Enabling Policies and Strategies to Promote 4IR Technologies for Climate Change Mitigation in Asia-Pacific

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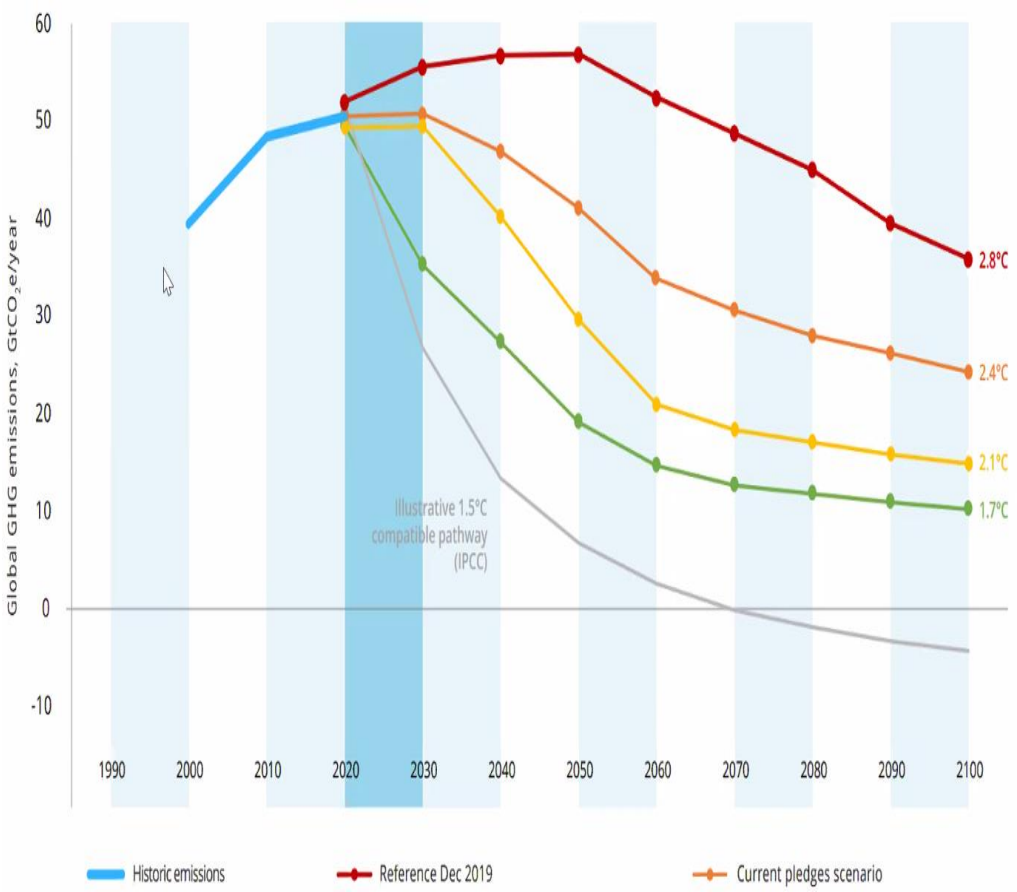
Industry 4.0

- Term first used in Hannover Fair (2011), Thailand, Singapore, Malaysia, Indonesia.
- Used for the next industrial revolution currently taking place
- Industry in general has recognized that it is at the beginning of revolution that is fundamentally changing the way production is made and connected with customers/clients

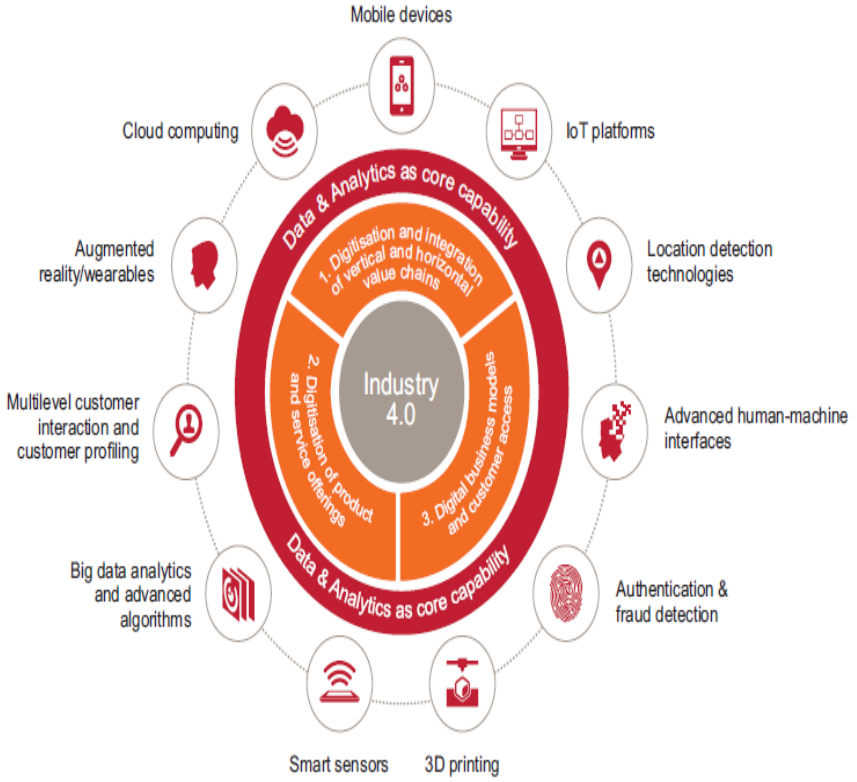
Search	No of Scholarly Publications
Cyber –Physical system	76
Internet of Things	52
Smart factory	54
Internet of services	37
Smart Product	29
Robotics - M2M	21
Big Data	17
Artificial Intelligence	16
Cloud	13

