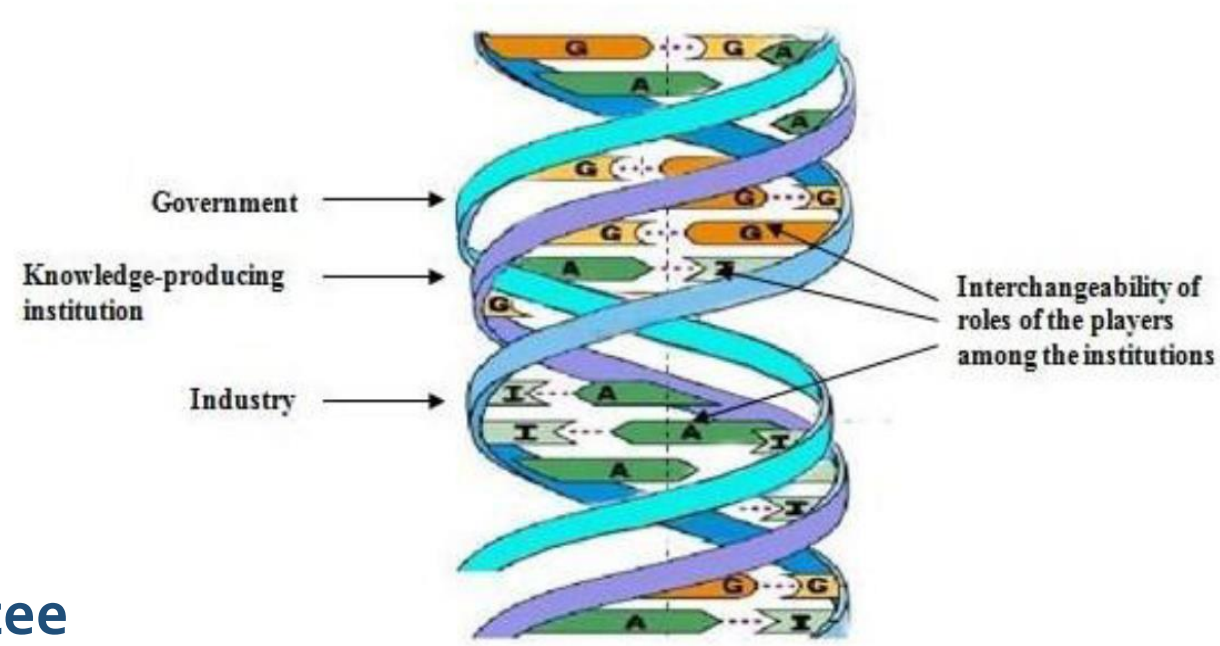
A new developmental paradigm University-Industry-Government linkages: Examples from developed world



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Innovation Capabilities and the Knowledge-Based Economy

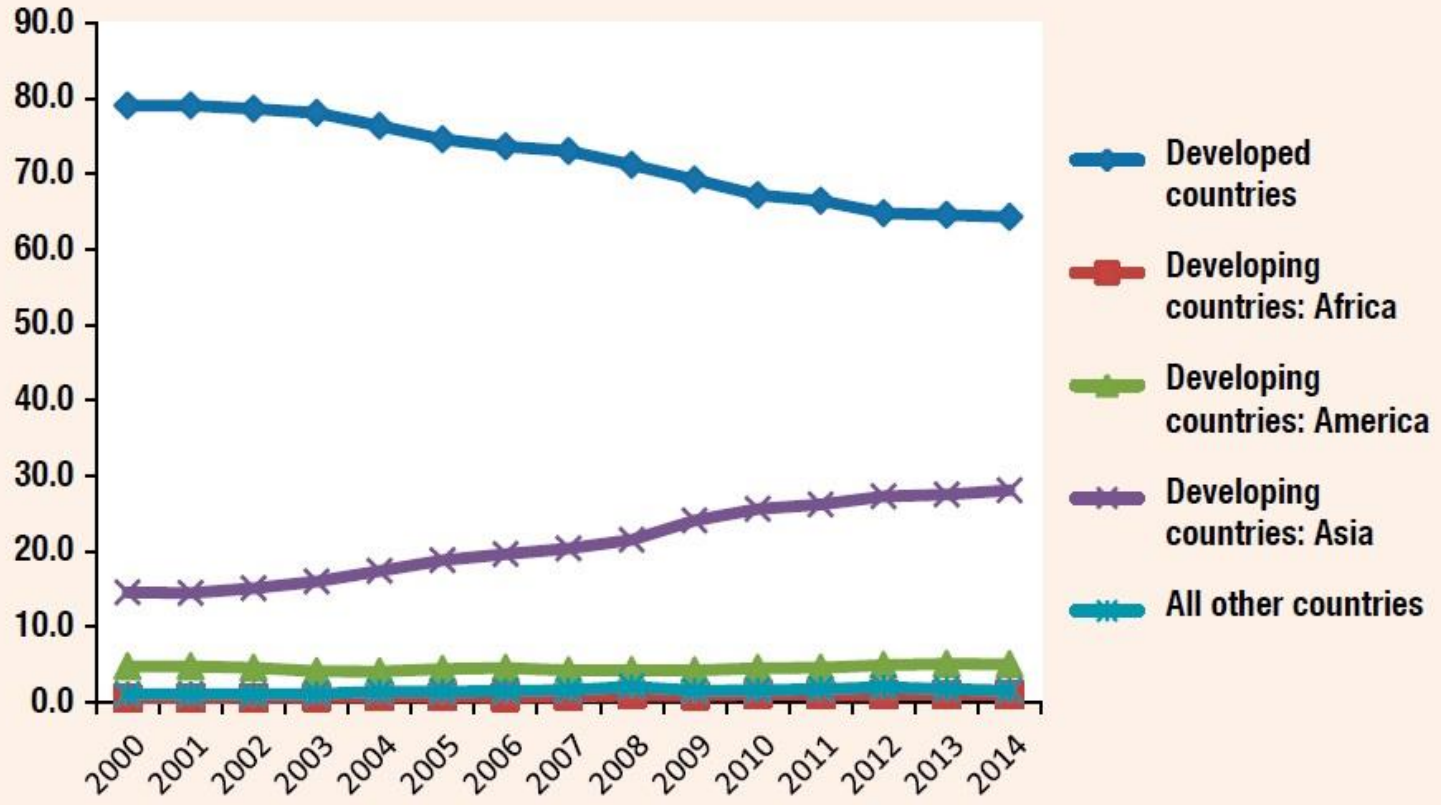
Innovation capabilities, as well as technological capabilities, are the result of learning processes, which are conscious and purposeful, costly and time-consuming, non-linear, path-dependent and cumulative.

