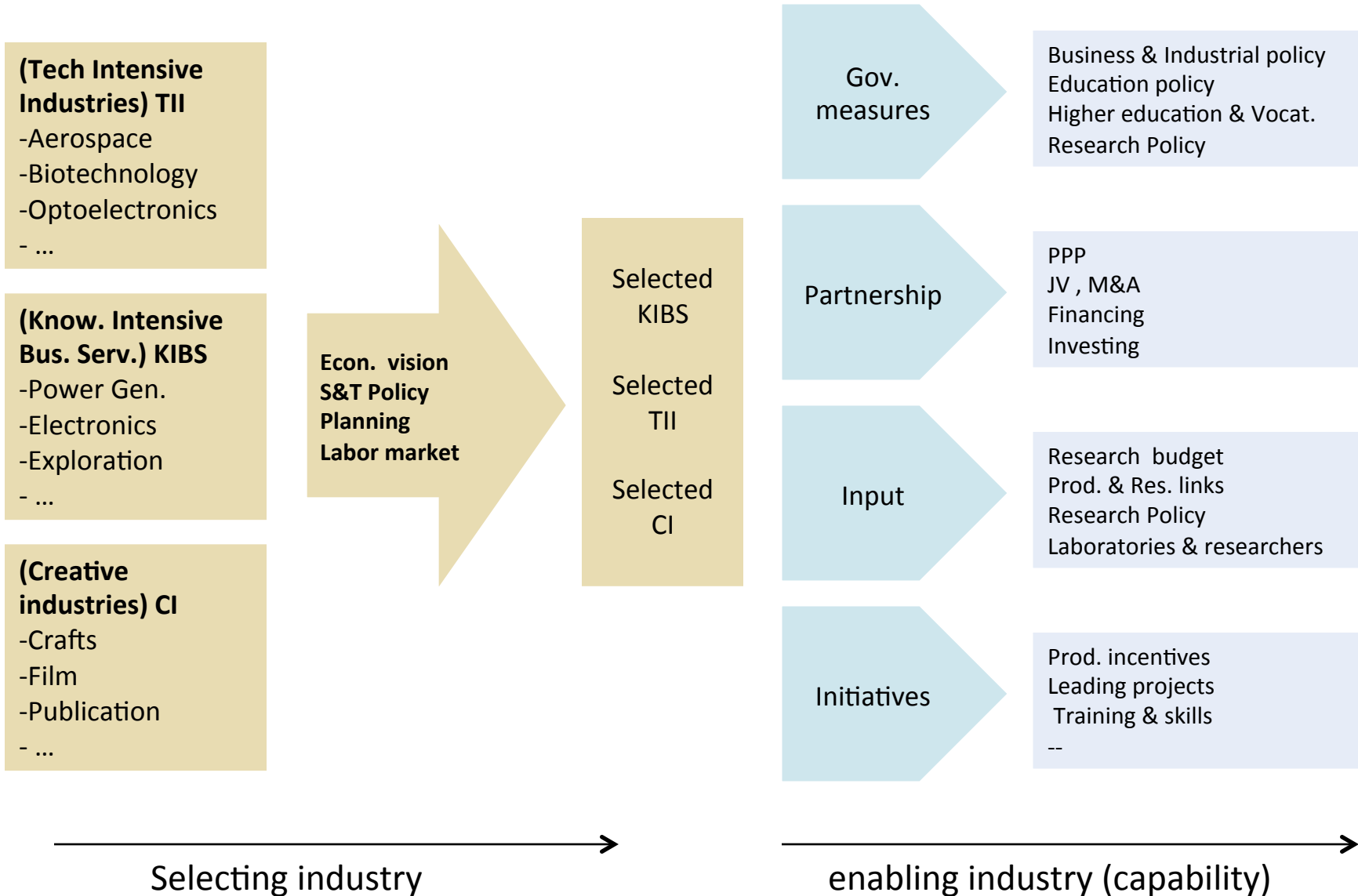


# Global Production Score board for Three Countries: Singapore, Turkey & Kingdom of Saudi Arabia, 2008



High tech exports is proportionally influenced by Industrial capabilities (Government measures/policy, infrastructure, R&D capacity & skills)