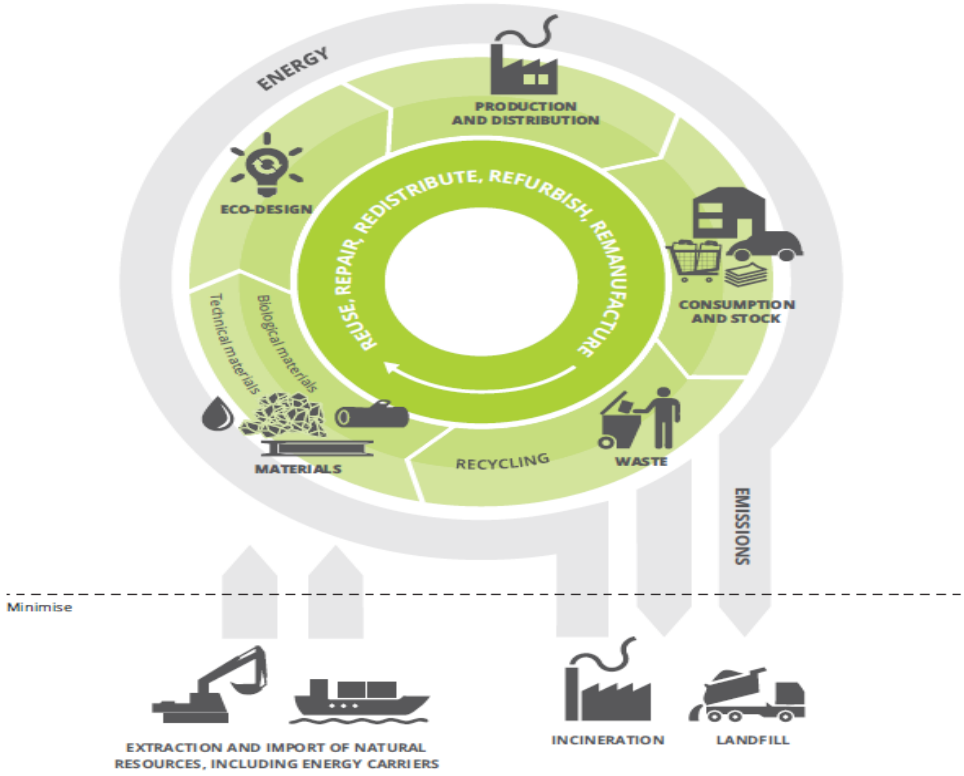
Climate Change Mitigation and Net Zero Economy

- Net Zero is when a country's Green House Gas Emissions are offset by taking out equivalent carbon from the atmosphere, so that emissions in balance are zero.



Industry 4.0 for Climate Change Mitigation





(PWC, 2014)

Innovation, Inclusions and Inclusion

Technological developments for Industry 4.0 and Climate Change Mitigation

Technological developments for Industry 4.0

- Information and communication technology
- Cyber-physical systems
- Network communications- Internet of Things (IoT)
- Simulation
- Advanced data analytics
- Robots, augmented reality and intelligent tools for support of human workers

Ten new technologies for circular economy

- Mobile technology
- Machine-to-machine communication
- Cloud computing
- Social media for business
- Big data analytics
- Modular desigingg technology
- Advanced recycling technology
- Life and material science technology
- Trace and return systems
- 3D Printing

