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## **Investing in Human Capital Development: Science and Technology in Education**

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**APEC**  
PHILIPPINES  
2 0 1 5

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# Investing in Human Capital Development: Science and Technology in Education

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## Top 10 Products Exported and Imported by APEC in 2012

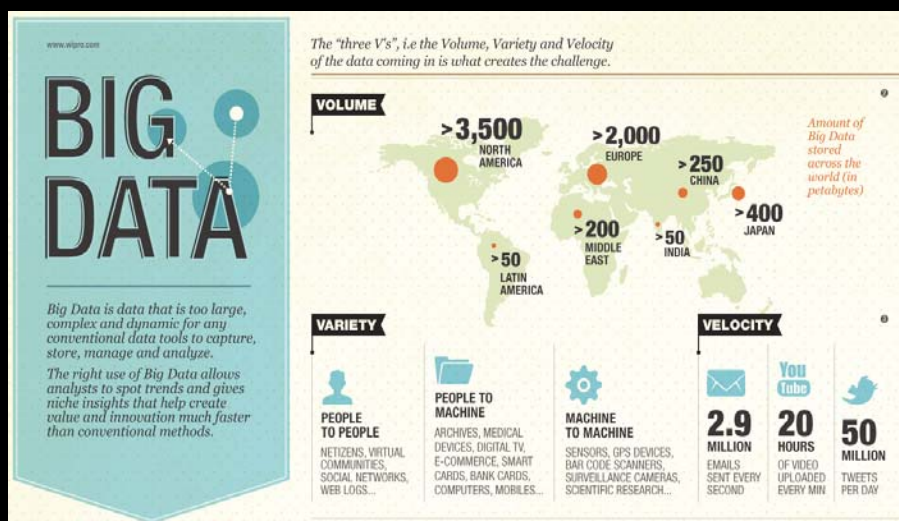
Products Exported According to Value	Products Imported According to Value
Petroleum, not crude	Crude Petroleum Oils
Electronic integrated circuits and microassemblies	Electronic integrated circuits and microassemblies
Crude petroleum oils	Petroleum oils, not crude
Electronic apparatus for line telephony	Motor cars and other motor vehicles principally designed for transport of persons
Motor cars and other motor vehicles principally designed for the transport of persons	Electronic apparatus for line telephony
Automatic data processing machines, optical readers	Automatic data processing machines, optical readers, etc.
Parts and accessories of motor vehicles	Petroleum gases
Gold, unwrought or in semi-manufactured forms	Parts and accessories of motor vehicles
Petroleum gases	Iron ores and concentrates
Parts and accessories of computers and office machines	Medicament mixtures put in dosage
TOTAL VALUE OF EXPORTS:USD 8.8 trillion	TOTAL VALUE OF IMPORTS:USD 9.1 trillion

## INNOVATION

“The design, invention, development and/or implementation of new or altered **products, services, processes, systems, organizational structures, or business models** for the purpose of creating new value for customers and financial returns for the firm.”

2008 Advisory Committee report to the Secretary of Commerce,  
*Innovation Measurement: Tracking the State of Innovation in the American Economy*

## ... The Dawn of “Big Data” Volume, Variety, Velocity



Marciano, 2013

## THE NEW MACHINE AGE

(Second Machine Age)

Prof. Erik Brynjolfsson

Director of MIT Center for Digital Business

- **Digital**- quantitative, measurable, freely replicable, near zero transport cost
- **Exponential**-fast, rapid development but we still expect linear trends
- **Combinatorial**- partnerships, team up with machines; human-computer cooperation; infrastructure systems

Brynjolfsson, 2013

## Neurosciences Brain research



Photo: Scientific American, Dec. 2013

ASSURING A COMPETENT  
WORKFORCE FOR  
ENHANCING COMPETITIVENESS  
AND  
INCLUSIVE GROWTH

Talents Incubation

Talents Employment

Talents creating  
Employment

## APEC:GERD as Percent of GDP and Researchers in R&amp;D per million population

APEC Member Country	Indicator	
	GERD as % of GDP	Researchers in R&D (per million people)
Australia (2008) <sup>1</sup>	2.40778	4,280
Brunei Darussalam (2004) <sup>2</sup>	0.04	686
Canada (2010) <sup>3</sup>	1.86008	4,579
Chile (2010) <sup>3</sup>	0.41722	317
China (2010) <sup>3</sup>	1.75899	890
Hong Kong SAR, China (2010) <sup>3</sup>	0.74927	2,925
Indonesia (2009) <sup>2</sup>	0.08	173
Japan (2010) <sup>3</sup>	3.25394	5,151
Korea, Rep. (2010) <sup>3</sup>	3.73781	5,451
Malaysia (2010) <sup>3</sup>	1.0674	1,459
Mexico (2010) <sup>3</sup>	0.45592	382
New Zealand (2009) <sup>1</sup>	1.28	3,724
Peru (2004) <sup>1</sup>	0.15	181
Philippines (2007) <sup>2</sup>	0.11	143
Russian Federation (2010) <sup>3</sup>	1.1302	3,078
Singapore (2010) <sup>3</sup>	2.054	6,307
Thailand (2009) <sup>2</sup>	0.21	575
United States (2010) <sup>3</sup>	2.73827	3,838
Vietnam (2002) <sup>2</sup>	0.19	511