OECD (Oslo Manual)

Innovations, therefore, emerge from the complex thinking, acting, and interacting of institutions and people - going about their everyday work under certain framework conditions.

Medium Technology Exports by Country Category

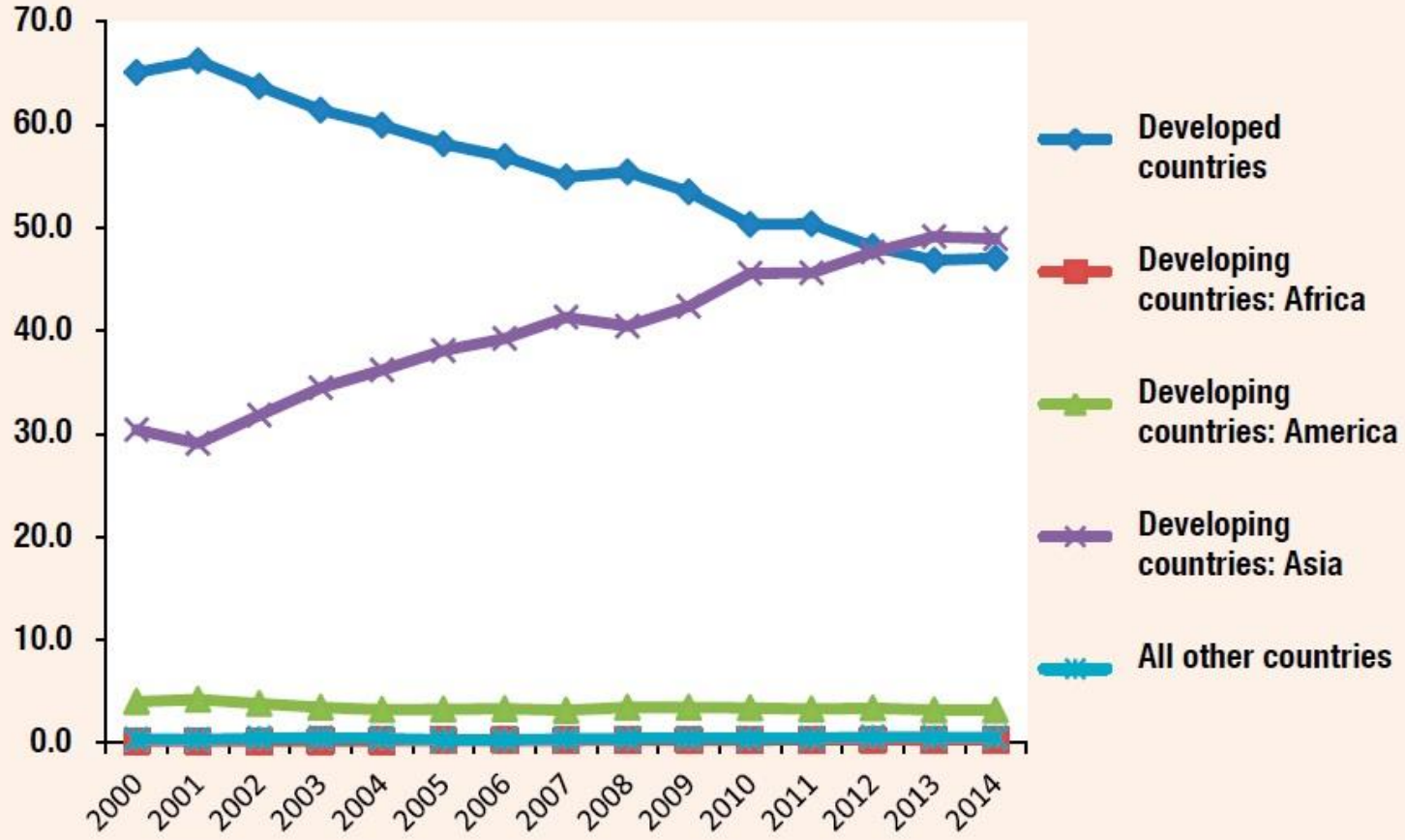
Figure 1.2: Distribution of medium-technology manufacturing exports by different country groups, 2000-2014 (in per cent)



Source: UNCTADstat (accessed on 20 Oct 2015).

High Technology Exports by Country Category

Figure 1.3: Distribution of high-technology manufacturing exports by different country groups, 2000-2014 (in per cent)



Source: UNCTADstat (accessed on 20 Oct 2015).

