

# **The 4th Industrial Revolution - reshaping innovation policies for sustainable and inclusive growth**

## **Session 3: Innovation policies for inclusive growth**

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## **Digital technologies and manufacturing: some insights from the "smile curve"**

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# **1. Digital technologies affecting manufacturing**

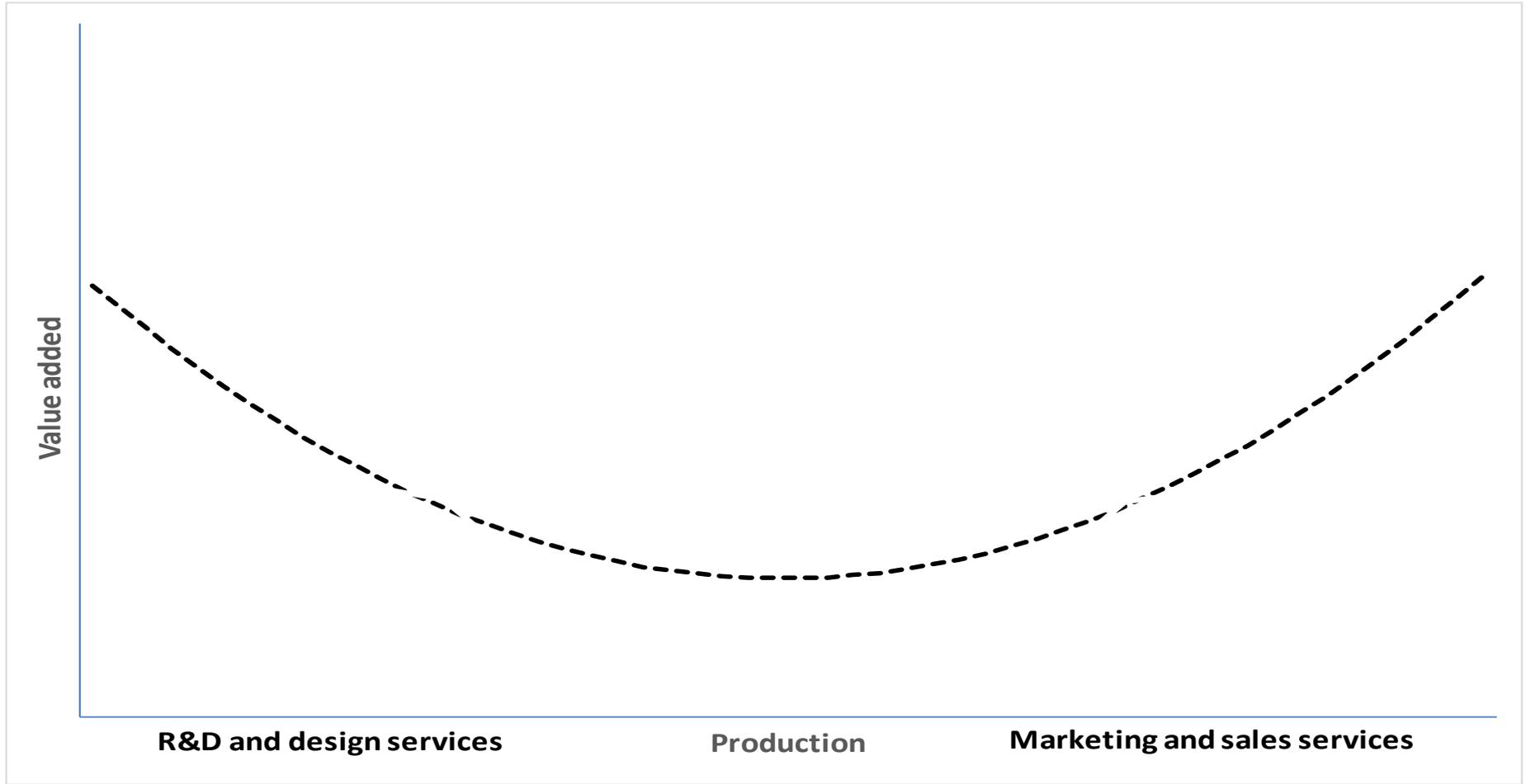
# Industry 4.0: economy-wide interfaces linking new digital technologies

