

# Measuring Innovation in Industrialising Countries: Conventional versus New Indicators



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# Outline

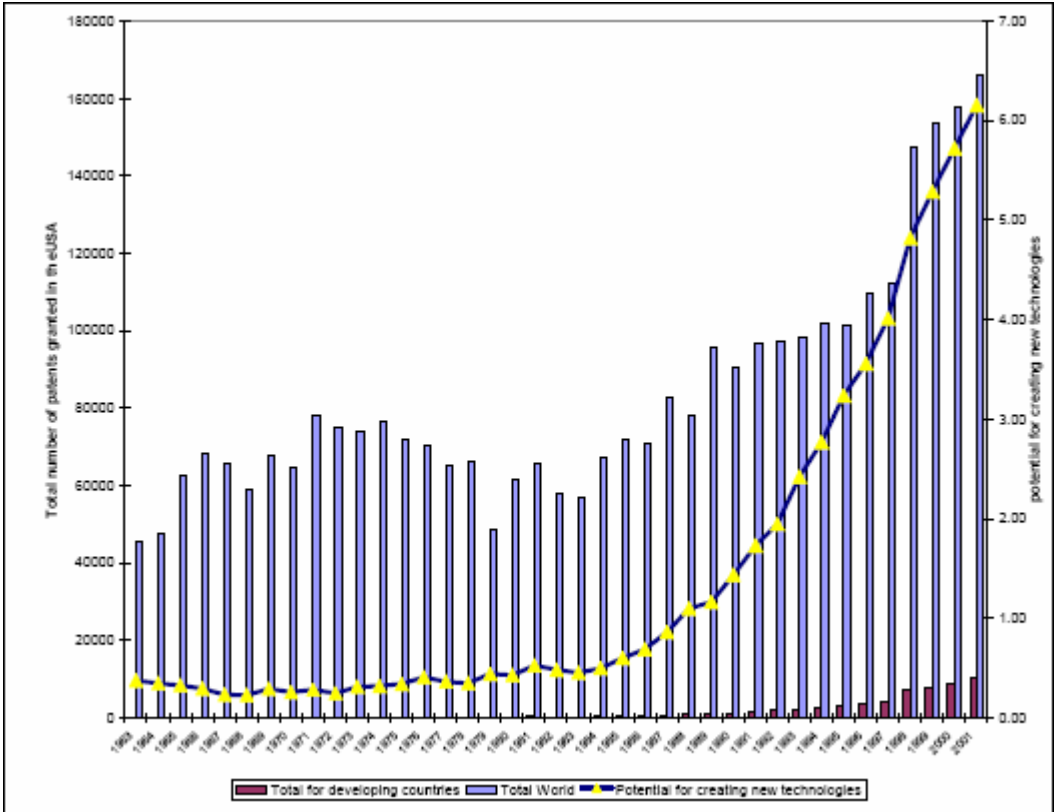
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- **Nature and extent of innovations in developing countries**
- **Engagement with the literature on measuring innovation**
- **New indicators for measuring innovation: use of results from innovation surveys**
  - Brazilian experience;
  - South African experience; and
  - Malaysian experience
- **Four critical issues wrt innovation surveys from the policy point of view**
- **Policy conclusions**

# Measuring innovation in Developing Countries as seen through conventional indicators

Based on the number of US Patents

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# Structure of performance of R&D in select developing countries