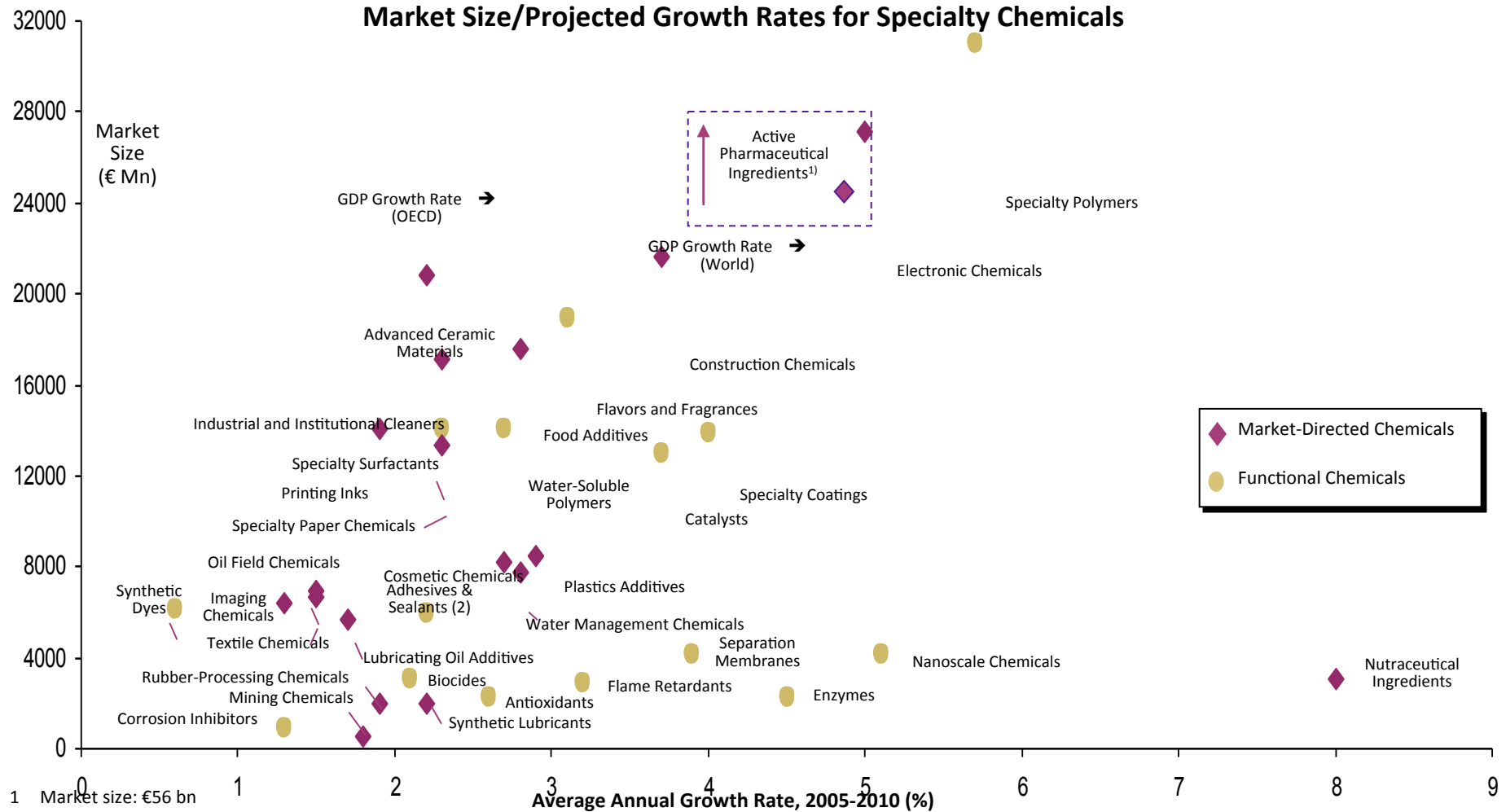
(LeapFrog) Scenario: Governments develop certain services & products by finding attractive environment (capabilities) and invest in terms of incentives, VC, training, grants, etc.



