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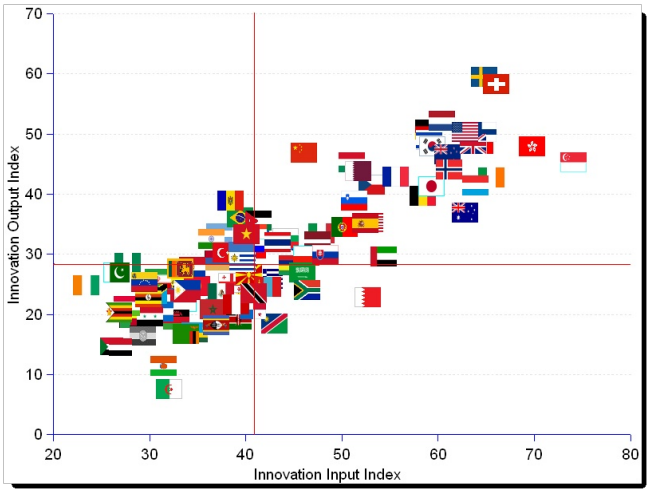
Innovation efficiency 2011

The chart shows the spread of the innovation output of 125 countries as a function of the innovation input they use. The linear association between output and input is strong as one would expect : correlation coefficient r = 0.85. Seventy one percent of output variation are explained by the input variation (R^2 = 0.714). However, some countries are more efficient than others in the way they use their inputs. The efficiency index, computed as the ratio of output per input times 100, provides a best-in-class group : in descending order Côte d'Ivoire (106), Nigeria (103), China, Pakistan, Moldova (101), Sweden (92), Brazil (91), Argentina (90), Bangladesh (89) and India (89).



To better illustrate the relative efficiency of all countries, the chart is divided into four quadrants by the input median (red vertical line), and the output median (red horizontal line) :

- Upper left quadrant : efficient innovators. This group includes those countries that succeed in getting an above median output from their below median input. Moldova, Brazil, Serbia, Argentina, India, Viet Nam can be found here. They are in relative terms the high-performers.
- Upper right quadrant : powerful innovators. Included are countries that both use above median inputs and obtain above median outputs. As expected, such countries as Switzerland, Sweden, Netherlands, Germany, United States, Finland, China, Israel, Korea fall in this quadrant.
- Lower left quadrant : modest innovators. Here one finds countries that use below median inputs and achieve below median outputs. Destitute economies prevail in this quadrant : Niger, Yemen, Ethiopia, Zambia, Rwanda.
- Lower right quadrant : inefficient innovators. Although they use above median inputs, their innovation output is low. In other terms, some innovation resources are wasted. Examples are Bahrain, Saudi Arabia, Mongolia, Greece.

Given the high correlation of output with input, we can get a better insight of the innovation efficiency ranking by looking at the residuals (difference between the computed output score and the line of fit). Now, the top ten ranking is as follows (residual in brackets) : China (14.1), Sweden (12.4), Moldova (12.2), Switzerland (10.3), Nigeria (10.0), Côte d'Ivoire (9.5), Pakistan (9.3), Hungary (8.8), Netherlands (8.6) and Brazil (8.5).. At the opposite end, the 10 least performers are :

Bahrain (-14.8), Algeria (-14.4), Namibia (-11.8), Niger (-10.0), Bosnia and Herzegovina (-10.0), United Arab Emirates (-9.4), Singapore (-8.9), South Africa (-8.8), Australia (-8.5) and Kenya (-8.3).

Such a brief data analysis does not justify any conclusions about the why's and the how's of innovation — even assuming that the methodology used by the source is trustworthy and robust. However, the neighborhood of Moldova and Sweden in the top 10 group may suggest some theory about innovation, for example that countries with huge differences as regards their wealth, economic background and cultural structure can still achieve relative high innovation outputs by adopting proper policies.