Measuring Innovation & Competitiveness

Economic development	Pakistan's Position	Drivers of Innovation	Pakistan's Position
Size of the economy (purchasing power)	26 (24)	**Global Innovation Index (2016 INSEAD)**	**119**
Size of GDP	45 (41)	Income (Lower Middle)	27
Size of middle class	18	Efficiency ratio	71
FT Kearny Globalisation index	56	Innovation input	123
Knowledge Economy Index (2012 WB)	**117**	Innovation output	108
Global Competitiveness Index (126 WEF)	**122**	Institutions	111
Macroeconomy	116	Infrastructure	116
Innovation sophistication factors	85	Business sophistication	95
Published scientific papers (2010)	*43*	Innovation	75
Efficiency enhancers	113	Higher education & training	123
		Technological readiness	119
Human development index	146	Health & primary education	128

Fundamentals of the Knowledge-Based Economy

- The advance of the knowledge-based economy both in high-tech and traditional sectors
- Government policy aiming to create public good
- Innovation policy must take into account the evolving interface between globalization, technical progress and organizational change
- The Factors of Global Production require continuous upgrade through innovation
  - ✓ Labour
  - ✓ Capital
  - ✓ Land
  - ✓ Technology
  - ✓ Knowledge
  - ✓ Entrepreneurship

Pillars of the Knowledge Economy (World Bank)

Figure 1 The four pillars of the knowledge economy

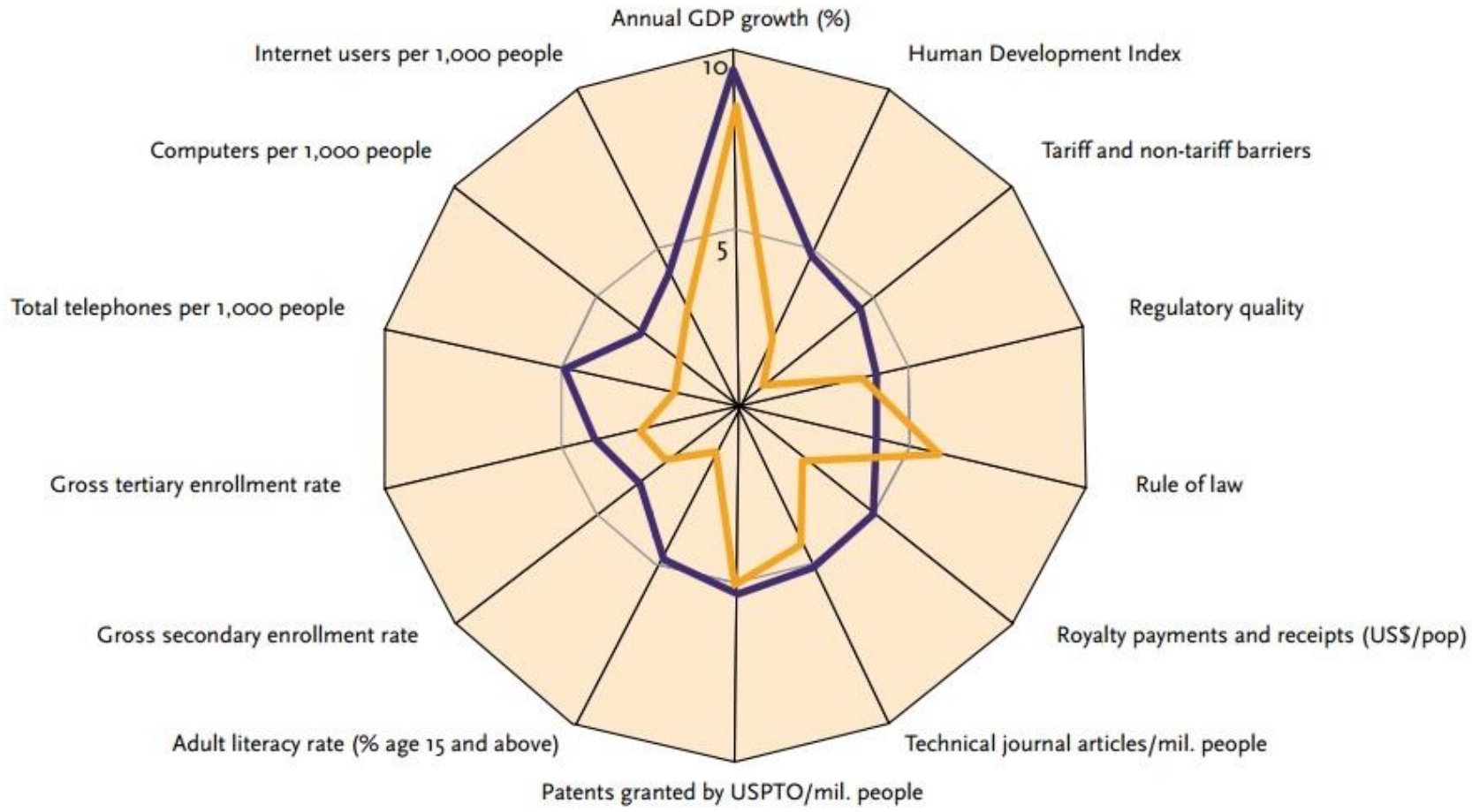
Pillar 1 **Economic and institutional regime**	Pillar 2 **Education and skills**	Pillar 3 **Information and communication infrastructure**	Pillar 4 **Innovation system**
The country's economic and institutional regime must provide incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship.	The country's people need education and skills that enable them to create and share, and to use it well.	A dynamic information infrastructure is needed to facilitate the effective communication, dissemination, and processing of information..	The country's innovation system—firms, research centers, universities, think tanks, consultants, and other organizations—must be capable of tapping the growing stock of global knowledge, assimilating and adapting it to local needs, and creating new technology.

