Fulbright University Việt Nam

Development Policy 2019

Session (14): Innovation, Science and Technology

Schedule

- Fast growing (or grown) economies tend to have deeper root of education on science and math as well as technological development.

- What has been the trend worldwide, how has the investment in science and technology resulted in economic growth?

- What is the causal link between science and technology, and economic growth?

Science, Math and Education

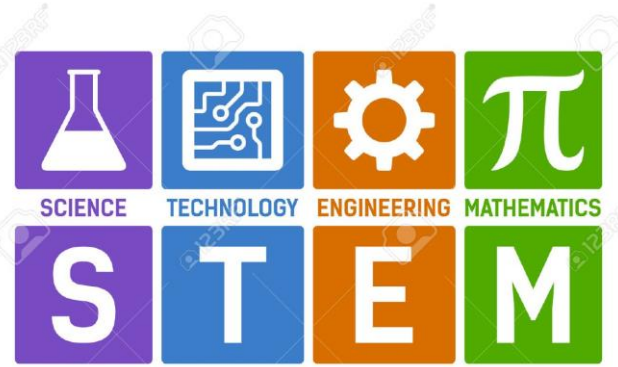
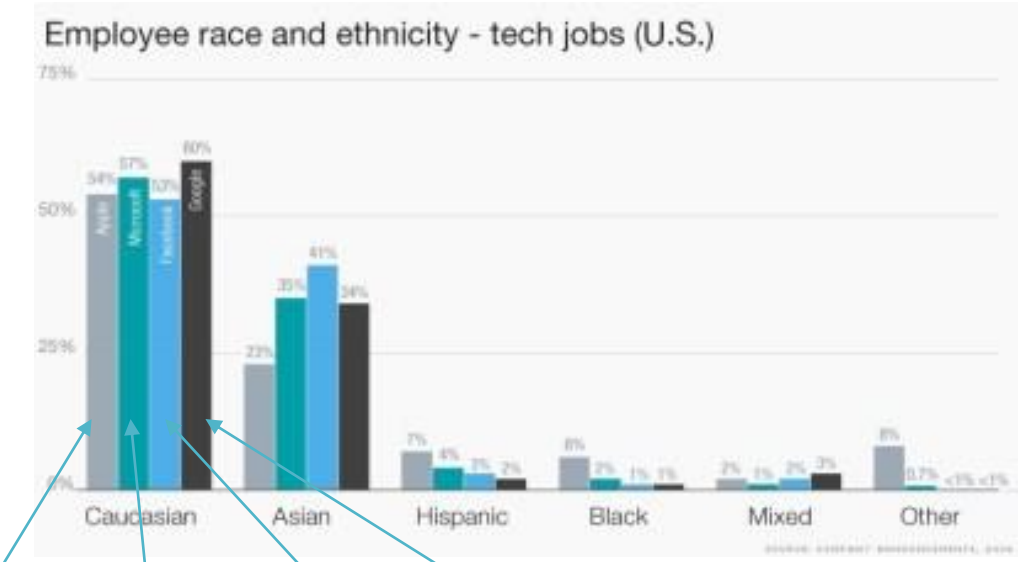