Commonalities of I4.0 and CC Mitigation Technologies

(i) transformational changes in the business models of industries

(ii) new integrated product and service offering to consumers

(iii) innovations along the value chains

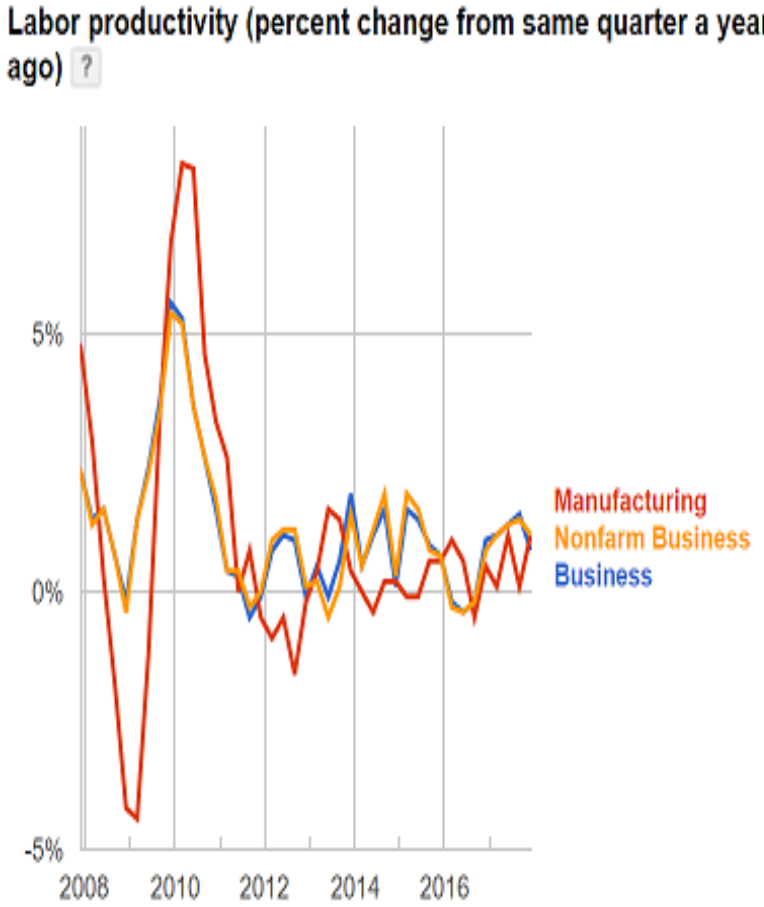
Industry 4.0 & NEZ
Policy Implications

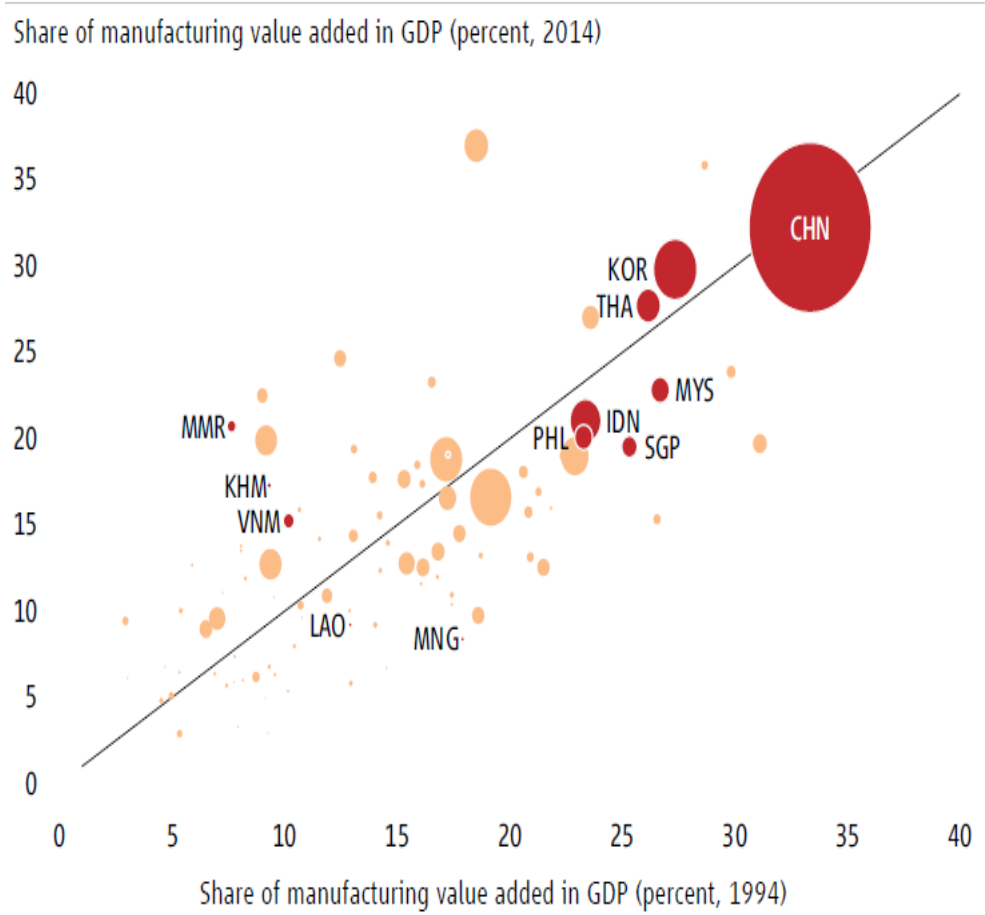
- All Industry 4.0 and Net Zero Economy models involve substantial innovation and ICT elements.
- Can and should build upon technical, commercial and legal impulses
- Must be open to questioning conventional wisdom
- New Smarter technologies everywhere
  - Extraction, Processing, Manufacturing, Usage, Recycling
- Huge retrofitting and investment needs; where to start ?
- Challenge for companies: Industry 4.0 as inspiration and/or driver for Net zero economy, not subordinate service provider.