Technology	Attributes
Industrial robots	Automatically controlled, reprogrammable, multipurpose manipulators programmable in three or more axes, which may be either fixed in place or mobile for use in industrial automation applications.
Additive manufacturing (3D printing)	3D printers build products by adding materials in layers.
Big data and cloud computing	Big data analytics refers to a set of techniques that allows voluminous amounts of machine-readable data to be rapidly generated, accessed, processed and analysed.
Computer-aided design and computer aided manufacturing (CAD/CAM) techniques	Software used to design and manufacture prototypes, finished products, and production runs.
Artificial intelligence and machine learning	Algorithms allowing computers and machines embodying or linked to computers to mimic and predict human behaviour.

- Digitalization gives important role to data, as well as other intangibles, e.g. R&D, design, software, market research, etc.
- Digitalization causes a blurring of the traditional boundaries between industrial and services activities and changes how the manufacturing process is undertaken and organized in value chains

## **2. Digital technologies in value chains: some insights from the "smile curve"**

# Digital technologies: what influence on the smile curve?



R&D and design services

Production

Marketing and sales services

Industrial robots

Additive manufacturing

INTERNET OF THINGS

CAD/CAM techniques

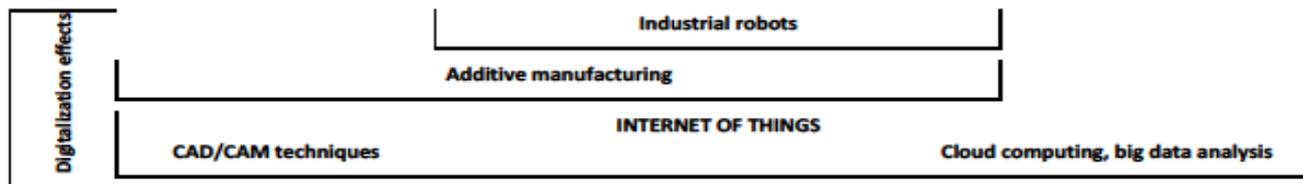
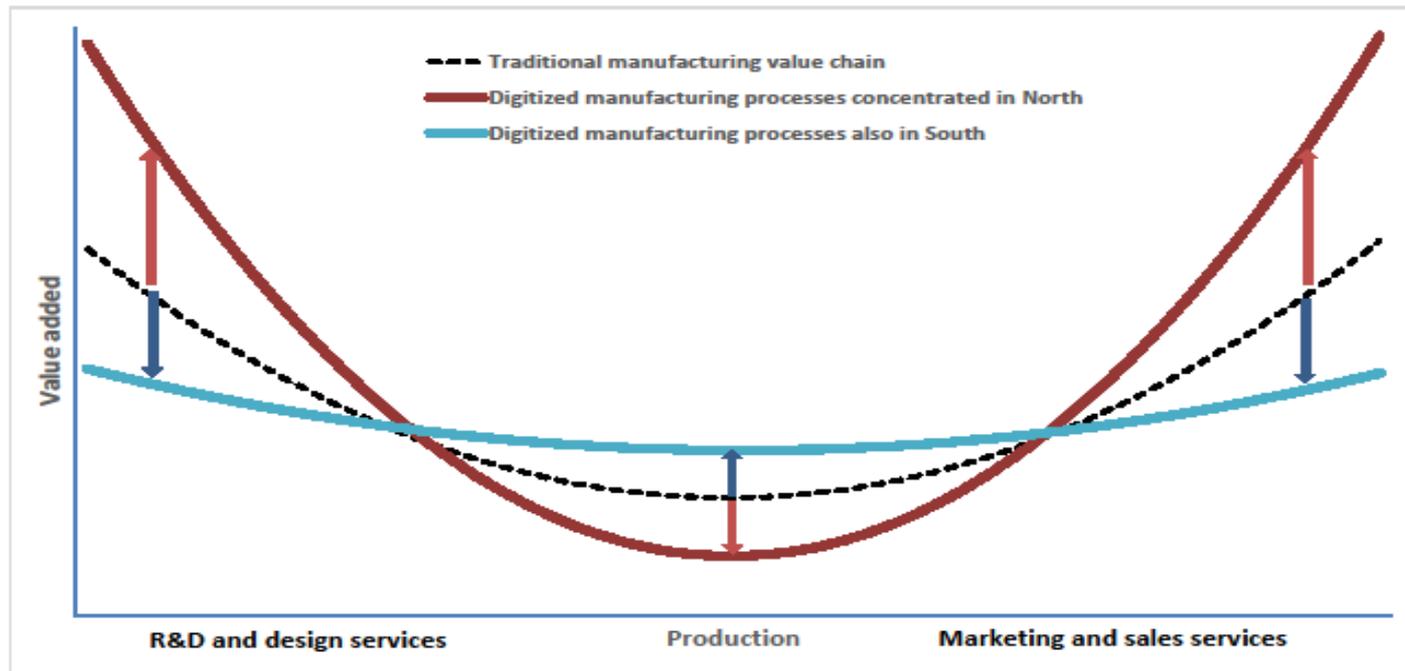
Cloud computing, big data analysis