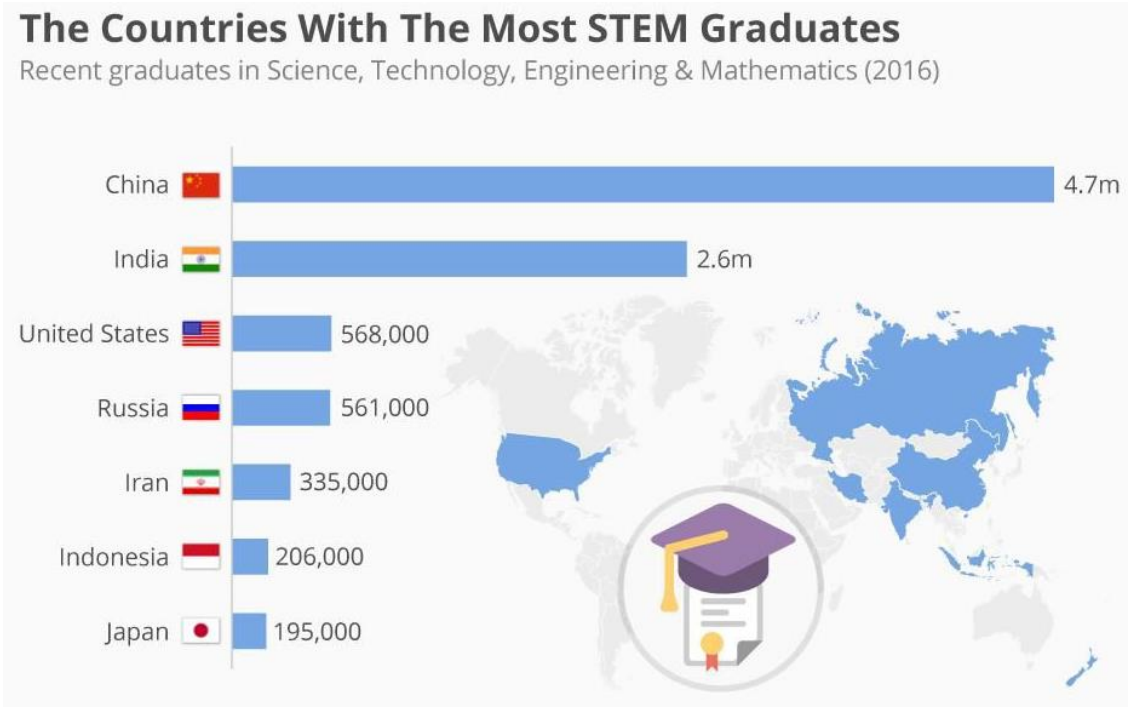
Exhibit 1.2: Distribution of Science A

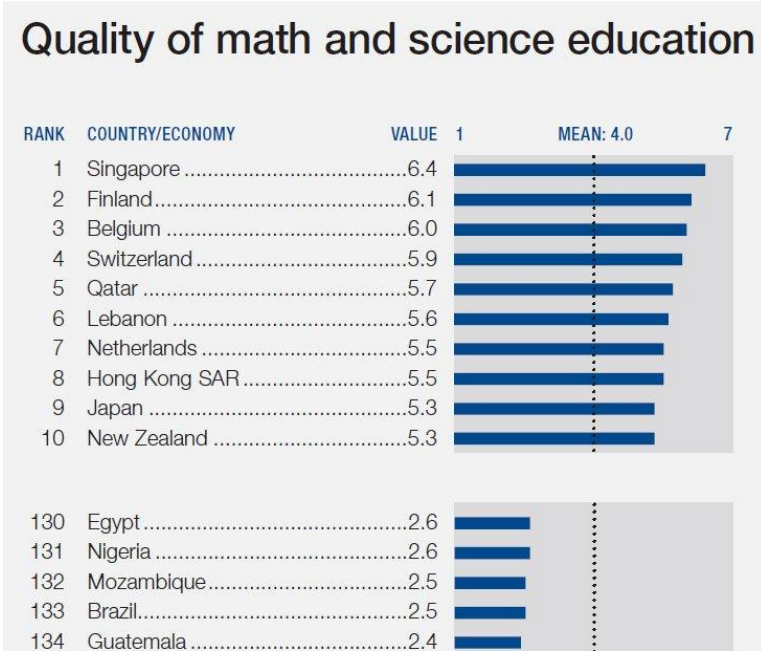
Country	Average Scale Score
2 Singapore	597 (3.2)
Japan	571 (1.8)
Chinese Taipei	569 (2.1)
Korea, Rep. of	556 (2.2)
Slovenia	551 (2.4)
Hong Kong SAR	546 (3.9)
Russian Federation	544 (4.2)
England	537 (3.8)
Kazakhstan	533 (4.4)
Ireland	530 (2.8)
† United States	530 (2.8)
Hungary	527 (3.4)
1 † Canada	526 (2.2)
Sweden	522 (3.4)
2 Lithuania	519 (2.8)
† New Zealand	513 (3.1)
Australia	512 (2.7)
Norway (9)	509 (2.8)
3 Israel	507 (3.9)