Further Elaboration on the Drivers of the Knowledge-Based Economy

- Education
- Free flow of information
- ICT infrastructure
- Cultural definitions of talent
- Encouraging Knowledge Hubs and Star-up Programmes
- Dispersed capabilities require match-making, facilitation, intermediation and coordination
- Global platform outreach
- Cross-border mobility
- Building regional comparative advantage
- Local market knowledge
- Global network access

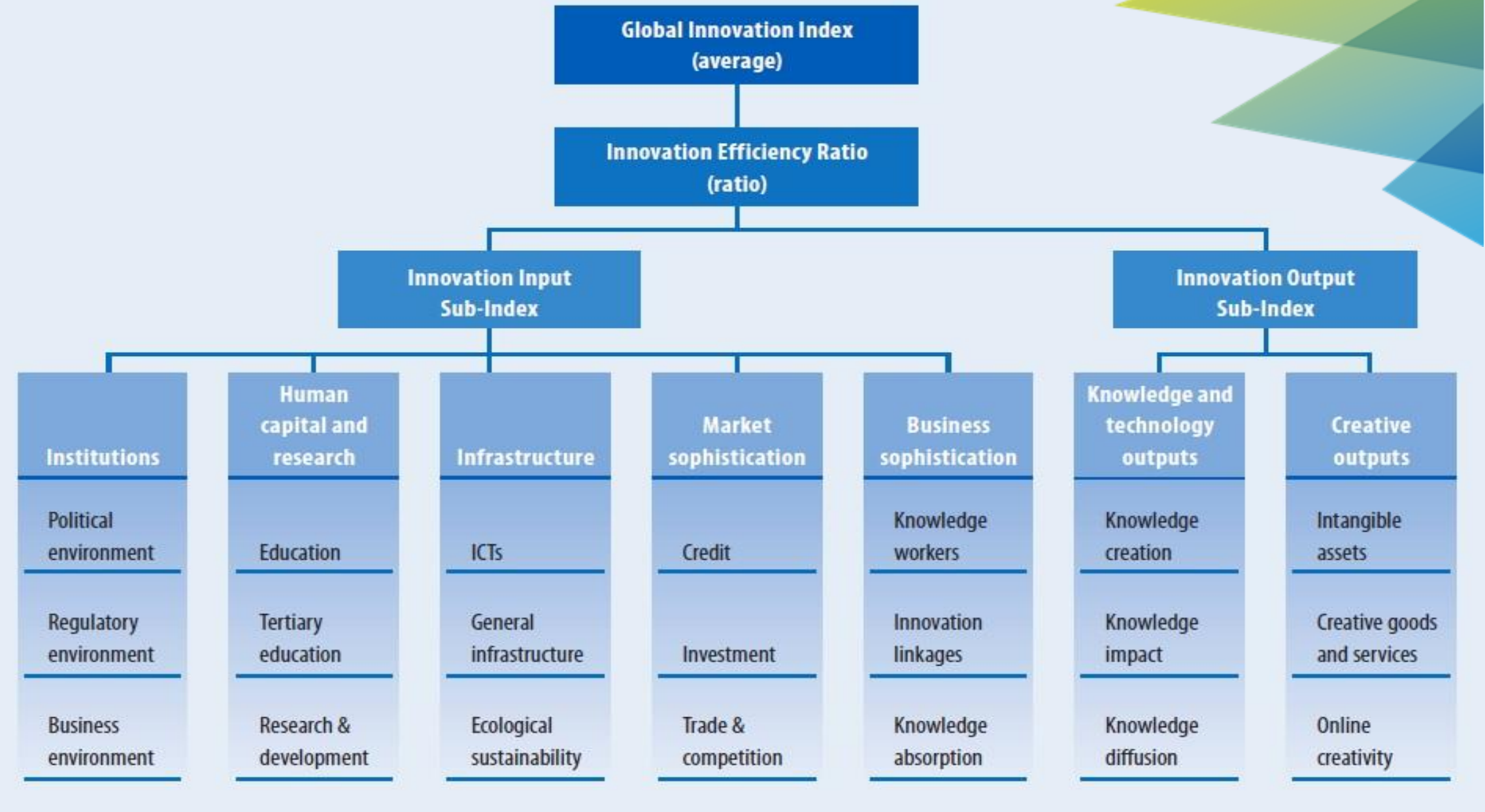
China India Knowledge Economy WB

Figure 2. Basic Knowledge Economy Scorecard for China (—) and India (—)