A similar reasoning may be applied to the low performers : Singapore and Niger both fall considerably below the line of fit, likely for quite different reasons. Singapore is known for its investment effort in the advanced technologies and in modernizing its economy, but apparently it is not getting enough bang for the buck — could it be a situation of misplaced bets ? Niger may be a plain case of a struggle for survival that does not leave much breathing space to organize for innovation. Further investigation would be required to find the answers.

Source : INSEAD - The Global Innovation Index.

Efficient Utilisation of Innovation Inputs - 2011

Country	Rank GII	GII (Global Innovation Index)	Innovation Input Index [1]	Innovation Output Index [2]	Innovation Efficiency Index [3]
Albania	80	30.45	38.29	22.62	59
Algeria	125	19.79	32.07	7.52	23
Argentina	58	35.36	37.29	33.44	90
Armenia	69	33	37.1	28.9	78
Australia	21	49.85	62.81	36.89	59
Austria	19	50.75	59.28	42.21	71
Azerbaijan	88	29.17	37.21	21.13	57
Bahrain	46	37.8	52.73	22.87	43
Bangladesh	97	28.05	29.64	26.47	89
Belgium	24	49.05	58.44	39.66	68
Benin	118	23.81	28.26	19.35	68
Bolivia	112	25.44	30.37	20.51	68
Bosnia and Herzegovina	76	30.84	42.1	19.58	47
Botswana	79	30.51	40.37	20.65	51
Brazil	47	37.75	39.47	36.03	91
Brunei Darussalam	75	30.93	39.19	22.68	58
Bulgaria	42	38.42	44.2	32.64	74
Burkina Faso	120	23.14	29.24	17.04	58
Cambodia	111	25.46	31.24	19.68	63
Cameroon	103	26.95	30.12	23.79	79
Canada	8	56.33	64.41	48.26	75
Chile	38	38.84	48.09	29.6	62
China	29	46.43	46.08	46.77	101
Colombia	71	32.32	38.72	25.92	67
Costa Rica	45	37.91	42.22	33.6	80
Côte d'Ivoire	117	24.08	23.4	24.77	106
Croatia	44	37.98	45	30.96	69
Cyprus	28	46.45	52.38	40.52	77
Czech Republic	27	47.3	53.11	41.49	78
Denmark	6	56.96	64.57	49.34	76
Ecuador	93	28.75	32.57	24.94	77
Egypt	87	29.21	35.08	23.34	67
El Salvador	90	29.14	34.6	23.67	68
Estonia	23	49.18	54.86	43.5	79
Ethiopia	121	22.88	29.29	16.47	56
Finland	5	57.5	64.71	50.29	78
France	22	49.25	55.61	42.9	77
Georgia	73	31.87	38.54	25.2	65
Germany	12	54.89	59.04	50.74	86
Ghana	70	32.48	39.84	25.12	63
Greece	63	34.18	42.48	25.89	61
Guatemala	86	29.33	33.18	25.49	77
Guyana	61	34.83	38.7	30.95	80
Honduras	98	27.81	33.08	22.53	68
Hong Kong (SAr), China	4	58.8	69.77	47.83	69
Hungary	25	48.12	51.04	45.2	89
Iceland	11	55.1	62.48	47.72	76
India	62	34.52	36.47	32.56	89
Indonesia	99	27.78	33.57	21.99	66
Iran	95	28.41	30.91	25.91	84
Ireland	13	54.1	65.53	42.67	65
Israel	14	54.03	59.12	48.94	83
Italy	35	40.69	47.88	33.49	70
Jamaica	92	28.88	38.89	18.87	49
Japan	20	50.32	59.34	41.3	70
Jordan	41	38.43	41.34	35.52	86
Kazakhstan	84	30.32	39.86	20.77	52
Kenya	89	29.15	39.24	19.05	49
Korea, Republic	16	53.68	59.43	47.93	81
Kuwait	52	36.64	42.44	30.85	73
Kyrgyzstan	85	29.79	34.93	24.65	71
Latvia	36	39.8	47.46	32.14	68
Lebanon	49	37.11	40.88	33.34	82
Lithuania	40	38.49	47.46	29.52	62
