Digitalization as a new catalyst for economic growth and connectivity or a challenge to our well-being?

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Digital transformation of the economy and society is happening at an accelerated pace
Digital technology diffusion: fast and widespread

Source: IIASA

Retail e-commerce sales are growing worldwide

Source: IPC Market Insights
Online banking rivals physical branch banking

*Source: Nielsen*

Grows of ICT sector

*Source: European Commission*
Digital transformation is expected to open up new opportunities …

Blockchain

Blockchain application to trade
- Trade finance
- B2G and national inter-agency coordination
- Certification and licensing
- Release and customs clearance of goods
- Logistics and transportation
- Cross-border payments
- Insurance
- …

- US$3.1 trillion valued added by 2030 (Gartner Inc.)
- Additional US$1.1 trillion in global trade volumes by 2026 (7% increase; Bain & Company and HSBC)
- Combined with IoT, AI and 3D printing, 34% trade growth (2016-2030); increase in services trade share to 25% in 2030 (WTO)
3D printing

Effect of 3D printing on world trade in goods and services, bln USD; Source: ING

- Up to 22% less world trade in 2040

Scenario I: current trend of investment in 3D printers and traditional machines continues
Scenario II: doubled rate of investment in 3D printers

Digitalization to reduce trade costs

- Full implementation of digital trade facilitation (incl. paperless and cross-border trade facilitation) is projected to decrease trade costs by more than 26% in Asia-Pacific region cutting international transaction by about $1.2 trillion annually (UN ESCAP).

<table>
<thead>
<tr>
<th>Country/indicator</th>
<th>Documents to export (number)</th>
<th>Cost to export (US$ per container)</th>
<th>Time to export (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>8</td>
<td>823</td>
<td>21</td>
</tr>
<tr>
<td>India</td>
<td>7</td>
<td>1332</td>
<td>17</td>
</tr>
<tr>
<td>Japan</td>
<td>3</td>
<td>829</td>
<td>11</td>
</tr>
<tr>
<td>Russia</td>
<td>9</td>
<td>2401</td>
<td>21</td>
</tr>
<tr>
<td>South Korea</td>
<td>3</td>
<td>670</td>
<td>8</td>
</tr>
<tr>
<td>Azerbaijan</td>
<td>9</td>
<td>3460</td>
<td>27</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>10</td>
<td>5285</td>
<td>79</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>9</td>
<td>4760</td>
<td>63</td>
</tr>
<tr>
<td>Latvia</td>
<td>5</td>
<td>600</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Doing Business, World Bank
Digitalization can create new jobs

Source: World Economic Forum / Accenture analysis

Digitalization and sustainable development

• Digitalization allows for a much more efficient energy and material use

Source: IIASA
Combined value of digitalization to industry and society (2016-2025)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Cumulative value to society and industry ($ trillion)</th>
<th>CO₂ emissions (million tonnes)</th>
<th>Net impact on jobs ('000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer</td>
<td>5.439</td>
<td>223</td>
<td>-5,249</td>
</tr>
<tr>
<td>Automotive</td>
<td>3.141</td>
<td>540</td>
<td>NA</td>
</tr>
<tr>
<td>Logistics</td>
<td>2.959</td>
<td>9,878</td>
<td>2,217</td>
</tr>
<tr>
<td>Electricity</td>
<td>1.341</td>
<td>15,849</td>
<td>3,158</td>
</tr>
<tr>
<td>Telecom</td>
<td>1.267</td>
<td>288</td>
<td>1,100</td>
</tr>
<tr>
<td>Aviation</td>
<td>121</td>
<td>250</td>
<td>-781</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>940</td>
<td>1,267</td>
<td>-67</td>
</tr>
<tr>
<td>Media</td>
<td>274</td>
<td>-151</td>
<td>NA</td>
</tr>
<tr>
<td>Mining</td>
<td>103</td>
<td>608</td>
<td>-330</td>
</tr>
<tr>
<td>Chemistry</td>
<td>102</td>
<td>56</td>
<td>-670</td>
</tr>
</tbody>
</table>

Note: 1 Total societal value at stake includes impact on the customers, society and environment. Impact on internal industries has not been considered.
2 Includes Extending Connectivity digital initiative.

Source: World Economic Forum / Accenture analysis

.... but there are serious challenges
Societal impacts

Likely worsen income distribution

Jobs, sectors, regions likely to adapt differently
Korinek and Stiglitz 2017, Goos et al. 2016, McKinsey 2016, 2018

Low-skilled, older, female workers likely to be losers
Dix-Carneiro 2014

Low-income countries likely to be losers
Lee 2017, Rodrik 2018

Richer individuals/countries will have access to better technologies
Hariri 2016

Source: McKinsey, Gender gap in mobile Internet use (2017), Source: GSMA Intelligence

Reshoring

Reshoring is the process of returning production and manufacturing of goods back to the company’s original country.

Reshored from Asia to Europe (selection)
- Adidas
- Burberry
- Electrostar
- Gigaset
- One-Lux
- Peugeot Scooters
- Prada
- Volvo car

Source: European Reshoring Monitor, Published reshoring cases in the United States, Source: Robotics Business Review
Countries over the global digitalization landscape

Ways forward
Impacts of previous technological waves

Research on the impact of automation started during the Industrial revolution (1800s), when textile mills started replacing humans.

Each wave of new technologies has been seen as a threat to jobs.

But has empirically increased employment, jobs, and growth.

- International cooperation to
  - Promote an enabling environment for digital innovations
  - Foster competition in the digital economy
  - Bridge digital divides
  - Promote international labor standards
  - Exchange experiences on digital transformation, digitalization of government and innovative models

"The openness of the European market should be maintained and developed further in the digital sphere. The EU should continue to press for the same openness and effective enforcement of intellectual property rights from ... trading partners ... an ambitious digital trade and investment policy should be further developed including by means of the EU's free trade agreements." (A Digital Single Market Strategy for Europe)
IIASA as a platform for science-based dialogue to enhance global cooperation

- Established in 1972 by USA and USSR: bridge between East and West, science diplomacy
- Currently 22 member countries
- International, independent, interdisciplinary research into the issues of sustainability and global transformation

Thank you for your attention