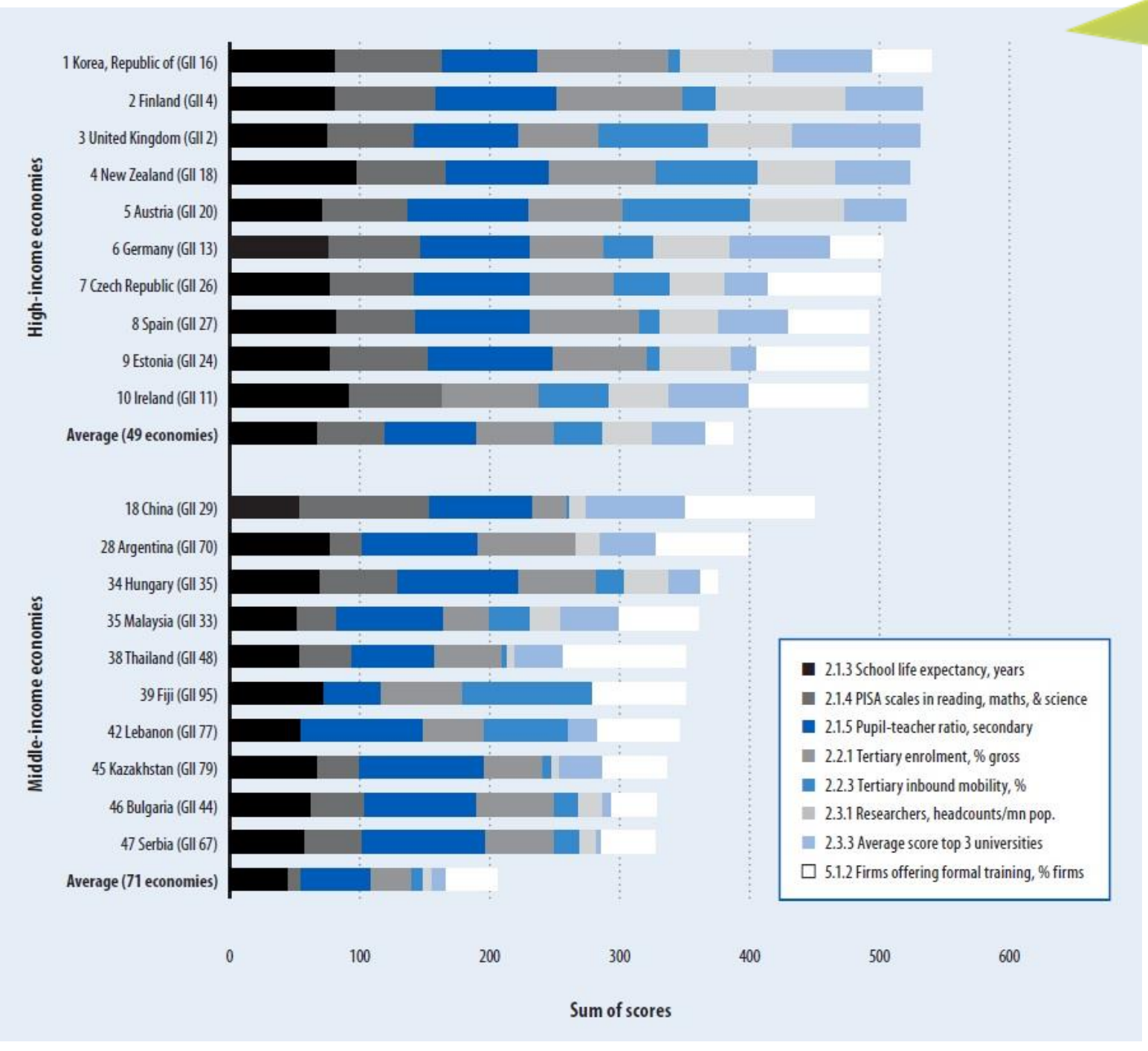


Comparison group: All countries; *Type:* weighted; *Year:* most recent (KAM 2007—www.worldbank.org/kam)