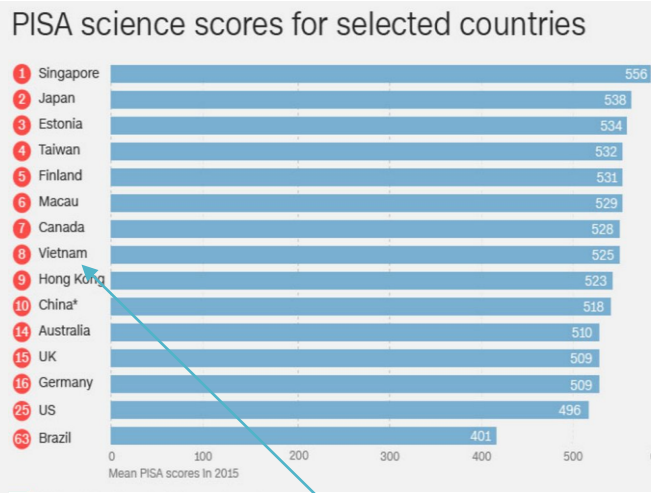
- Asian countries (in particular, East Asian countries, India, etc.) spend a lot of time and money to educate their children with special emphasis on **science** and **math**.
- All countries recognize the necessity of new educational paradigm and reform, but at the same time, they still value the system that brought about great success. Heading toward STEM.
- Trends in International Mathematics and Science Study (TIMSS) and Programme for International Student Assessment (PISA) claim top positions.
- Eastern philosophy (emphasis on education) + the role of parenting ('Tiger Mom') + education policies (institutional support).

STEM education









Coding Education is Now Required

- South Korea started to teach software coding (concept-based) from primary schools (support from big business, nonprofit, and the government). Started from mid-2010s, officially launched in 2019.

