Harnessing IR4.0 for Malaysia's Future

A research programme from The Economist Intelligence Unit and UNDP

Sumana Rajarethnam

Director for Partnerships, Asia

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1. What is Industrial Revolution 4.0?

Evolution of Industrial Revolution 4.0

The First Industrial Revolution (1760–1840) used water and steam power to mechanise production, beginning in Britain's textiles industry.

The Second Industrial Revolution, in the late 19th and early 20th centuries, harnessed electric power to enable mass production, and unleashed the tools of the modern age, including the internal combustion engine and modern communications.

The Third Industrial Revolution of the 1970s brought electronics and information technology (IT) to production. This revolution witnessed the rise of electronics—with the transistor and microprocessor—but also the rise of telecommunications and computers.

The Fourth Industrial Revolution integrates advanced control systems with internet-based technologies to enable closer communication, interaction and collaboration between people, machines, logistics systems and products within intelligent factories.

Four key technologies that form the core of IR 4.0

Internet of Things

- Industrial IoT
- 'Smart' factories
- 'Smart' homes

Artificial intelligence

- Google's DeepMind
- Customer service
- Predictive services

Big Data

- Data generated by IoT
- AI and machine learning fuelled by Big Data

Robotics and Automation

- Self-driving vehicles
- Elderly care robotics
- Robots for warehouses

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2. Why should Malaysia embrace IR 4.0?
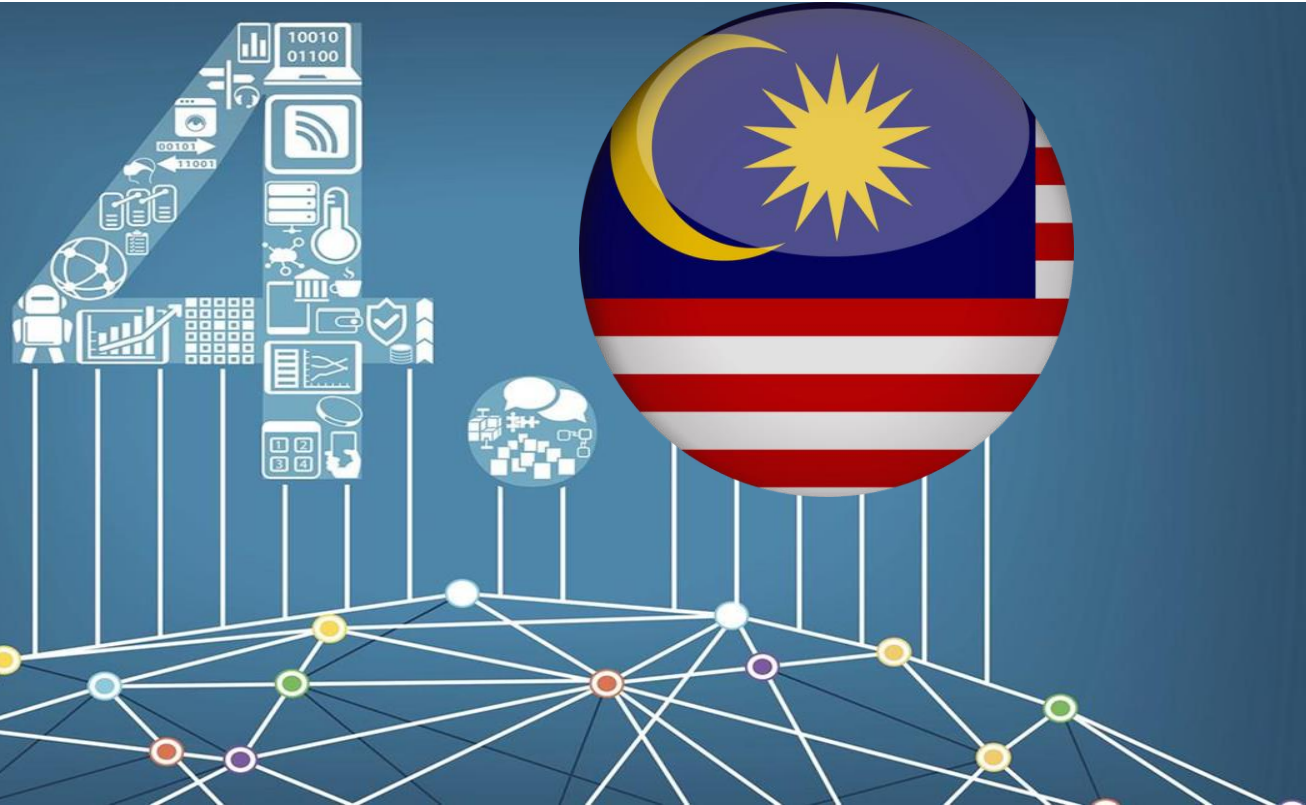
Urgency in updating the regulatory environment

"We have a legal, regulatory framework built on the basis of mail, paper, words, versus a new world order which is digital, continuous, 24/7, and built on bits and bytes. Somehow we need to square these two worlds."