Innovation input	123
Innovation output	108



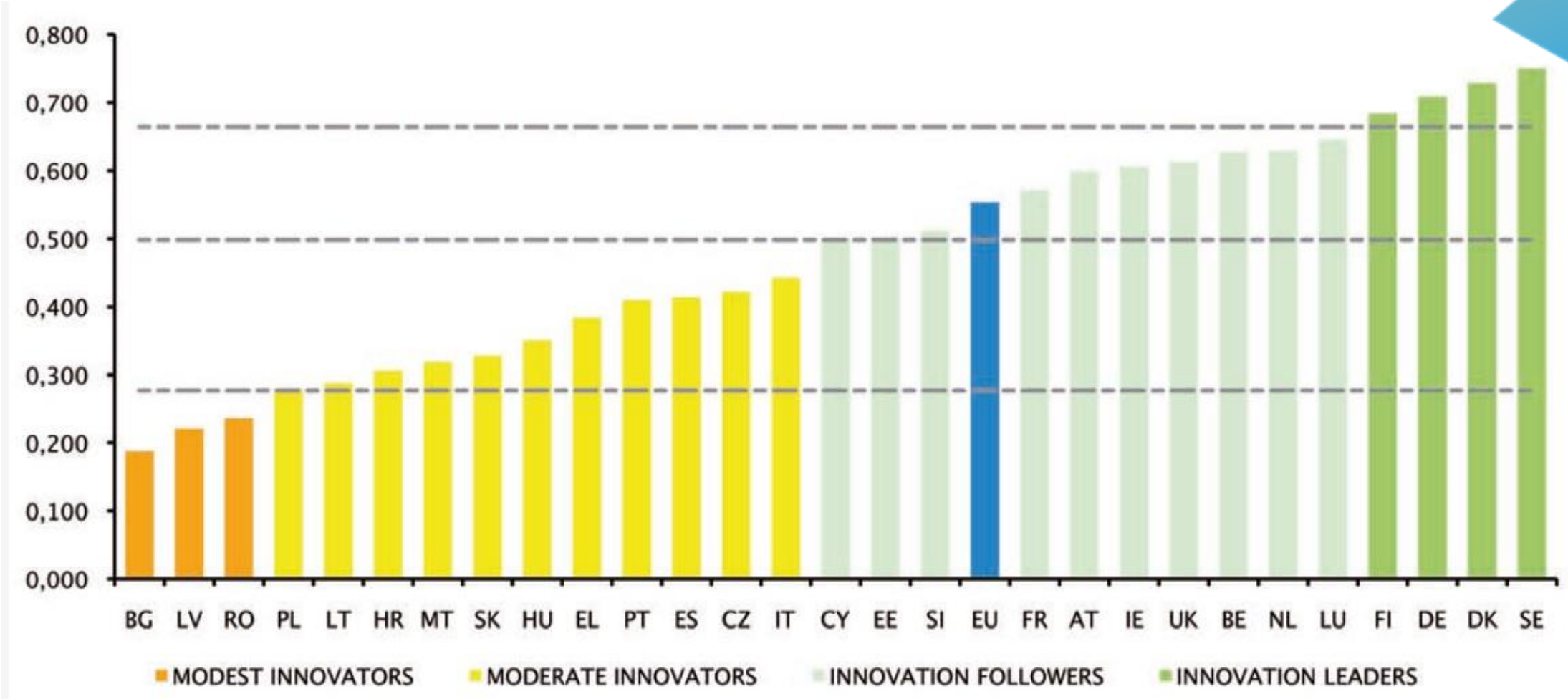
Ranking Education



EU Innovation Performance (2011)

	EU27
ENABLERS	
Human resources	
1.1.1 New doctorate graduates	1,7
1.1.2 Population completed tertiary education	35,8
1.1.3 Youth with upper secondary level education	80,2
Open, excellent and attractive research systems	
1.2.1 International scientific co-publications	343
1.2.2 Scientific publications among top 10% most cited	11,0
1.2.3 Non-EU doctorate students	24,2
Finance and support	
1.3.1 R&D expenditure in the public sector	0,75
1.3.2 Venture capital investments	0,277
FIRM ACTIVITIES	
Firm investments	
2.1.1 R&D expenditure in the business sector	1,31
2.1.2 Non-R&D innovation expenditure	0,56
Linkages & entrepreneurship	
2.2.1 SMEs innovating in-house	31,8
2.2.2 Innovative SMEs collaborating with others	11,7
2.2.3 Public-private co-publications	7,3
Intellectual Assets	
2.3.1 PCT patent applications	1,98
2.3.2 PCT patent applications in societal challenges	0,92
2.3.3 Community trademarks	5,91
2.3.4 Community designs	4,75
OUTPUTS	
Innovators	
3.1.1 SMEs introducing product or process innovations	38,4
3.1.2 SMEs introducing marketing/organisational innovations	40,3
3.1.3 Fast-growing innovative firms	16,2
Economic effects	
3.2.1 Employment in knowledge-intensive activities	13,9
3.2.2 Contribution MHT product exports to trade balance	1,27
3.2.3 Knowledge-intensive services exports	45,3
3.2.4 Sales of new to market and new to firm innovations	14,4
3.2.5 License and patent revenues from abroad	0,77

EU Member States Innovation Performance



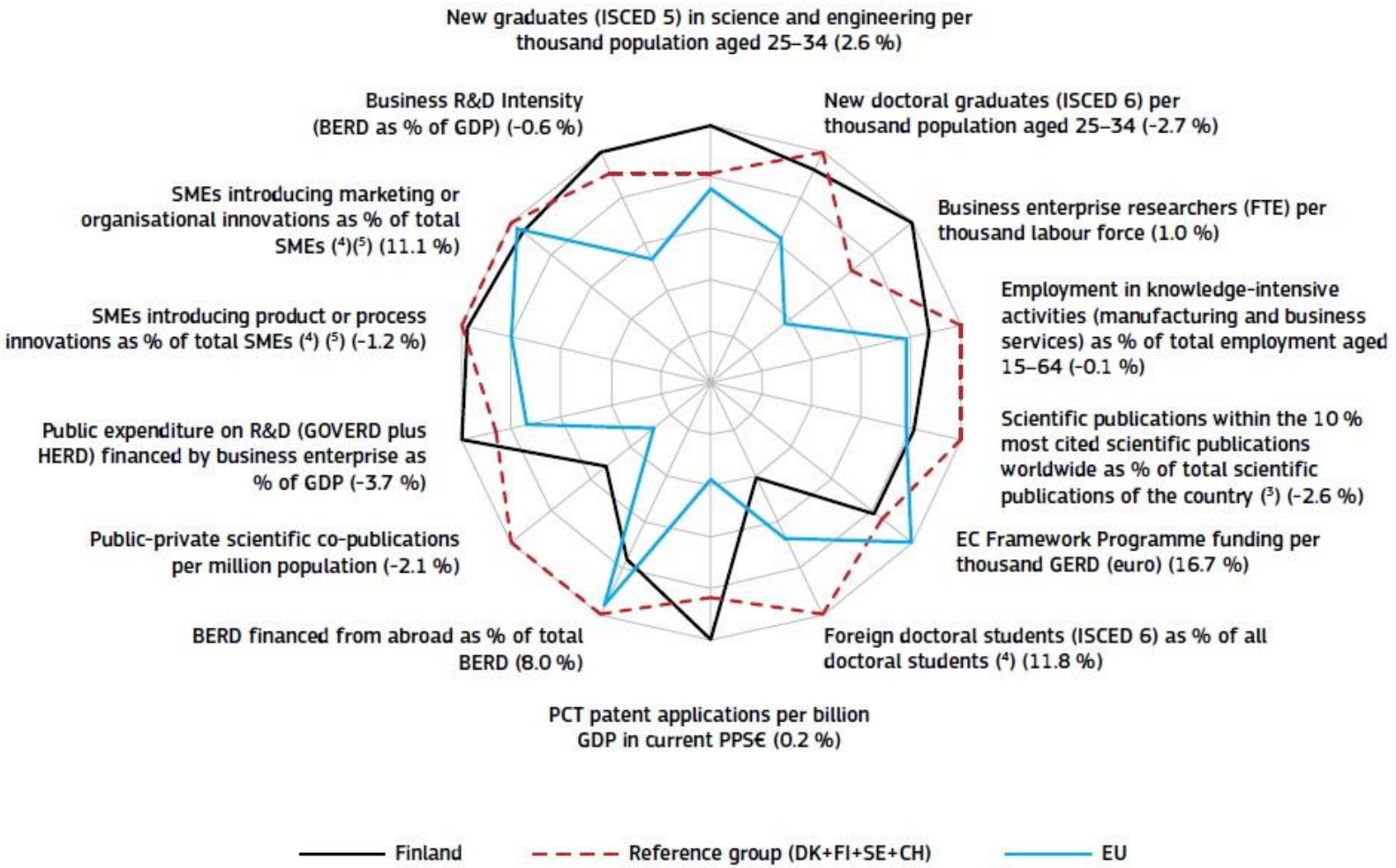
EU R&I Performance Member States 2014 (2012)

