



***Science, Technology and Innovation Indicators:
Trends and Challenges in Croatia***

by

Emira Becic, Ph.D.

Ministry of Science, Education and Sports of Croatia

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I. Challenges for Measurement

- Globalisations
- The Knowledge-based Economy towards a Sustainable Knowledge Society
- Internationalisation of R&D
- Science policy
- Networking (e.g. STI-ERA, ERA-MORE, ERAWATCH, SEE-ERA-NET, etc.)



Globalisation

- **Ageing population**
 - **Increasing pressure on public finance** -retirement expenditures
 - **Social security** – unemployment, healthcare and pensions.
- **Mass immigration and labour markets - impact on growth and productivity**
 - Immigration young human capital
 - Education
- **Environmental sustainability**
- **Economic environment**
 - Increasing global markets
 - Technological changes
- **Investment in Knowledge**



Science policy

E.g.:

- Some tensions have emerged within science policy, for example between encouraging higher scientific productivity in terms of publications, and pushing researchers towards commercialisation and patenting



II. Role of Indicators

- Relevant information for policymakers in their deliberation
- Indicate priority setting
- Provide knowledge which S&T policy can impact on the socio-economic objectives
- Reflect past trends, trends performance and current performance
- Contribute to understanding the current environment
- Guide the development of future STI and RTD policies
- Comparison according to the different goals,.....Etc.



III. Hot Topic: GBAORD, HRST, CIS, CDH

- GBAORD (improvement of R&D methodology according to the Frascati Manual, 2002)
- CIS (Oslo manual; useful data of the innovation activities of enterprises)
- HRST (ISCED 1997; The ESTAT-CLFS, The ESTAT NewCronos; Canberra Manual)
- CDH (Careers of Doctorate Holders statistics)



Highlighting statistical sources in Croatia

1. R&D Surveys
2. Labour Force Survey (LFS)
3. Education Statistics
4. Population Survey
5. National Patent Office



IV. USERS and their DEMANDS

Type of Users

Politicians
Government
Parliament
S&T decision policy makers
Local authorities
Scientific community
Business sector
Society
International organizations
NGOs

Demands

Up-to-date, **key indicators** by
policy-relevant categories
Long time series, **detailed**
statistics, **comparable**
indicators by **research views**
General overview, detailed
information on their **own sector**
and **connecting sectors**
Mass media, inquiry
ranking nations by
competitiveness, searching co-
operation partners, knowledge
of global tendencies



V. S&T and Innovation indicators: - quick analysis

- **Research and development**
- Community innovation survey
- **High-tech industry and knowledge-intensive services**
- **Patent statistics**
- Human resources in S & T
- Information society statistics

Human resources, 2005

INPUT – Innovation drivers

- New S&E graduates per 1000 population aged 20-29 - **(A)* 2004**
- Participation in lifelong learning population aged 25-64,in% - **(C)**
- Youth education attainment level (% of population aged 20-24 having completed at least level ISCED 3) - **(D)**

	Indicators		
	(A)*	(C)	(D)
EU25	12.7	10.2	77.5
HR	5.4	2.1	93.8
BG	8.5	1.3	76.5
RO	9.8	1.6	76.0
TR	5.6	:	44.0
MK	3.7	:	:



Total intramural R&D expenditure (GERD) as a percentage of GDP by sectors of performance, 2005

	GERD	BERD	HERD	GOVERD
EU 25	1.84 s	1.17	0.41 s	0.24 s
10 nms	0.82 s	0.4	0.21 s	0.22 s
HR*	1.22	0.51	0.45	0.25
BG	0.5	0.11	0.05	0.33
RO*	0.39	0,21	0.4	0.13
TR**	0.72	:	:	:

INPUT – Knowledge creation

Source: Eurostat, R&D statistics

*HR, RO: 2004; **TR:2001; s – Eurostat estimate; (:) - data not available

Employment in high-tech sectors

OUTPUT - Application

Employment in manufacturing and services sectors, as a percentage of total employment, EU 25 and selected countries, 2005