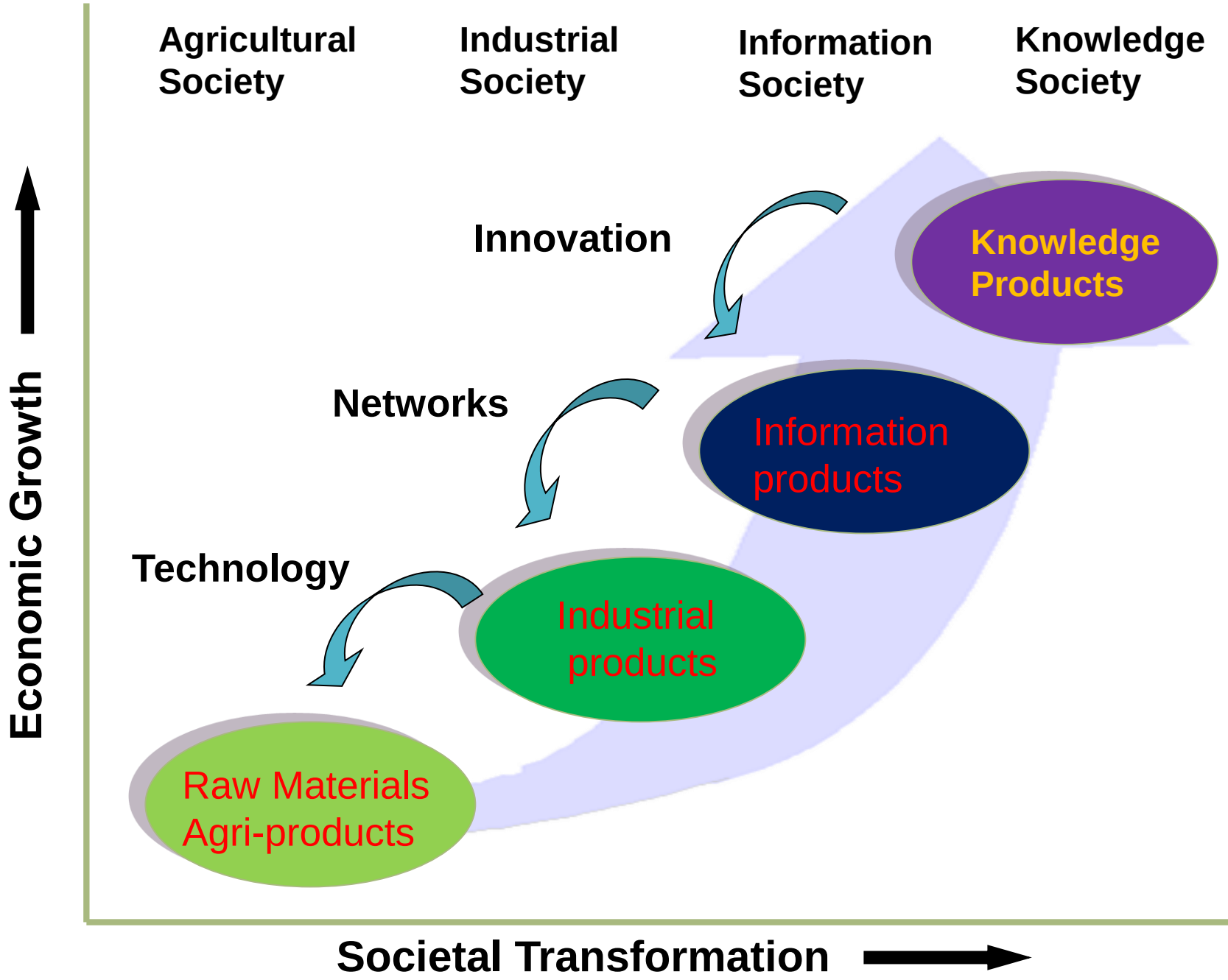
- Singapore will roll out coding education in primary schools from 2020 (introduced as an optional class in 2014 → next target is upper primary students (10 hour programme in schools).

Already late!

Countries	Coding Education
Estonia	Since 1992, Coding was included in public education (from primary 1)
UK	'Year of the Code' (2014), coding education for 5~16 years old. Government nurtures coding teachers
Finland	Mandatory coding education (2016) – 7~9 graders can do programming language.
China	Since 2001, 70 hours of software education from primary 3, mandatory AI education for high schoolers.
India	Since 2010, mandatory software education for all schoolers, coding language (C++, Java, etc.) for high schoolers

Vietnam (Link)

- It is too late for students to start learning programming and coding, by the time they enter universities – must start earlier.
- Vietnam has potential in human resource investment – but lacks systematic approach to Artificial Intelligence, IoT, etc.
- Some sporadic & uncoordinated efforts have not been effective (Google, nonprofit, etc.)
- According to the recent survey, 25% of IT workers intend to work abroad (Brain drain issue).
- Q. Why people want to leave? (at least in IT field?). Can international schools in Vietnam prevent brain drain?


Agricultural Society
Industrial Society
Information Society
Knowledge Society
Economic Growth
Societal Transformation
Innovation
Networks
Technology
Knowledge Products
Information products
Industrial products
Raw Materials
Agri-products

Causal Link? STEM-Development

- There is a consensus among policymakers and economists – at least half, not more, of the economic growth in countries is directly attributable to science and technology.

- In a globalizing and knowledge-driven world with increasing importance of service industries and technological competitiveness, this contribution can only become stronger.

- World Bank (1999): “Growing recognition that development is built not merely through the accumulation of physical capital and human skill, but on a foundation of information, learning and adaptation, etc…”

- Historically, high rates of return on investment in science and technology (the dominant engine of economic growth).

