The Knowledge Divide

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The knowledge explosion has been felt throughout the planet, but in a most uneven manner. The capacity to generate and utilize scientific and technological knowledge has become highly concentrated in the government agencies, corporations, academic institutions, and civil society organizations of a few nations where science, technology, and production are tightly intertwined. The rest of the world still relies on traditional knowledge and techniques, complemented by a thin layer of modern knowledge, technologies, products, and services, mostly passively received from the technologically advanced regions of the world.

One of the key salient features of the fractured global order is the knowledge divide, which has been relentlessly deepening and enlarging, and led to a sort of "knowledge apartheid" that radically separates those societies that have modern advanced science, technology and innovation capabilities, from those that do not. It is at the root of security, economic, social, environmental, cultural, governance, and communication fractures, which in turn amplify the differences in capacities to generate and utilize knowledge.

As an example, disparities between science, technology and innovation capabilities of developed and developing countries are much larger than economic disparities. At the beginning of the twenty-first century, the ratio between the Gross Domestic Product (GDP) *per capita* of the high-income countries of the Organization for Economic Cooperation and Development (OECD) to that of the low-income countries (as defined by the World Bank) was about 70 to 1, while the ratios of gross capital formation *per capita* and trade *per capita* were 53 to 1 and 77 to 1, respectively.

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However striking these disparities may be, they are dwarfed by the differences between developed and developing countries in their capacities to generate scientific knowledge, develop modern technologies, and produce high-technology goods and services. The ratio of scientific publications per 100,000 inhabitants in OECD countries to that of low-income countries is 270 to 1, the ratio between patent applications by residents per 100,000 inhabitants is 2,000 to 1, while those of high technology exports *per capita* is 1,300 to 1 (see Table).

TABLE: **Economic Disparities and the Knowledge Divide**

(2013 or most recent year)

Indicator	***Values and ratios***		
	(A) OECD countries	(B) Low -income countries	Ratio (A)/(B)
Gross domestic product *per capita* (constant 2005 US$)	32,108.19	401.97	79.88
Gross capital formation *per capita* (constant 2000 US$)*	6,586.24	104.93	62.77
Trade *per capita* (imports + exports of goods and services) (constant 2005 US$)	17,762.41	286.96	61.90
Scientific output: Scientific publications per 100,000 inhabitants**	49.65	0.18	***271.70***
Technological Output: Patent applications by residents per 100,000 inhabitants***	66.92	0.03	***2,076.63***
Production Output: High-technology exports *per capita******	878.81	0.67	***1,306.59***

Source: *World Bank Global Indicators*. (Low-income countries, as defined by the World Bank, have an average income *per capita* of less than US$1,045 in 2010.
Note: the full value for technological output in low-income countries (column B) is 0.030558, and for production output 0.121954. Rounding up these figures to two decimals generate the ratios in the last column.
*Year 2012, ** Year 2009, *** Information available for four low income countries (out of 31), **** Information available for 16 low income countries (out of 31)

Moreover, scientific research and technological development organizations in most developing countries are highly vulnerable to changes in the domestic economic and political climate, and also vulnerable to the attraction exerted by better-financed and more advanced research and development

organizations in developed countries. Building a world-class research institution takes at least a decade-and-a-half of sustained efforts, but these achievements can be destroyed in a couple of years by the emigration of highly-qualified staff.

These figures provide a snapshot of disparities in the worldwide distribution of science and technology capabilities at the beginning of the twenty-first century. Yet, asymmetries are even greater than these figures suggest. The cumulative character of modern science, technology and production capacity building means that, as abilities in these fields are acquired, it becomes easier to continue accumulating them. Those that have a long history of doing so are in a much better position to reap the benefit of future advances in science and technology.

The knowledge divide runs the highly probable risk of becoming an impassable abyss.