	Country	R&D intensity (1) 2012		Excellence in S&T 2012		Innovation output indicator (3) 2012	Knowledge-intensity of economy 2012		HT&MT contribution to trade balance (2) 2012	
		value	growth rate (1)	value	growth rate (2007-2012)		value	growth rate (2007-2012)	value	growth rate (2)
EU	**European Union**	2.07 %	+2.4 %	47.8	+2.9 %	101.6	51.2	+1.0 %	4.2 %	+4.8 %
AT	**Austria**	2.84 %	+2.5 %	51.9	+3.6 %	100.1	45.3	+1.7 %	3.5 %	+10.0 %
BE	**Belgium**	2.24 %	+3.4 %	61.1	+3.2 %	94.8	60.8	+0.7 %	2.3 %	+7.0 %
BG	**Bulgaria**	0.64 %	+7.1 %	24.5	+0.3 %	65.3	33.5	+2.8 %	-5.2 %	n.a.
HR	**Croatia**	0.75 %	-1.3 %	18.9	+9.6 %	68.1	n.a	n.a.	1.0 %	+44.8 %
CY	**Cyprus**	0.46 %	+0.9 %	28.1	+1.4 %	82.8	40.7	+0.3 %	2.4 %	+31.9 %
CZ	**Czech Republic**	1.88 %	+6.6 %	26.1	+0.7 %	89.7	41.4	+1.6 %	3.8 %	+1.5 %
DK	**Denmark**	2.98 %	+3.0 %	81.1	+4.4 %	114.6	56.2	+2.0 %	-3.3 %	n.a.
EE	**Estonia**	2.18 %	+15.1 %	29.4	+13.4 %	81.7	49.5	+2.7 %	-2.9 %	n.a.
FI	**Finland**	3.55 %	+0.5 %	69.9	+5.1 %	115.7	55.8	+0.4 %	1.2 %	-5.7 %
FR	**France**	2.29 %	+1.0 %	49.5	+3.4 %	105.6	58.1	+0.5 %	5.2 %	+2.2 %
DE	**Germany**	2.98 %	+3.3 %	59.0	+2.2 %	124.2	47.1	+1.0 %	9.2 %	+1.7 %
EL	**Greece**	0.69 %	+0.6 %	27.2	-1.9 %	76.3	31.6	+0.8 %	-5.4 %	n.a.
HU	**Hungary**	1.30 %	+5.7 %	31.5	+2.4 %	92.0	54.4	+2.3 %	5.6 %	+4.5 %
IE	**Ireland**	1.72 %	+6.1 %	60.9	+14.6 %	116.5	68.2	+3.5 %	2.0 %	+11.6 %
IT	**Italy**	1.27 %	+1.5 %	36.5	-0.5 %	84.3	37.2	+0.9 %	4.8 %	+2.5 %
LV	**Latvia**	0.66 %	+2.0 %	19.9	+6.5 %	63.8	37.6	+3.5 %	-4.9 %	n.a.
LT	**Lithuania**	0.90 %	+2.2 %	14.1	+1.2 %	57.9	32.7	+1.7 %	-0.8 %	n.a.
LU	**Luxembourg**	1.46 %	-1.6 %	23.5	+1.6 %	116.4	68.1	+1.5 %	-4.4 %	n.a.
MT	**Malta**	0.84 %	+8.1 %	23.3	+5.6 %	84.8	55.3	+2.1 %	3.4 %	-18.4 %
NL	**Netherlands**	2.16 %	+0.9 %	79.7	+2.9 %	95.5	61.0	+0.1 %	0.9 %	+24.0 %
PL	**Poland**	0.90 %	+9.7 %	20.0	+9.8 %	81.4	34.8	+1.5 %	0.6 %	+14.7 %
PT	**Portugal**	1.50 %	-0.1 %	27.3	+3.7 %	70.1	42.6	+2.3 %	-0.3 %	n.a.
RO	**Romania**	0.49 %	-4.2 %	13.2	+2.3 %	78.0	27.5	+3.5 %	0.4 %	-14.2 %
SK	**Slovakia**	0.82 %	+12.3 %	25.2	+8.5 %	85.7	32.0	+0.6 %	3.9 %	+12.2 %
SI	**Slovenia**	2.80 %	+12.7 %	28.8	+9.9 %	87.4	50.3	+3.7 %	6.5 %	+9.4 %
ES	**Spain**	1.30 %	+0.5 %	33.2	+0.4 %	80.8	38.0	+2.1 %	3.3 %	+15.9 %
SE	**Sweden**	3.41 %	-0.2 %	87.9	+5.5 %	122.4	65.3	+2.0 %	1.8 %	+0.5 %
UK	**United Kingdom**	1.72 %	-0.3 %	63.5	+5.2 %	110.3	60.7	+0.6 %	4.2 %	+9.2 %

Finland Innovation Performance

Finland, 2012 (1)

In brackets: average annual growth for Finland, 2007–2012 (2)



Source: DG Research and Innovation – Unit for the Analysis and Monitoring of National Research Policies

Data: DG Research and Innovation, Eurostat, OECD, Science-Metrix/Scopus (Elsevier), Innovation Union Scoreboard.