—Aaron Klein, policy director, Center on Regulation and Markets, Brookings Institution

Employment — Estimates of jobs at risk vary significantly (gender; tasks vs jobs; social overheads)

Premature Deindustrialisation — Early withering of industry in developing economies; productivity lags, reshoring; export reliance

Public Services — Efficient and less-bureaucratic services; however, can have embedded biases

# IR4.0 can reverse declining productivity growth

Total factor productivity growth, 2011-15
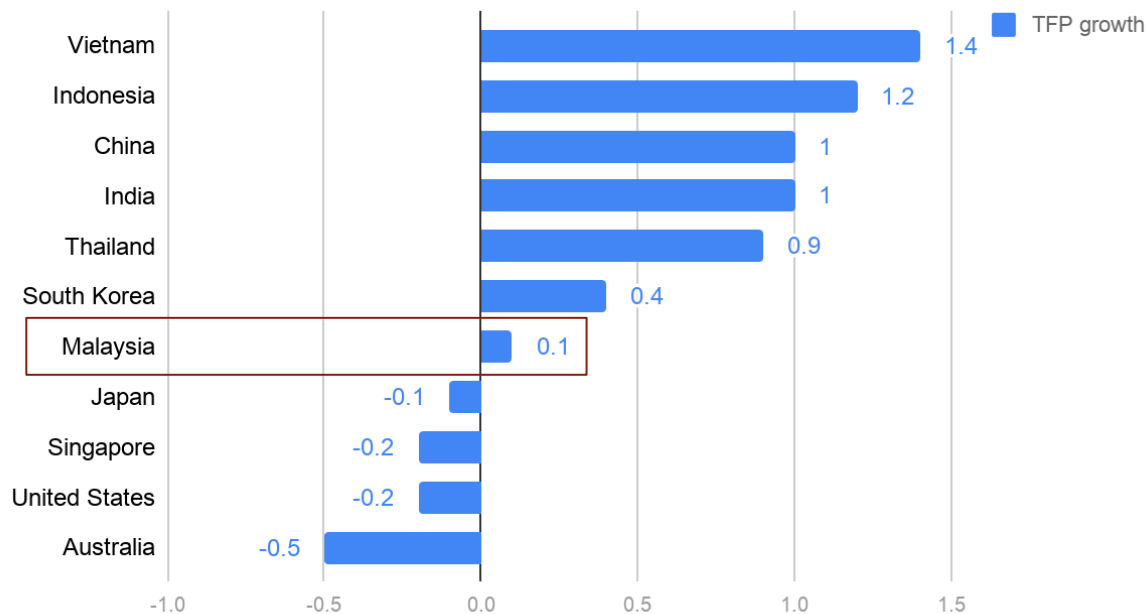
- Productivity growth has declined in advanced economies in recent decades and is now largely stagnant–between 1995 and the turn of the century, productivity in OECD countries rose on average by just under 1% per annum.
- Between then and 2007, it was already sliding lower, to 0.6% annually.
- In 2011-15, Malaysia led Singapore but lags Thailand, Vietnam and Indonesia.
- Labour productivity growth is slowing in Malaysia
  - 2009-18: 1.31% average annual growth
  - 1999-2008: 3.33% average annual growth

Source: Total Economy Database, The Conference Board

Risks and rewards for IR4.0

EIU research shows enormous IR4.0 potential for developing Asia, but there are significant consequences for failing to get the policy environment right in 2016-2030
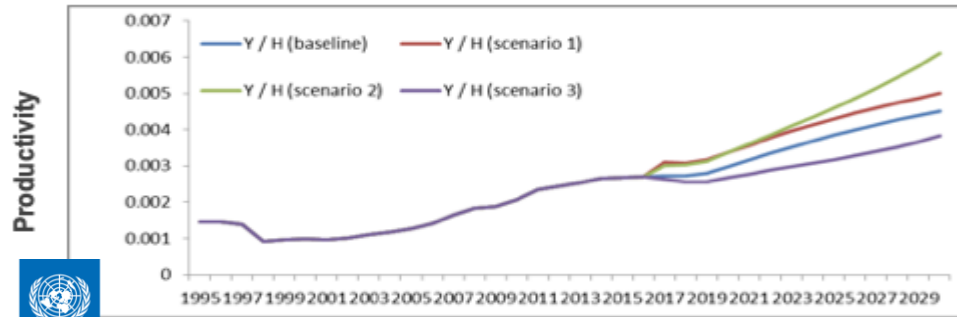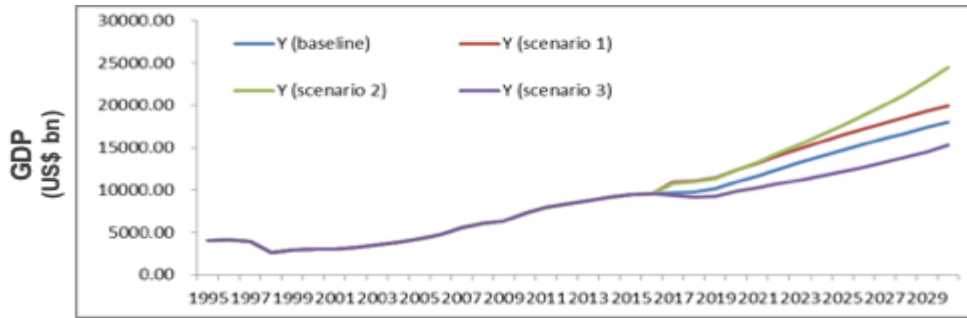
1. **Scenario 1:** focus on education that complements IR4.0 leads to better skills in the region
2. **Scenario 2:** in addition to better skills, supportive regulatory environment for open source data, ICT investment
3. **Scenario 3:** skills development stagnates, and policymakers are apathetic towards ICT regulatory environment