Digitalization effects

# Potential impacts of digitalization

- Post-production segment (potential dispersion away from North):
  - Cloud computing and big data reduce need for hard digital infrastructure, as well as cost of computing and software use
  - Data help to uncover functionalities and feature that customers value: the larger an economy's demand, the more valuable is its customer data
- Pre-production segment (potential dispersion away from North):
  - Computer-aided design and 3D-printing make design and prototyping more flexible
  - Easier and cheaper information exchange and networking may shift these tasks away from developed countries, where labour costs are higher across skill spectrum
- Production segment (ambivalent geographic effects):
  - Robotization: re-shoring of labour-intensive manufacturing? Little supportive evidence
  - Computer-aided manufacturing and 3D-printing allow for increased customization, decentralized production and smaller production runs

# How can developing and transition economies avoid production segment moving back to developed economies (reshoring) and attract pre- and post-production segments to their economies?



**4. Policies enabling innovation and ensuring a fair sharing of the benefits from the 4<sup>th</sup> industrial revolution**

- Experiencing benefits from moving towards digital economy is contingent on presence of appropriate digital infrastructure and skills – engaging in digital trade perhaps promising first step
- Here focus on ensuring broad distribution and fair sharing of benefits from industry 4.0 – related frameworks include innovation & regulatory policies

# Innovation policy

- Pro-active innovation policy to reduce dependence on technology transfer, hoped for to come from FDI
  - Close look at IP-protection (patent protection only in large markets; design rights may cover appearance but not functionality & ease of use; contain patent trolls)
  - Policy towards inward FDI: M&A of rivals to pre-empt competition has long been part of corporate rivalry but, in a data-driven economy, can aim at blocking emergence of potential future competitor and, thus, damage dynamism of innovation system
  - Financing investment in intangibles needs new instruments: direct investment by government in corporate equity?
  - Increased R&D-spending, return of skilled diaspora, demand-side-led innovation through industrial policy

# Regulatory policy

- New challenges from network effects that tend to result in market concentration, first-mover advantages and market-entry barriers
- Antitrust & competition policies to address rent creation:
  - Move from exclusive focus on price-based assessments of consumer welfare, back towards greater focus on market structure & behaviour that may cause anti-competitive behaviour
  - Possible action includes: breaking up firms, forcing them into joint ventures, or regulating large firms as a public utility
- Tax measures (e.g. BEPS) to redistribute rents created from shifting profits to low-tax jurisdictions (enabled by greater role of intangibles)
- National data policies: who can own data; how it can be collected; who can use it and under what terms; under what conditions can data cross borders and whose country's law governs transferred data

## **4. Conclusions**

# Main points

1. Digitalization affects how and where things are designed, made and distributed; resulting new production methods and business models can provide additional impetus to manufacturing in developing and transition economies
2. For digitalization to provide benefits in inclusive way, policymakers need to be prepared – need for clear and feasible national digital development strategy whose objectives will include to:
  - Enhance digital infrastructure and capabilities
  - Adopt pro-active innovation policy
  - Design proper responses in areas of taxation, competition and data privacy

**Thank you !**

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Digitalization and industrialization: friends or foes?

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