Notes: (1) The values refer to 2012 or to the latest available year.

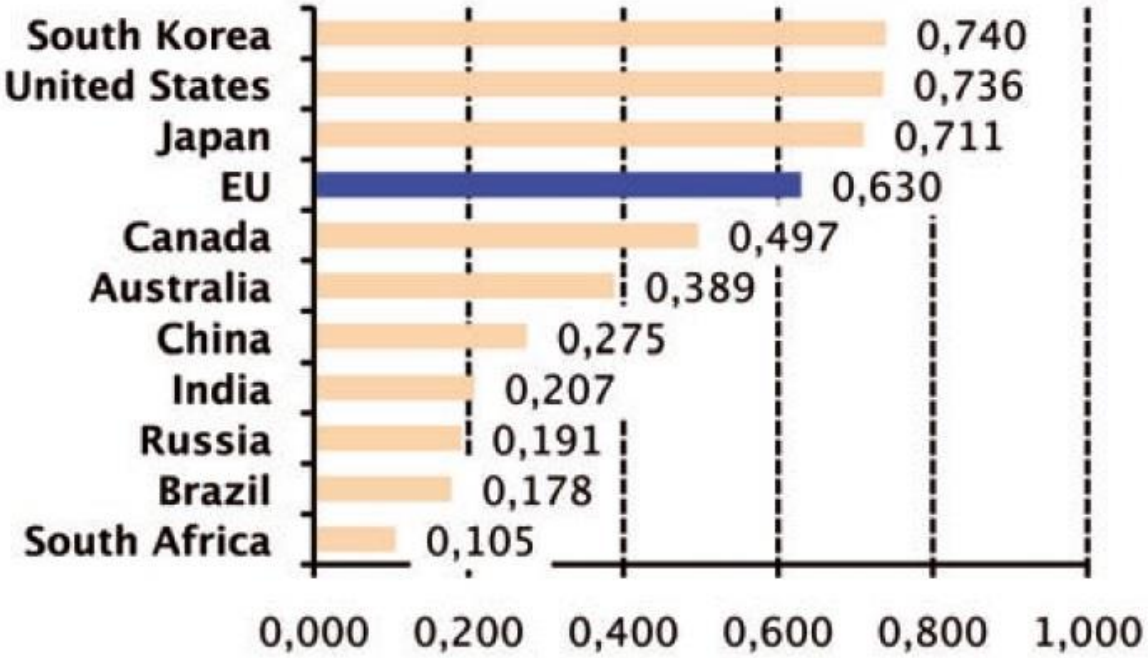
(2) Growth rates which do not refer to 2007–2012 refer to growth between the earliest available year and the latest available year for which comparable data are available over the period 2007–2012.

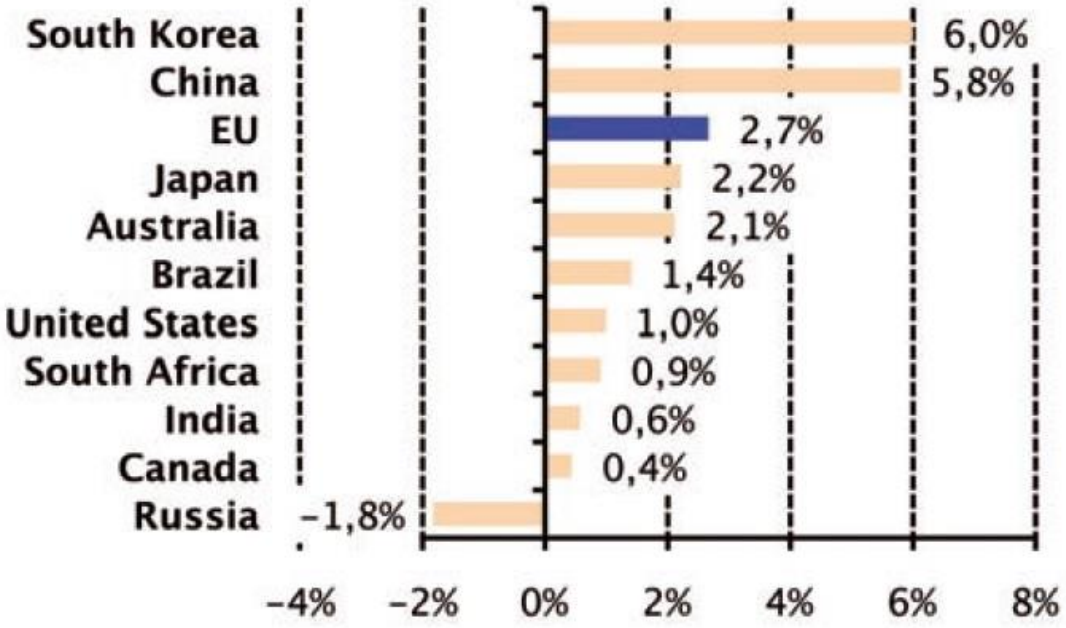
(3) Fractional counting method.

(4) EU does not include EL.

(5) CH is not included in the reference group.

Global Innovation Performance and Growth Rate





Building multi-stakeholder platforms for harnessing innovation, or

accelerated growth,

wealth creation and

improved living standards