Luxembourg	17	52.65	63.93	41.37	65
Macedonia	67	33.47	40.37	26.57	66
Madagascar	113	25.41	31.2	19.63	63
Malawi	108	25.96	32.82	19.11	58
Malaysia	31	44.05	52.94	35.17	66
Mali	107	26.35	29.85	22.85	77
Mauritius	53	36.47	44.79	28.15	63
Mexico	81	30.45	37.47	23.42	63
Moldova, Republic	39	38.66	38.4	38.92	101
Mongolia	68	33.4	42.31	24.49	58
Morocco	94	28.73	36.65	20.81	57
Namibia	78	30.74	43.01	18.46	43
Netherlands	9	56.31	60.42	52.2	86
New Zealand	15	53.79	60.97	46.61	76
Nicaragua	110	25.78	31.13	20.44	66
Niger	122	21.41	31.44	11.38	36
Nigeria	96	28.15	27.72	28.58	103
Norway	18	52.6	61.15	44.04	72
Oman	57	35.51	46.23	24.79	54
Pakistan	105	26.75	26.57	26.94	101
Panama	77	30.77	40.73	20.82	51
Paraguay	74	31.17	34.45	27.9	81
Peru	83	30.34	39.06	21.63	55
Philippines	91	28.98	34	23.96	70
Poland	43	38.02	46.29	29.74	64
Portugal	33	42.4	50.32	34.47	69
Qatar	26	47.74	51.71	43.77	85
Romania	50	36.83	41.8	31.86	76
Russian Federation	56	35.85	40.79	30.91	76
Rwanda	109	25.86	34.73	17	49
Saudi Arabia	54	36.44	45.94	26.94	59
Senegal	100	27.56	30.73	24.38	79
Serbia	55	36.31	39.09	33.53	86
Singapore	3	59.64	74.11	45.18	61
Slovak Republic	37	39.05	48.27	29.83	62
Slovenia	30	45.07	51.29	38.86	76
South Africa	59	35.22	46.37	24.07	52
Spain	32	43.81	52.43	35.19	67
Sri Lanka	82	30.36	33.2	27.53	83
Sudan	124	20.36	26.06	14.65	56
Swaziland	101	27.52	36.93	18.11	49
Sweden	2	62.12	64.85	59.4	92
Switzerland	1	63.82	66.07	58.2	88
Syrian Arab Republic	115	24.82	30.03	19.61	65
Tajikistan	116	24.5	27.64	21.36	77
Tanzania	104	26.88	30.45	23.3	77
Thailand	48	37.63	43.33	31.93	74
Trinidad and Tobago	72	32.17	40.86	23.47	57
Tunisia	66	33.89	38.21	29.57	77
Turkey	65	34.11	37.96	30.25	80
Uganda	106	26.37	29.86	22.87	77
Ukraine	60	35.01	39.59	30.42	77
United Arab Emirates	34	41.99	54.38	29.61	54
United Kingdom	10	55.96	63.66	48.27	76
United States of America	7	56.57	62.84	50.3	80
Uruguay	64	34.18	39.69	28.67	72
Venezuela	102	27.41	29.48	25.35	86
Viet Nam	51	36.71	40.09	33.34	83
Yemen	123	20.72	27	14.44	53
Zambia	114	25.27	33.81	16.73	49
Zimbabwe	119	23.54	26.82	20.26	76
Median			40.09	28.15	

[1] The Innovation Input Index is the simple average of 5 sub-indexes : Institutions (Political environment, Regulatory environment, Business environment), Human capital and research (Education, Tertiary education, Research and development), Infrastructure (ICT, Energy, General infrastructure), Market sophistication (Credit, Investment, Trade and competition) and Business sophistication (Knowledge workers, Innovation linkages, Knowledge absorption).

[2] The Innovation Output Index is the simple average of 2 sub-indexes : Scientific outputs (Knowledge creation, Knowledge impact, Knowledge diffusion) and Creative outputs (Creative intangibles, Creative goods and services outputs).

[3] Innovation Efficiency Index = (Innovation Output ÷ Innovation Input) × 100.