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	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Hong Kong (China), SAR	...	...	29	24	18	29	33	41	48	51	53	...
India	...	23	27	24	18	19	20	20	20	...	...	...
Indonesia	...	...	...	...	26	14	...	...	...	4	...	...
Iran, Islamic Republic of	...	...	...	...	...	18	19	17	20	12	14	...
Lao People's Democratic Republic	...	...	...	...	...	...	37	...	...	...	...	...
Malaysia	...	...	66	...	58	65	...	...	72	...	85	...
Maldives	...	...	...	...	...	...	...	...	...	...	...	...
Peru	...	14	12	12	10	10	11	10	29	...	...	...
Philippines	...	...	...	...	...	...	68	68	...	59	...	...
South Africa	...	54	...	...	...	54	54	55	56	58	56	...
Sudan	...	...	...	31	32	31	32	32	34	34	...	...
Syrian Arab Republic	...	...	...	...	...	...	...	...	...	...	...	...
The Former Yugoslav Rep. of Macedonia	...	14	12	12	6	6	3	1	6	12	12	...
Switzerland	71	...	...	...	74	...	...	...	74	...	...	...
Italy	53	50	48	49	50	49	48	47	48	50	49	...
Australia	48	...	46	...	48	...	53	...	54	...	57	...
Brazil	46	...	...	...	40	39	40	40	40	...	...	...
Uruguay	30	33	38	37	39	...	49	...	...	...	29	...
Colombia	30	21	45	35	27	28	27	23	23	23	22	...
Trinidad and Tobago	24	22	6	7	13	13	11	10	24	24	25	...
Thailand	22	10	...	47	35	39	39	44	36	44	41	...
Mexico	22	20	28	26	30	30	34	35	47	49	...	...
Costa Rica	22	26	25	16	23	...	...	32	28	...	...	...
Chile	9	11	11	11	15	15	36	44	46	...	...	...
Israel	61	64	66	70	76	76	75	73	75	76	77	79
Japan	71	72	71	71	74	74	74	75	75	76	77	78
Republic of Korea	73	73	70	71	74	76	75	75	77	77	77	76
Sweden	...	66	66	...	74	77	...	74	74	73	75	74
Finland	...	86	86	67	68	71	71	70	70	70	71	72
China	43	46	45	50	60	60	61	62	67	68	71	72
United States	72	73	74	74	75	73	70	69	69	70	71	72
Austria	...	...	64	...	...	...	67	...	68	70	70	70
Germany	...	66	67	68	70	70	70	69	70	69	70	70
Belgium	72	72	71	72	72	73	70	70	69	68	69	69
Singapore	63	62	62	63	62	63	61	61	64	66	66	67
Ireland	71	71	72	73	72	70	69	68	66	66	68	67
Denmark	61	61	65	65	64	69	69	69	68	69	67	65
Russian Federation	69	66	69	70	71	70	70	68	69	68	67	64
United Kingdom	65	65	66	67	65	66	66	64	63	61	62	64
Czech Republic	60	63	65	63	60	60	61	61	64	64	66	64
France	62	63	62	63	63	63	63	63	63	62	63	63
Belarus	...	52	52	59	54	53	51	45	44	44	39	61
Netherlands	53	55	54	56	58	58	57	57	58	58	59	60
Slovenia	51	53	52	55	56	58	60	64	67	69	60	60
Canada	59	60	60	59	60	62	58	57	57	56	56	56
Spain	48	49	52	52	54	52	54	54	54	54	56	56
Ukraine	...	56	66	62	63	62	62	64	60	62	69	56
Iceland	...	41	37	47	56	59	57	52	...	52	53	55
Norway	...	57	...	56	...	60	57	57	55	54	54	53
Portugal	22	22	23	23	26	32	32	33	36	38	46	51
Hungary	43	42	38	40	44	40	35	37	41	43	48	50
Estonia	...	...	20	24	23	34	31	34	39	45	44	47
Kazakhstan	...	11	19	19	26	34	...	29	44	39	35	45
New Zealand	...	...	28	30	...	37	...	41	42	...	43	...
Romania	74	81	77	74	69	62	60	58	55	50	48	42
Turkey	26	32	32	38	33	34	29	23	24	34	37	41
Croatia	...	...	...	44	45	42	43	39	42	41	37	41
Slovakia	56	76	66	63	66	67	64	65	49	50	43	40
Latvia	27	24	21	17	40	36	41	34	44	41	50	33
Bulgaria	59	23	19	21	21	20	19	20	24	22	25	31
Poland	41	39	41	41	36	36	20	27	29	32	32	30
Argentina	26	29	30	26	26	23	26	29	33	32	30	30
Lithuania	...	4	5	2	2	29	17	21	23	23	28	29
Kyrgyzstan	...	41	42	38	45	47	51	60	47	39	40	28
Cyprus	...	...	14	20	21	19	20	21	21	22	23	23
Ecuador	4	4	5	...	...	13	11	13	...	...	17	22
Serbia	...	9	12	28	6	13	5	14	15	12	11	2

# Exponential growth of innovation indicators

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<b>Decades</b>	<b>50s and 60s</b>	<b>70s</b>	<b>80s</b>	<b>90s</b>
Main Indicators used	R&D	R&D	R&D	R&D
		Patents	Patents	Patents
		Technological balance of payments	Technological balance of payments	Technological balance of payments
			High-tech products and sectors	High-tech products and sectors
			Bibliometrics	Bibliometrics
			Human Resources	Human Resources
			Innovation Surveys	Innovation Surveys
				Innovations mentioned in technical literature
				Surveys of production technologies
				Intangible investment
				Productivity

# How do firms measure innovations ?

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## **Box 1: Measuring innovation at the firm level: Findings from a senior management survey**