Structure of I4.0 – Climate Change Mitigation Practices

	Micro (single business entity)	Meso (symbiosis association at sector)	Macro (economy -state)
Production area (primary, secondary, and tertiary industry)	Cleaner energy production Eco design	Eco-industrial park	Regional eco-industrial network
Consumption area	Green purchase and consumption	Smart Cities	Renting service
Waste management area	Product recycle system	Waste trade market Venous industrial park	Urban symbiosis
Other support	Policies and laws; information platform; capacity building		

Policy Issues and Indicators – Where to Start? (Macro-level)

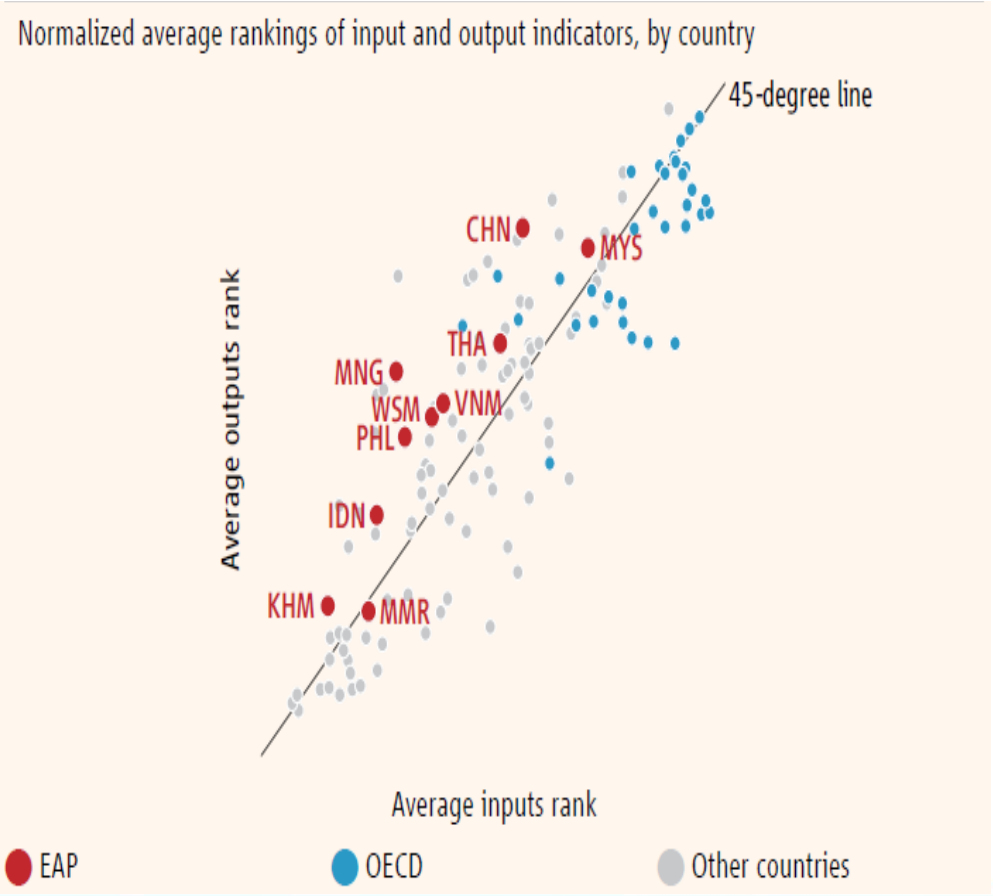




Worldwide there is a decline in the share of manufacturing in GDP, except ASEAN and East Asia

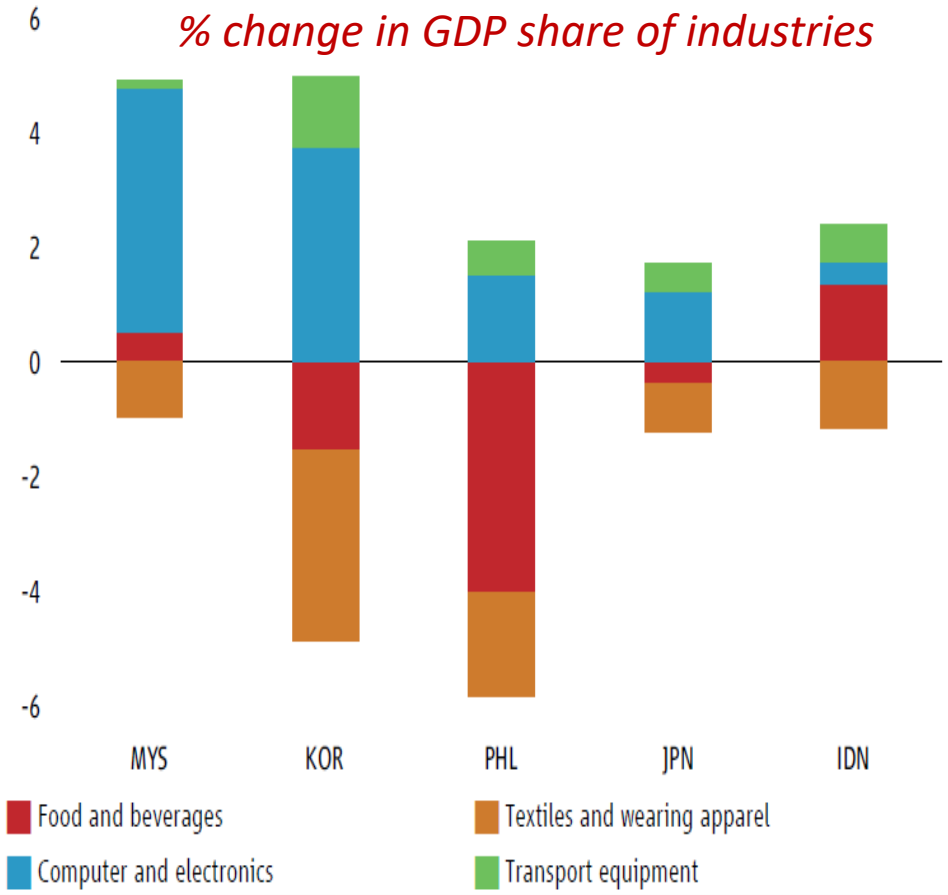
Policy Issue– Does AP have an efficient innovation systems – Macro Level