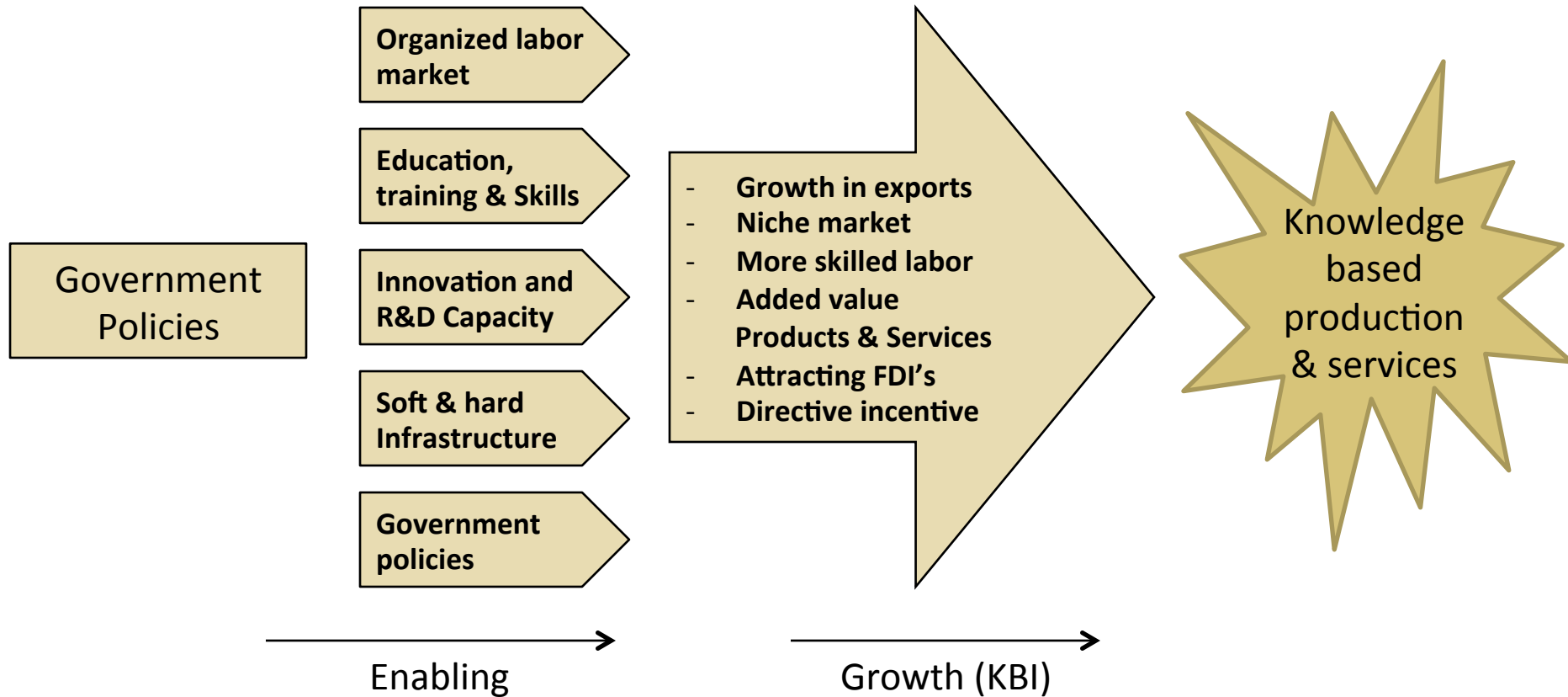
# Case Study: Road map of Technology based industries

	ISRev.3	1997		1991	
		R&D / production	R&D / value added	R&D / production	R&D / value added
		Aggregate Intensity	Aggregate Intensity	Aggregate Intensity	Aggregate Intensity
<b>High Technology Industries</b>					
Aircraft & Spacecraft	353	12.7	36.5	14.0	34.4
Pharmaceuticals	2423	11.3	25.4	9.6	21.6
Office, accounting & computing Machinery	30	10.5	39.7	10.4	31.3
Radio. Television and communication equipment	32	8.2	19.9	7.6	17.7
Medical, precision and optical instruments	33	7.9	20.6	6.6	15.8
<b>Medium-High-Technology Industries</b>					
Electrical machinery & apparatus, n.e.c	31	3.5	10.3	4.3	9.9
Motor vehicles, trailers & semi	34	3.5	13.4	3.7	14.5
Chemicals excluding Pharmaceuticals	24 excl. 2423	2.5	7.9	3.4	10.3
Railroad equipments and transport equipment.n.e.c	352 +359	2.8	6.5	2.5	7.5
Machinery & equipment. n.e.c	29	1.9	5.0	1.8	4.4
<b>Medium-low-technology industries</b>					
Coke, refined petroleum products & nuclear fuel	23	0.8	3.6	1.2	5.5
Rubber & Plastics products	25	0.9	2.6	1.0	2.7
Other non-metallic mineral products	26	0.9	2.2	1.1	2.7
Building & repairing of ships & boats	351	0.7	2.7	0.9	3.1
Basic metals	27	0.7	2.7	0.9	3.3
Fabricated metal products, except machinery & equipment	28	0.8	1.6	0.5	1.3
<b>Low-technology industries</b>					
Manufacturing and recycling	35-37	0.4	1.1	0.5	1.2
Wood, pulp, paper,paper products, printing & publishing	20-22	0.3	0.8	0.3	0.8
Food products, beverages & tobacco	15-16	0.4	1.3	0.3	1.2
Textiles, textile products, leather and footwear	17-18	0.3	1.0	0.3	0.7
Total Manufacturing	15-37	2.5	7.6	2.5	7.2

# Case study: Government plans segments and products to develop KBI's in the field of Specialty Chemicals, Droege & Co. 2009



Governments in GCC can utilize its conducive knowledge environment (high KEI) by directing investment and business activities toward high value services & products. Developing environment to (labor, incentive, Education, infrastructure) grow certain industries



Industrial policies in GCC countries have concentrated on developing Oil/Gas, Petrochemical and consumable products industries. It is the time to shift toward knowledge based activities.

Thank you