\*Papua New Guinea and Chinese Taipei were not included in the list



Researchers in Headcounts (HC)



Researchers in Full Time Equivalents (FTE)

Sources: <sup>1</sup>UNESCO Institute for Statistics ([www.uis.unesco.org](http://www.uis.unesco.org)), <sup>2</sup>DOST Compendium of S&T Statistics, 2012, <sup>3</sup>The World Bank ([www.worldbank.org](http://www.worldbank.org))

## APEC: GERD as %GDP, Researchers per million population and Rank in 2014 GII

APEC Member Country	Indicator		World Rank based from the Global Innovation Index (2014) <sup>4</sup>
	GERD as % of GDP	Researchers in R&D (per million people)	
Australia (2008) <sup>1</sup>	2.40778	4,280	17
Brunei Darussalam (2004) <sup>2</sup>	0.04	686	88
Canada (2010) <sup>3</sup>	1.86008	4,579	12
Chile (2010) <sup>3</sup>	0.41722	317	46
China (2010) <sup>3</sup>	1.75899	890	29
Hong Kong SAR, China (2010) <sup>3</sup>	0.74927	2,925	10
Indonesia (2009) <sup>2</sup>	0.08	173	87
Japan (2010) <sup>3</sup>	3.25394	5,151	21
Korea, Rep. (2010) <sup>3</sup>	3.73781	5,451	16
Malaysia (2010) <sup>3</sup>	1.0674	1,459	33
Mexico (2010) <sup>3</sup>	0.45592	382	66
New Zealand (2009) <sup>1</sup>	1.28	3,724	18
Peru (2004) <sup>1</sup>	0.15	181	73
Philippines (2007) <sup>2</sup>	0.11	143	100
Russian Federation (2010) <sup>3</sup>	1.1302	3,078	49
Singapore (2010) <sup>3</sup>	2.054	6,307	7
Thailand (2009) <sup>2</sup>	0.21	575	48
United States (2010) <sup>3</sup>	2.73827	3,838	6
Vietnam (2002) <sup>2</sup>	0.19	511	71

\*Papua New Guinea and Chinese Taipei were not included in the list



Researchers in Headcounts (HC)



Researchers in Full Time Equivalents (FTE)

Sources: <sup>1</sup>UNESCO Institute for Statistics ([www.uis.unesco.org](http://www.uis.unesco.org)), <sup>2</sup>DOST Compendium of S&T Statistics, 2012, <sup>3</sup>The World Bank ([www.worldbank.org](http://www.worldbank.org)), <sup>4</sup>Global Innovation Index 2014 ([www.globalinnovationindex.org](http://www.globalinnovationindex.org))

## TOWARDS ENHANCING COMPETITIVENESS AND INCLUSIVE GROWTH

- PROMOTE ECONOMIC EFFICIENCY
- FACILITATE TRADE
- ATTRACT INVESTMENTS
- ENSURE FOOD SECURITY AND BIOSECURITY
- PROVIDE ADEQUATE HEALTH CARE
- ENHANCE ENVIRONMENTAL PROTECTION
- MITIGATE EFFECTS OF HAZARDS AND DISASTERS
  - Humanitarian Emergencies

## TRAIN HIGHLY-SKILLED AND HIGHLY PRODUCTIVE WORKFORCE

- HEALTH CARE DELIVERY
- SCIENCE AND MATHEMATICS EDUCATION FOR ELEMENTARY AND HIGH SCHOOL
- TECHNICAL AND TECHNICIAN EDUCATION
- TERTIARY LEVEL SCIENCE AND ENGINEERING EDUCATION
- GRADUATE PROGRAMS IN SCIENCE AND ENGINEERING

## APEC Initiatives

- Connectivity Blueprint
  - Seamless and comprehensive integration
- 2013 APEC Leaders Declaration on the Connectivity Blueprint
  - Make APEC more competitive and cohesive

## APEC Activities in S&T Education

- Policy Partnership in Science, Technology and Innovation (PPSTI)
- APEC Scholarship Initiative
- APEC Science Prize for Innovation, Research and Education (ASPIRE)
- APEC Youth Science Festival



## Adequate Social Capability to Absorb and Manage Advanced Technologies

A technology explicit  
development agenda

## Towards an APEC Knowledge Network

## COLLABORATION

The growing connectedness of the world and the rising contribution of scientists and engineers from all continents have broadened the possibilities of human creativity.

Scientific American, Oct. 2013