- AP has relatively greater innovation efficiency than the rest of developing countries.
- Efficient in converting inputs (R&D, Researchers, IP etc) into high tech exports, trade mark applications and patent applications.
- Lag behind OECD in-terms of level of innovation inputs and outputs



Trends Shaping Future of Manufacturing (Meso level)

- High and middle come countries are changing their production away from low skilled, labor intensive goods to more skilled.
- Thailand have acquired relative comparative advantage in medium skill global innovator industry.
- China, India, Indonesia, Cambodia and Viet Nam – rca in labor intensive tradable



Thailand Automotive Industry Development Master Plan 2017-2021 and Vision 2027

THAILAND AUTOMOTIVE INSTITUTE สถาบันยานยนต์

"Thailand is a Global Green Automotive R&D base which create high value added base economy"

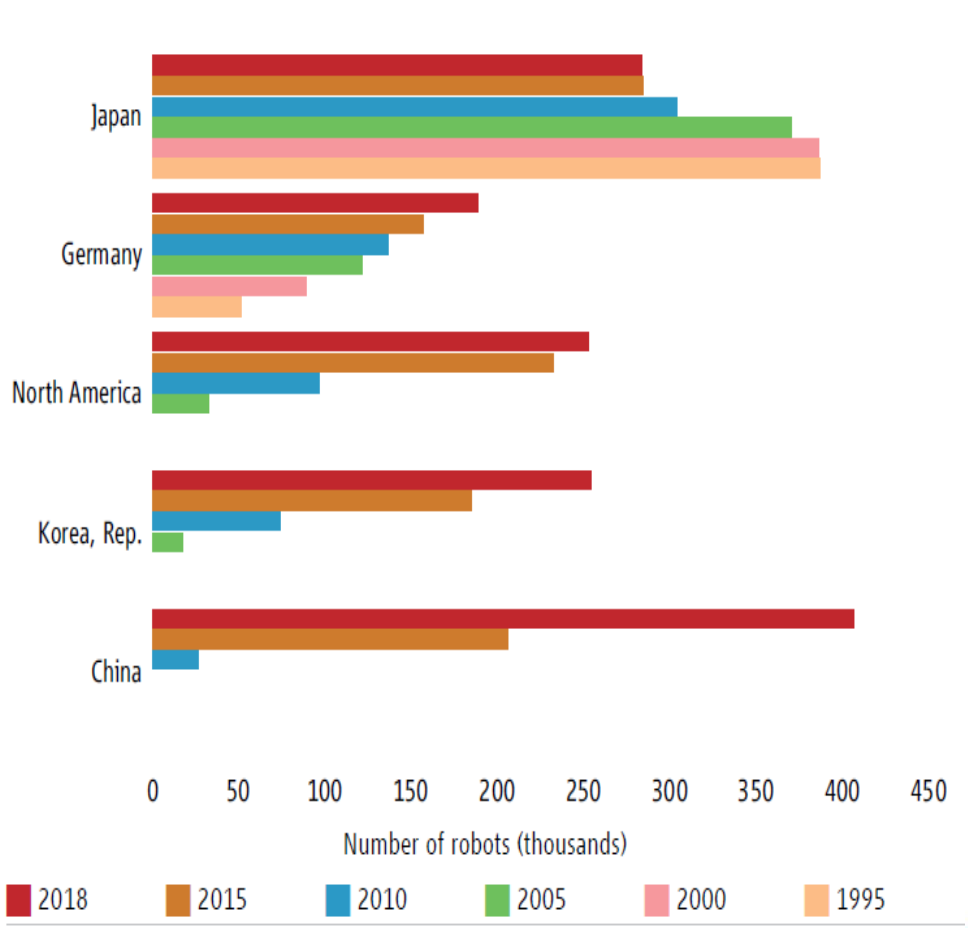
Thailand 4.0
Industry 4.0
Next Generation Vehicles

