Turning Industry 4.0 challenges into SDGs opportunities

Ludovico Alcorta, Director
United Nations Industrial Development Organization (UNIDO)
The Fourth Industrial Revolution – reshaping innovation policies for sustainable and inclusive growth
Eleventh session of the Team of Specialists on Innovation and Competitiveness Policies
UN Economic Commission for Europe
Palais des Nations, November 1st, 2018
# Diffusion of 4.0 into production

<table>
<thead>
<tr>
<th>Manufacturing perspective</th>
<th>Advanced manufacturing challenges (and opportunities)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product innovation</strong></td>
<td>Development of products with improved functionalities, performance and reliability through the application of advances in, for example, physical and biological sciences (e.g. nanotechnology, chemistry, and biology)</td>
</tr>
<tr>
<td><strong>Process innovation</strong></td>
<td>Process optimisation (speed, cost, resources) and change; production technologies capable of achieving more complex shapes and ever tighter process tolerances; hybrid production technologies and systems able to deliver individualised products at mass production prices</td>
</tr>
<tr>
<td><strong>Supply chain</strong></td>
<td>Supplying materials and components faster/more efficiently; establishing adaptable and agile (global) supply chains in emerging and established industries (to deliver current and next-generation products)</td>
</tr>
<tr>
<td><strong>Customer demand</strong></td>
<td>Getting products and services to customers faster/more demand-led; creating stronger (digital) links between design, production and delivery; foreseeing changing patterns of demand and customer wants and needs; integration</td>
</tr>
</tbody>
</table>

*Source: López-Gómez and O’Sullivan (2017).*
4.0 and investment

• Investment requirements to take part in accelerated technological change will be significant
• Investment requirements in the telecommunications and educational infrastructure add to an already hefty bill
• Capacity to invest is mainly in the hands of a few large companies and is not widespread across the board. In Germany only around 250 large and middle enterprises are actively participating in the 4.0 initiative
• How are these funds going to be directed to pay for all these investments?
• Mechanism like venture capital, redirecting institutions like the World Bank who now has to lend for climate change, and the remerging development banks like BRICS
• Investment incentives aimed at working and attracting accelerated technical change champions will be crucial
4.0 and technology transfer

• The question of technology transfer has long been sidelined in the UN context and while no one wants to go back to the unproductive discussions of the 70s the issue remains.

• Further, what will be the IPR regime for the emerging technologies. There is a very strong open source movement which argues that IPR are detrimental to innovation and progress. But emerging technologies have significant competitive value and companies are not going to let go that easily.

• Identifying and implementing technology transfer funding mechanisms will be crucial to the achievement of the SDGs. In the climate change discussion this was very clear and commitments were made to pay for the acquisition of environmental friendly technologies. A fund for diffusing automation?

• Plenty can also be done through technology demonstration projects, capacity building centers on specific areas of technical change.
4.0 and social inclusion

• Who are the losers of globalization? While country inequalities and extreme poverty has reduced within country inequality has increased. Across the globe there is a growing ‘underclass’ of approx. the bottom quintile that have seen their incomes flat or shrink.

• Losers of globalizations may be the same as the losers of accelerated technical change (low and semi-skilled workers) with huge social consequences, some of which are already apparent

• High time to experiment with technological unemployment insurance, guaranteed or universal income policies or any other social policies that may compensate for employment losses

• Retraining and reskilling have to be at the core of policymaking related to accelerated technical change
4.0 and middle income countries

- Opportunities: Cost reductions/linkages to GVCs and structural change
- Impact by industry (potential for automation/wages):
  - Labour intensive: garments, shoes; diffusion takes longer (Adidas and Sewbot)
  - Electrical, electronics and machinery will be affected depending on wages
  - Automotives: neither automation nor wages but quality
  - ‘Islands of modernity’ vs old capital stock and obsolete ICT, retrofitting with new technologies?
- Lose of production facilities to developed countries: reshoring?
- Tertiary education institutions able of churning large amounts of quality STEM students that can find their way into production
4.0 and the environment

• Reduction of greenhouse gas emissions by use of more resource and energy efficient technologies and data centered and traceable carbon footprint analyses

• Closed value creation networks, reuse of resources and tools, as well as retrofitting of machines (circular economy)

• Facilitating recycling through design and process organization and management

• Reduction of physical transport and of logistics processes
Many thanks for your attention!
4.0 and employment

Innovation inputs and outputs and their impact on employment

The two faces of innovation

- Product innovation
- Product and process innovation
- Process innovation

Source: Vivarelli 2013.
4.0 and the UN

- **Research:**
  - Accelerated technical change, impact, measurement, policy
  - G20/OECD

- **Forum activities:** Conferences, seminars, workshops, expert meetings
  - Awareness campaigns (diffusion of knowledge)

- **Capacity Building**
  - Technology Facilitation Mechanism (TFM)
  - Executive training

- **Normative**
  - (Pre) Standards setting

- **Technology transfer/cooperation**
  - Investment promotion
  - Trade promotion: fairs
  - Technological collaboration/demonstration: north-south, south-south
  - Facilitate technology transfer by connecting firms across the globe

- **Partnerships**
  - Academia and research community
  - Governments and private sector
  - UN: IATT

- **Policy Advice**
  - Investment and financing
  - Technology and innovation
  - Skills and employment
  - Technology transfer
  - Diversification
Emerging responses to 4.0

<table>
<thead>
<tr>
<th>Working group / consultations</th>
<th>Leveraging existing policies</th>
<th>Roadmaps</th>
<th>Strategies</th>
</tr>
</thead>
</table>
| Argentina, Brazil, Malaysia, Turkey | **India**: Make in India initiative + 'Smart Cities Mission' projects + Digital India programme | **Mexico**: Crafting the Future. A Roadmap for Industry 4.0 in Mexico (2016)  
**Vietnam**: Directive (16/CT-TTg) “Strengthening the country’s capacity to address 4.0 (2017)  
**Kazakhstan**: Expected end-2017 | **Chile**: Strategic Program Smart Industries 2015-2025  
**Thailand**: Thailand 4.0  