Strategic Approach

- Solution-driven priorities (not driven by priorities of S&T community).
- Co-production of usable knowledge (through collaborations of users & producers) – Drawing on global research, innovation systems, design-thinking.
- Incentive structure design to engage the private sector in harnessing S&T for the provision of public goods.
- Honor scientists and engineers.
- Universal scientific and technical literacy

Case of Estonia (Link)

- Tiny Estonia, with only 1.3 million population, ranks among the most digitally advanced societies in the world.
- Has performed strongly across digital metrics, whether in terms of the ICT education of its citizens, or the sophistication of the government digital services.
- In 1996, Tiger Leap Foundation, a government-backed technology investment body – all Estonian schools were online by the late 1990s, and large investment were made in computer networking and infrastructure.
- 2000s: ten public and private companies formed a PPP, Look@World Foundation, raised digital awareness of the citizens (popularized the use of the internet and ICT in education, science, and culture). Early computer education (from 7 yrs.). e-Residency program (empowering entrepreneurs).
- Over 400 startups in the capital city, 'Silicon Valley of the Baltic Sea,' Skype was created.
- Cooperation and Reciprocity were the key: government, business, non-profits, and citizens.

Silicon Valley – The Original

- Silicon Valley has a guaranteed place in history as the original industrial core of the revolution in information technologies.
- A home for largest high-tech corporations: Headquarters of 39 companies in Fortune 100 & thousands of startup companies. 1/3 of venture capitals.
- The creation of its high-tech industrial basis in the 1950s around the Stanford Industrial Park.
- Growth of innovative microelectronics firms in the 1960s, Support from Department of Defense, launching of personal computers.
- Centrality of work - Technical professionals – Entrepreneurialism – Aggressive competition – venture capitals (high risk money)

DaeDeok Science Town – South Korea

- Research and Development oriented town in South Korea (1973) – by the order of Park Chung Hee, with establishment of Korea Advanced Institute of Science and Technology (KAIST).

- Concentration of Ph.Ds in Science and Technology, Electronics, Aerospace, etc. 232 institutions.

- Government was the main actor (support the creation, relocation of research institutes to the town).

- Scientists returned from US and Europe – suburban belt, good quality of life in the town.

A*STAR - Singapore

- Agency for Science and Technology Research (Singapore) – A statutory board under the Ministry of Trade & Industry.

- Support R&D and allocate fund for competitive areas. Advanced manufacturing and engineering, health and biomedical sciences, urban solutions and sustainability, etc.

- Close relationship with companies and industries, 18 research institutes, and more than 5,000 staff and researchers in the research towns.

- Depended upon imported workers but now producing local researchers (more than 700 Ph.D. and Post-doctors have been supported.

Agency for Science, Technology and Research

SINGAPORE

Role of Nonprofit Sector

- One million **Malaysians** still do not have access to electricity and 62% of businesses in the country find it difficult to source skilled workers.

- The initiative of the Solar Academy Program | Science of Life Studies 24/7 – provide underprivileged youth with cutting-edge training that serves as an access point to occupations in STEM → positioned them in renewable energy sector (solving two problems).

- **India** produced 2.6 million STEM college graduates – but still 6~12% behind the market demands.

- Nonprofit organization, Agastya International Foundation designed a unique initiative to address the gap between market demand and STEM fluency of the students (STEM fluency – holistic and practical applications of teaching into traditional pedagogy).

Vietnam is Not Doing Anything

- In the age of Industry 4.0, the Vietnamese government is also pushing for science and technology as well as innovation (National Strategy on Industry 4.0, Ministry of Science and Technology's plan, Vietnam's 2035).

- Vision, Vietnam 2035 – apply technology to all industries and fields (e.g. AI, IoT).

- Young workforce education, collaboration with foreign institutions (tech transfer).

- Exploiting big data and high tech: (e.g.) Vin Group (investment in AI and software development, creation of high-tech park).

- Regardless of these efforts, Vietnam still faces a lot of challenges. Discuss.