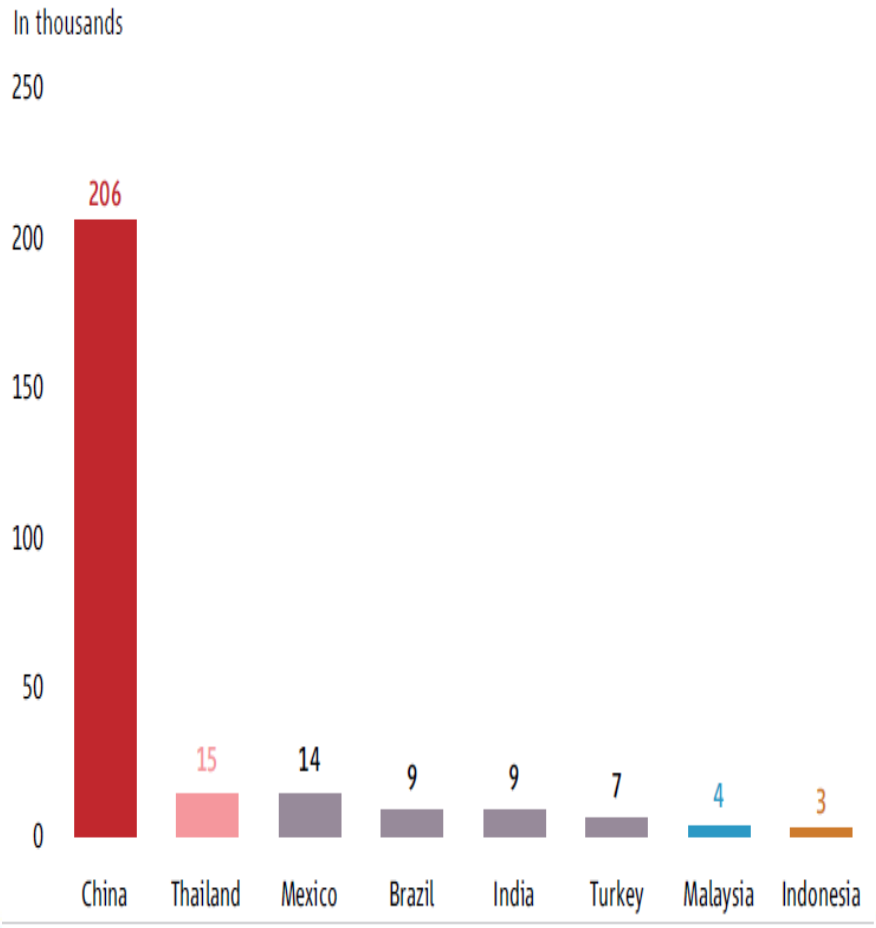
1 Technology R&D Innovation	ICE (Gasoline, Diesel) . Global Standard . Light weight . Emission Reduction (CO_2) . Engine Efficiency . Productivity Next Generation Vehicles . Engine & Motor Efficiency . New/Advance Technology . Waste & Green . Software Application . Battery Pack, Charging Station	Institution for Policy and Development Driven Systematic	. Global Linkage Management System with Digital system . Global Business Service Solution	4 Market
2 HRD 4.0	. High skill enhancement . Knowledge Creation and Diffusion Society . R&D, Innovation Capability	Government Policy & Support	. Technology Transformation . R&D, Design Capability . Automation . SMEs Start up / Spring up	5 Suppliers
3 Academic	. Education for new and advance technology . Education for new management system for Industry 4.0 . Academic Alliance	Global Partnership & Linkage	. IT intelligence . Big data management . Financial	6 Logistics/ Management Center