Source: Eurostat, High-tech statistics

	Manufacturing (% of employment)			Services (% of employment)		
				Total	Knowledge intensive services (KIS)	
	Total	High-tech	Medium High-tech		Total	Total
EU25	18.3 s	1.1 s	5.6 s	67.5 s	33.3 s	3.4 s
HR	17.8	0.6	3.3	54.2	20.8	2.0
RO	22.0	0.3	5.1	36.5	13.7	1.4
BG	24.6	0.5	4.2	56.5	22.0	2.9



Total high-tech trade as a percentage of total, 2002-2004

Imports				Exports			
	2002	2003	2004		2002	2003	2004
HR	10.9	11.1	11.1	HR	10.4	10.2	10.8
BG	9.7	9.9	8.5	BG	3	3.4	2.9
RO	11.5	11	11	RO	6.2	3.7	3.8
TR	11.9	10.6	11.8	TR	1.9	2.1	2.3

OUTPUT - Application

- Total high-tech trade, partners all countries of the world, without EU25.

Source: Eurostat, High-tech statistics



High-tech exports **OUTPUT - Application**

- **High-tech exports-
Exports of high
technology products as
a share of total exports**

Source: Eurostat, High-tech statistics

	2003	2004
EU25	18	18
HR	10	11
BG	3	3
RO	4	4
TR	2	2

Patent activities: statistics

OUTPUT – Intellectual property

- **Patent applications to the EPO by economic activity (NACE section D-Industrial sectors), 2003**

Source: Eurostat, patent statistics

	Total No.	In %	Manufacture of chemicals, chemical products and man-made fibres (DG)	Manufact. of machinery and equipment (DK)	Manufact. of electrical and optical equipment (DL)	Manufact. of transport equipment (DM)	Other manufacturing subsections
EU 25	62036	100	22.0	12.5	35.0	13.7	16.8
HR	81	100	39.5	7.6	24.8	11.5	16.7
TR	133	100	21.1	20.0	30.0	11.5	17.3
BG	34	100	24.2	9.1	35.7	9.4	21.7
RO	25	100	23.2	15.6	33.1	10.8	17.2

Patent activities: statistics

- **High- technology patent applications to the EPO,2003**

Source: Eurostat,patent statistics

	Total No of high-tech patent applications	In %	Aviation	Computer and automated business equipment	Communi- cation and technology	Lasers	Micro- organism and Genetic engineering	Semi- conductors
EU 25	10834	100	2.4	29.9	45.5	1.1	12.4	8.7
HR	4	100	0.0	55.9	37.2	0.0	7.0	0.0
TR	13	100	0.0	34.8	40.5	0.0	17.1	7.6
BG	3	100	0.0	46.2	0.0	7.7	30.8	15.4
RO	3	100	0.0	48.4	41.9	0.0	0.0	9.7



R&D statistics: improvement of current methodology

- Commission Regulation on S&T statistics No 753/2004
- Frascati Manual 2002, **Improvements:**
 - **Coverage** (no limitations concerning enterprises size)
 - **Private non profit sector added**
 - **New attributes added** (size of the enterprises - less than 10 employees)
 - **New extended list of industry groups for enterprises**
 - **EUROSTAT R&D Questionnaire** (Edition 2005); and, **CORE Questionnaire** (Requested by both OECD_MSTI and ESTAT_CR on S&T)



VI. Future activities

- **Introducing CIS** (Community Innovation Survey) within the frame of Phare Multicountry Programme (**February 2007- February 2008**) - through technical assistance
- **GBOARD (2008)** - data collection from all government bodies (government budget side, all fiscal levels) - different view regarding the R&D survey where data are collected from users
- **HRST** - using existing surveys as sources: LFS, higher education surveys
- **CDH** - Careers of doctorate holders statistics
- Establishing register of enterprises (in progress)



Main problems: some of them...?

- Lack of trained statisticians in the field (quality of provided data)
- Administrative capacities (lack of staff with skills for work in statistics)



Thank you for your attention!

emira.becic@mzos.hr