- Only 32 percent of executives are satisfied with their company's innovation-measurement practices. And that percentage has been falling.
- While most executives-73 percent of respondents-believe that innovation should be tracked as rigorously as other business operations, only 46 percent said that their company actually does so.
- The majority of companies continue to rely on a handful of metrics to measure the full scope of their innovation activities. Fifty-two percent of respondents said their company uses five or fewer metrics. But that number is starting to rise.
- A surprisingly small no of companies-27 percent of respondents-attempt to drive innovation by linking employee incentives metrics. But that number, too, is edging up.
- The most widely tracked components of innovation are overall company profitability (79 percent of respondents said their company measures it), overall customer satisfaction (75 percent), and incremental revenue from innovation (73 percent)
- The metrics that employees pay the most attention to-the ones that have the greatest impact on their behavior and attitudes towards the company's innovation efforts-are incremental revenue from innovation and overall customer satisfaction.
- Companies consider themselves most effective at measuring innovation outputs (such as revenue growth, shareholder returns, and brand impact). They consider themselves far less successful at tracking innovation inputs (for example, dedicated resources, such as people and funds invested) and the quality of their innovation processes.

# Diffusion of innovation surveys across developing countries

Country	Methodological Basis	Questionnaire Reference	Period	Activities
<b>Argentina</b> (Segunda Encuesta Nacional de Innovación y Conducta Tecnológica de las empresas Argentinas 1998-2001)	Oslo Manual and Bogota Manual	CIS3 (major adaptation)	1998-2001	Manufacturing
<b>Brazil</b> PINTEC 2000 (Pesquisa Industrial-Inovacao Tecnológica 2000)	Oslo Manual	CIS3 (minor adaptation)	1998-2000	Manufacturing and Mining and quarrying
<b>Malaysia</b> NIS-3 (Third National Survey of Innovation)	Oslo Manual	CIS3 (minor adaptation)	2000-2001	Manufacturing
<b>Mexico</b> (Segunda Encuesta Nacional de Innovación en los sectores manufacturero y de Servicios 2001)	Oslo Manual	CIS3 (minor adaptation)	1999-2000	Manufacturing
<b>South Africa</b> 2001	Oslo Manual	CIS2 (major adaptation)	1998-2000	Manufacturing and Services
2005 (First official innovation survey)	Oslo Manual	CIS 4	2002-2004	Services (merged with manufacturing)

## The Country experiences

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- **The rate of innovation**
- **Innovation activities and expenditures**
- **Sources of information and partnerships for effecting innovations**
- **Factors hampering innovation**
- **Effects of innovation on specific dimensions of performance**

# Developing country experiences wrt innovation surveys

	<b>Brazil</b>	<b>Malaysia</b>	<b>South Africa</b>
Survey Period	1998-2000	2000-2001	2002-2004
Response rate in percentage	Not clearly indicated	19	31
Scope	Manufacturing and services	Manufacturing only	Manufacturing and services
Innovation rate (in Percentage)	31	35	52
Most important innovation activity	Acquisition of capital goods	Acquisition of R&D	Acquisition of capital goods
Intensity if innovation expenditures	Greater than unity	Greater than unity	Greater than unity
Importance of intramural R&D	Not very important- less than one third	Not very important- less than one third	Not very important- less than one third
Source of information on innovation and partnership for effecting innovations	Customers and suppliers	Customers and suppliers	Customers and suppliers
Importance of universities and research institutes as a source of information on innovation	Not very important	Not very important	Not very important
Factors hampering innovation	Innovation costs	Innovation costs	Competition from established firms and Innovation costs
Importance of governmental source of financing innovation	Not important	Not important	Ambiguous

# The Four Critical Issues wrt Innovation Surveys

- (i) The definition of the term innovation and measurement errors due to self-reporting. This is especially severe when the economy is dominated by the services sector where even the output is not tangible;
- (ii) Low response rates and missing values and the consequent problems in generalising the results for the entire universe;
- (iii) Poor quality of data on the six or seven items of innovation activities and expenditures and the difficulties in interpreting these results
- (iv) Use of innovation surveys: more for academic publications (?) rather than for designing public policy instruments for impacting on the rate of innovations in the economy.

## Conclusions

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- There is need to increase response rates to at least 50 per cent. Combining the innovation survey as part of other mandatory surveys may do the trick as in the case of France, Norway and Portugal for instance;
- Care needs to be placed while tabulating and interpreting the data on innovation activity expenditures. Age of the unit need to be taken explicitly into account;
- Results of innovation surveys must feed into public policy making. Systemic failures must be detected; and
- Time series data on innovation activity and expenditure must be developed.