Measuring the I4R at Meso Level: Policy Determinants

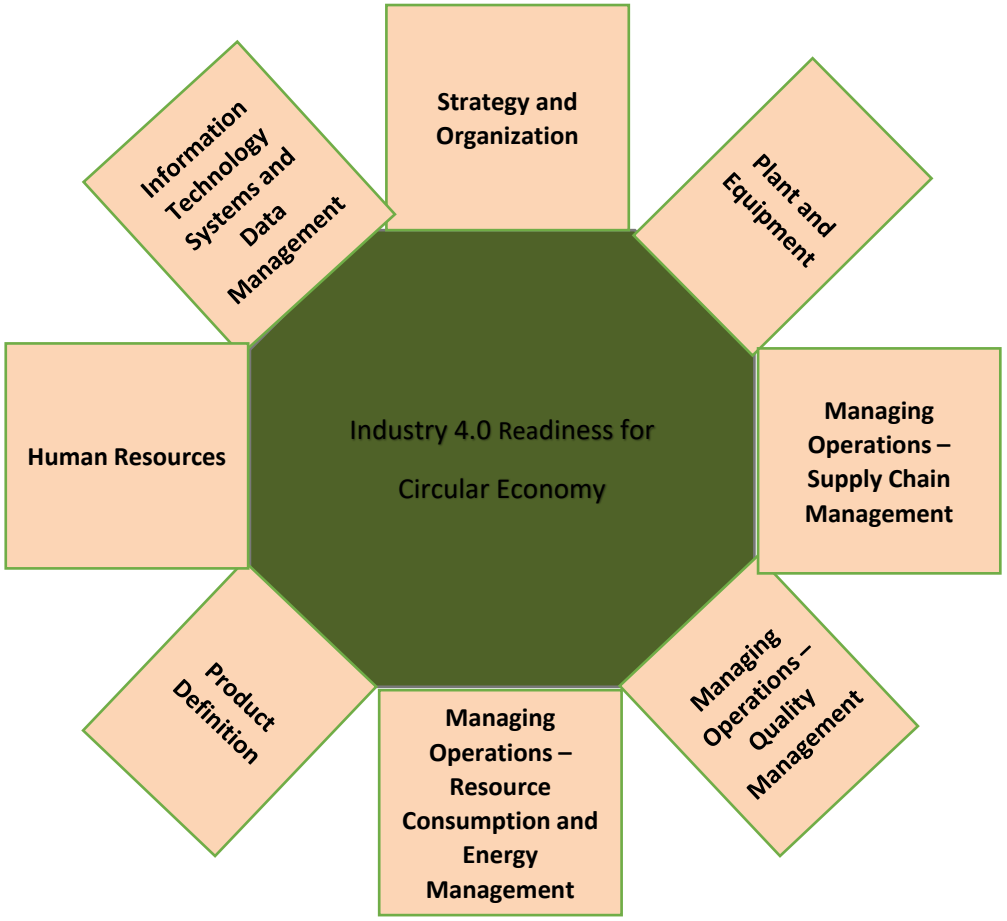
	Extent of impacts of new technology and globalization				*Priorities within 3Cs agenda*		
Sectors (grouped by the common combinations of trends they face)	*Increasing concen-tration of inter-national production*	*Traded*	*Robots/3D printers*	*Use of Services*	*Competitiveness*	*Capabilities*	*Connectedness*
Transportation	High	High	High	High	Yes	Yes[a]	Yes
Electronics	High	High	High	High			
Pharmaceuticals	High	High	High	High			
Electrical machinery	High	High	High	High			
Machinery and equipment	High	High	High	Low[b]			
Manufacturing n.e.c.	High	High	High	Low[b]			
Textiles	High	High	Low	Low	Yes		Yes
Rubber and plastics	Low	Rising	High	Low		Yes	
Fabricated metals	Low	Rising	High	Low			
Food	Low	Low	Low	High	Yes		
Chemicals	Low	Low	Low	High			
Coke and refined petroleum	Low	Low	Low	High			
Wood products	Low	Low	Low	Low			
Paper products	Low	Low	Low	Low			
Basic metals	Low	Low	Low	Low			
Nonmetalic minerals	High	Low	Low	Low			

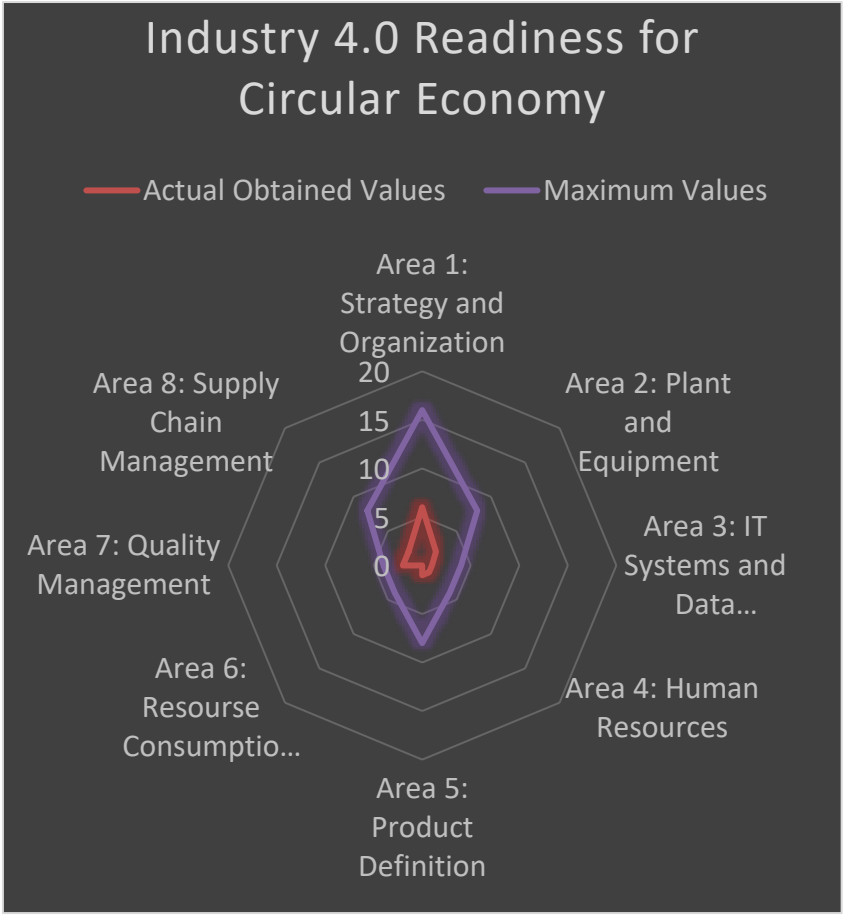
Readiness of Industry 4.0 to address declining wage competitiveness and Energy efficiency (micro level)





