Strategic approaches to Industry 4.0 in middle-income countries

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Agenda

• Proposed dimensions to understand Industry 4.0
• Research questions
• Countries in study sample
• Policy responses to Industry 4.0: developing countries
• Final remarks
Technological

- Logistics systems
- Human systems
- Smart Factory
- Manufacturing systems
- Digital systems

Future of manufacturing

Developmental

- Catch up
- Falling behind?
- Industrial leadership

Policy strategies

- Learning and experimentation
- Multiple interactions / coordination
- Converging policy realms
- Distributed power
- Context specific
The case of middle-income countries

• Are middle-income countries getting ready for I4.0?

• What basic principles of strategic policy approaches to Industry 4.0?
  • What concrete measures to facilitate readiness for I4.0?
  • What sectors are most targeted?
  • Is progress measured? How?
  • Are there opportunities for international policy coordination and collaboration?
### Characterizing countries included in this study, 2016

<table>
<thead>
<tr>
<th>Country</th>
<th>% World Pop</th>
<th>% World GDP</th>
<th>% Region GDP</th>
<th>GDP per capita</th>
<th>Industrial VA1</th>
<th>% World Ind VA</th>
<th>Internet use2</th>
<th>Secure Internet3</th>
<th>Mob phone4</th>
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<td><strong>31.6</strong></td>
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</table>

Notes: GDP values at constant 2010 prices in US$; 1 Share of GDP; 2 % of population; 3 Number of servers per million people; 4 per 100 people
Source: UNIDO Statistics Unit and World Bank Databank
Distributions of global sales of robots by country, 2016

Source: International Federation of Robotics (2017)
Are middle-income countries getting ready for Industry 4.0?
Establishing a strategy and an implementation entity signals readiness

- Development plans generally at initial stages of discussion, consultation, planning

<table>
<thead>
<tr>
<th>Working group / consultations</th>
<th>Leveraging existing policies</th>
<th>Roadmaps</th>
<th>Strategies</th>
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</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 I4.0 (2017)  
**Kazakhstan:** Expected end-2017 | **Chile:** Strategic Program Smart Industries 2015-2025  
**Thailand:** Thailand 4.0  
**South Africa:** Industrial Policy Action Plan 2017/18-2019/20 |

- Need better articulated milestones, resources and pathways towards outcomes
- Difficult to determine impacts of I4.0 on manufacturing and society at large
What are the basic tenets of strategic policy approaches to Industry 4.0?
Policy efforts involve multiple stakeholders, distributed leadership and synergies across policy areas

- Leaderships falls on ministries of industry or economy or science and technology
- Collaboration with sectorial and regional initiatives and authorities (Chile, Mexico, Vietnam)

Innovation-driven economies, away from commodities and traditional industries and increasingly into higher value added sectors
Private sector plays a key role both as driver and as partner

- Participates in design, implementation and follow of national strategies
- Contribute to awareness building strategies
- Provides knowledge inputs for national or sectorial development strategies

Strategy development processes lend themselves to experimentation, learning from past experience and leveraging knowledge from multiple actors

- Leverage on ongoing initiatives and tested tools that can be scaled up
- Expected outputs: sectoral “white papers”, proposals for concrete policy interventions, strategies to develop particular technologies in the I4.0 suite (Argentina, Chile, Mexico, Malaysia)
Strategies pursue heterogeneous objectives, often not explicitly recognized

- Creating framework conditions
- Promote specific behaviors
- Enhance performance
- Develop policy tools
- Offsetting negative effects (South Africa)
Strategies target diverse sectors

Source: Author based on policy documents included in this study
Strategic partnerships with foreign agents to speed up learning curves

- Boosting STI capacities (Brazil)
- Facilitating industrial promotion initiatives (India)
- Setting up technology transfer offices to become major regional provider of I4.0 technologies and services (Mexico, Malaysia)
- Institutionalizing collaboration (signing MoU around I4.0 - Egypt).
- Jointly organizing awareness raising activities targeting domestic agents (firms).
Final remarks
Determining impacts on industry and society remains problematic, yet I4.0 can alter industrial leadership and catching up prospects.

Policy initiatives remain at initial stages of implementation even in pioneering countries.

Approaches to Industry 4.0 are highly contextual.

Be wary of one-size-fits all solutions!

Searching practical actions connected to broader national development strategies

Need clear, measurable milestones, outcomes and resources. Culture of M&E!

Looking for exemplar experiences, domestically and abroad.

Multi-stakeholder participatory processes are core for strategic responses, but success cannot be guaranteed: prevent capture from vested interest!

Developing countries: Forging ahead but not quite there yet!
Thank you