Frontier Technology in Asia and the Pacific

Trade, Investment and Innovation Division
United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)
Agenda

• Frontier technologies
  – what technologies are we talking about?

• Impacts of frontier technologies on jobs

• Diversified capacities of ASEAN members for embracing frontier technologies

• Policy recommendations
Defining frontier technologies

There is no universally agreed definition of frontier technology. However, there is a recurring common feature across the different technological advances in that they all “have the potential to disrupt the status quo, alter the way people live and work, rearrange value pools, and lead to entirely new products and services.”
The 40 key emerging technologies for the future according to OECD
## Frontier technologies identified by different organizations

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<tbody>
<tr>
<td>Internet of Things</td>
<td>Fifth-generation (5G) mobile phones</td>
<td>Artificial intelligence</td>
<td>Mobile internet</td>
<td>3D printing</td>
<td>3D Metal Printing</td>
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<td>Big data analytics</td>
<td>Artificial intelligence</td>
<td>Robotics</td>
<td>Automation of knowledge work</td>
<td>Collaborative economy tools</td>
<td>Artificial Embryos</td>
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<td>Artificial intelligence</td>
<td>Robotics</td>
<td>Internet of Things</td>
<td>Internet of Things</td>
<td>Alternative internet delivery</td>
<td>Sensing City</td>
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<td>Neuro technologies</td>
<td>Autonomous vehicles</td>
<td>Autonomous vehicles</td>
<td>Cloud technology</td>
<td>Internet of Things</td>
<td>Artificial intelligence for Everybody</td>
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<td>Nano/micro satellites</td>
<td>Internet of Things</td>
<td>3D printing</td>
<td>Advanced robotics</td>
<td>Unmanned aerial vehicles/drones</td>
<td>Dueling Neural Networks</td>
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<td>Nanomaterials</td>
<td>3D printing</td>
<td>Nanotechnology</td>
<td>Autonomous and near-autonomous vehicles</td>
<td>Airships</td>
<td>Babel-Fish Earbuds</td>
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<td>3D printing (additive manufacturing)</td>
<td>Biotechnology</td>
<td>Next-generation genomics</td>
<td>Solar desalination</td>
<td>Zero-Carbon Natural Gas</td>
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<td>Advanced energy storage technologies</td>
<td>Materials science</td>
<td>Energy storage</td>
<td>Atmospheric water condensers</td>
<td>Perfect Online Privacy</td>
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<td>Synthetic biology</td>
<td>Energy storage</td>
<td>3D printing</td>
<td>Household-scale batteries</td>
<td>Genetic fortune-telling</td>
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<td>Blockchain</td>
<td>Quantum computing</td>
<td>Advanced materials</td>
<td>Smog-reducing technologies</td>
<td>Materials’ Quantum Leap</td>
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<td>Advanced oil and gas exploration</td>
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<td>Renewable energy</td>
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*Source: prepared by ESCAP*
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Impact of frontier technologies on jobs: the scale and pace remain largely unknown

Range of estimates of the share of jobs at risk of being lost to automation

Source: compiled by ESCAP
What is technically feasible is not always economically viable

Dynamics between wages and machine costs: Scenario analysis

Source: ESCAP
Wages vs. machine costs: Evidences

Estimated robot density in manufacturing, 2014 and 2016

Source: prepared by ESCAP based on UNCTAD, 2017
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National competitiveness and innovation capability

\[ y = 0.05x + 2.5 \]
\[ R^2 = 0.82 \]
Fixed-broadband subscriptions per 100 inhabitants in ESCAP member countries

**Source:** prepared by ESCAP according to the data from ITU
Gross domestic expenditure on R&D as a share of GDP

Source: prepared by ESCAP
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Policy recommendations

2. A workforce fit for the emerging scale and speed of the technological revolution. In this context, there is a need to promote lifelong learning, reskilling and entrepreneurship development to develop a cadre of job creators.
3. A responsive and adaptive regulatory framework that doesn’t stifle innovation.
4. A private sector that pursues responsible frontier technology development to tackle social and environment concerns; and to strengthen the quality and sustainability of growth by creating “shared value” through a focus on corporate sustainability.
5. A catalyzing role of government in frontier technologies’ evolution.
Further reading