Policy Issues Readiness of Industry 4.0 for Climate Change (micro level)



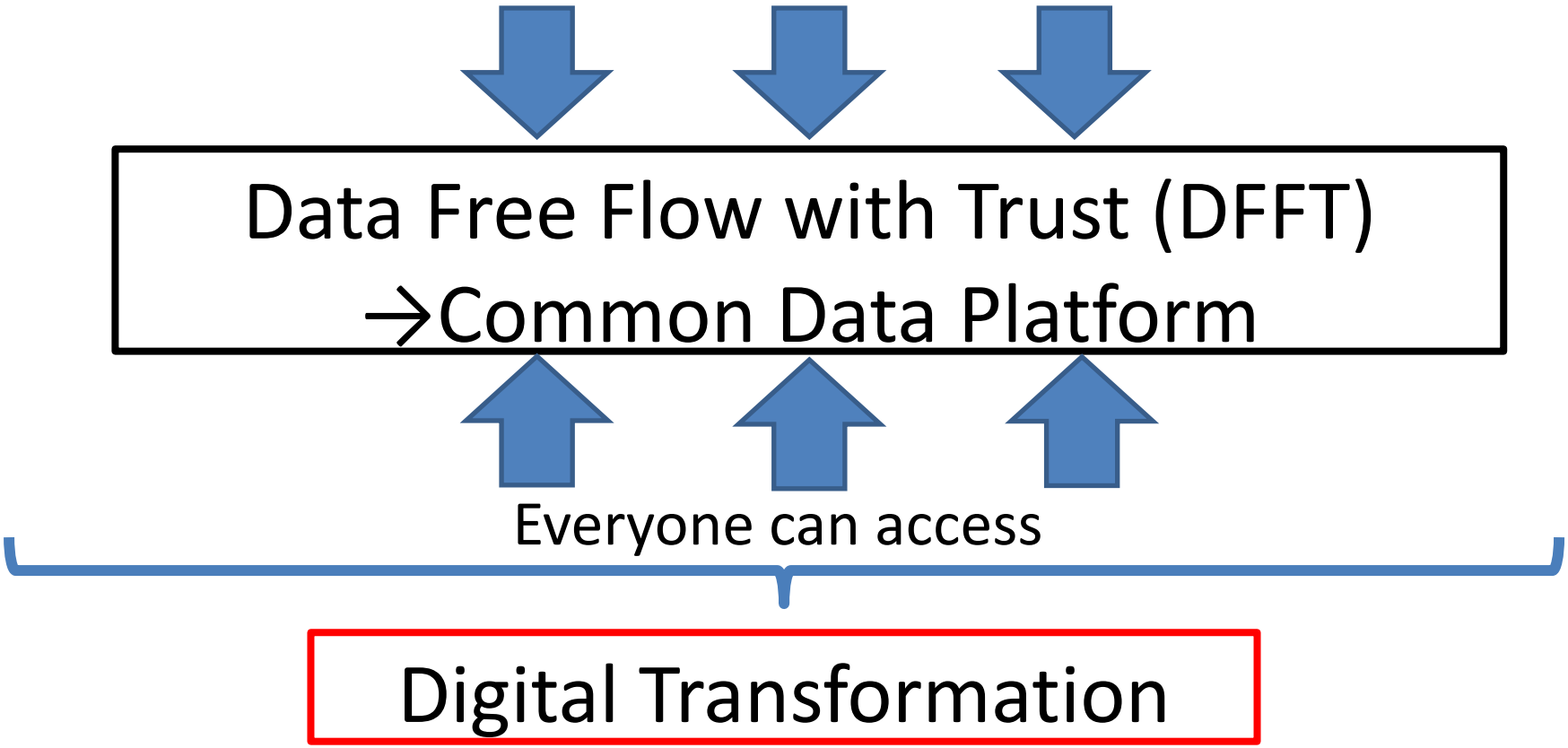


Five Difficulties in Integrating 4IR and CC Governance

1. **Privacy Protection Vs Social Intelligence Securement.**
2. **Formulations of Government-Citizen-Private sector Holistic Governance**
3. **Harmonization of Services: Publicity and Private Investment.**
4. **Political Rationality: Difficult of Structural Innovation rather than Technological Innovation.**
5. **Future Investment: High Risk, High Return**

International cooperation for 4IR and Sustainable Development

→Mutual benefit ←



Technological Capabilities
Experience of digitalization

AP Digital Single Market

Organization of ERIA -I4R for CC Assessment Framework

	Production Efficiency	Policies and Regulations	Cross-Cutting
Industry 4.0	Readiness to implement key procedural decisions	Planning incentives, mandates and policies to directly support the preparedness	Sector/Economy wide innovation and institutional procedures that effect preparedness
Climate change/CE			

All indicators/determinants have been carefully designed to be:

Actionable	Under direct control of decision makers (business/policy making)
Context neutral	Relevant- independent of cost and time
Consensus	Widely agreed by the stakeholders

Thank You!

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