*****Baseline forecast** for comparison

Automation and AI impact sectors differently…

Asia's SDG-related progress is linked to its performance in the manufacturing and services sectors

Impact on manufacturing

- Electronics (Vietnam)
- Garments & footwear (Bangladesh)
- Large consumer base (India & Indonesia)
- Low MVA as % of GDP (Laos)

Impact on services

- BPO industry (India and Philippines)
- Logistics and fulfillment
- Retail and tourism

Impact on individuals

- Loss of employment
- Public services (more efficient but potentially biased)
- Personal privacy
- Gender inequality & social divisions

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Automation and AI can be key enablers for SDGs

Opportunities and Threats for SDGs

Automation and AI's threats and opportunities to SDGs in Asia

	Threats	Opportunities
1 NO POVERTY	• Increased unemployment. • End of export-led manufacturing model. • Reduced tax base.	• More efficient welfare through digital ID. • AI and big data-enabled fin-tech. • New livelihoods in the gig economy.
2 ZERO HUNGER	• Lower disposable income for food purchases. • Reverse migration to food-insecure rural areas. • Micronutrient-deficient diets.	• AI and big data-driven food supply chains optimisation. • Improved manufactured food quality through sensors. • Yield improvement through precision agriculture.
3 GOOD HEALTH AND WELL-BEING	• Health spending constraints. • Lack of safeguards in gig economy. • Job insecurity.	• Advanced health diagnostics through AI and big data. • Improved access to care through telemedicine. • Blockchain and AI-optimised patient data.
4 QUALITY EDUCATION	• Obsolete educational curricula. • Reduced public spending on education. • Widening gap between high and low-skilled.	• Low cost e-learning tools. • Speech recognition for learning. • AI-based marking optimises teacher time allocation.
5 GENDER EQUALITY	• Greater gender pay imbalance in STEM. • Reduced women employment in BPO and retail. • Algorithm-driven decisions bias against women.	• Women opportunity in automation-proof sectors (e.g. care economy and tourism). • Reduced decision-maker bias in recruitment or finance through AI-powered selection software.

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Opportunities and Threats for SDGs

Automation and AI's threats and opportunities to SDGs in Asia

	Threats	Opportunities
8 DECENT WORK AND ECONOMIC GROWTH	• Resurgence of informal sector. • Loss of export-led manufacturing model. • Regionalisation of supply chains.	• Creation of new, improved livelihoods. • Reinvigoration of rural areas through internet-enabled entrepreneuriship.
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	• Decline of the BPO sector. • Decline of developing economy technological innovation. • Polarised industrialisation.	• Benefits of IoT encourage ICT infrastructure investment (e.g. 4G/5G). • Emergence of new innovation champions in middle income Asia.
10 REDUCED INEQUALITIES	• Racial and ethnic bias from badly-designed AI. • Wealth polarisation away from labour. • Higher wages for STEM-trained middle classes.	• Women excel in rising sectors of creative industries and e-commerce. • Internet inclusion gives discriminated groups more independent means of income.
16 PEACE, JUSTICE AND STRONG INSTITUTIONS	• Social media bots generate fake news and misinformation. • Increased cyberterrorism vulnerability. • AI-based surveillance targets minorities.	• Blockchain-powered citizen data management. • Human rights enforcement through social media listening.

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3. How can Malaysia incorporate IR 4.0 into 12MP?

Stakeholder roles in making a country IR 4.0 ready

Private sector: In many countries, private firms are taking on education and training of their workforce beyond on-the-job training in firm-specific procedures to cover a range of education needs. Adapting to technological changes and investing in innovations.

Public sector: The government can act as an essential catalyst for industry upgrading by providing four instrumental functions: Coordination, information sharing, financial support and regulatory action.

People: Masses can become more flexible with work and develop more than one skill. People can adapt to lifelong learning models and also embrace changing circumstances.

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How can policymakers respond?

Three-pronged response to ensure positive outcomes and manage risks of AI and automation in Asia; affirmative action
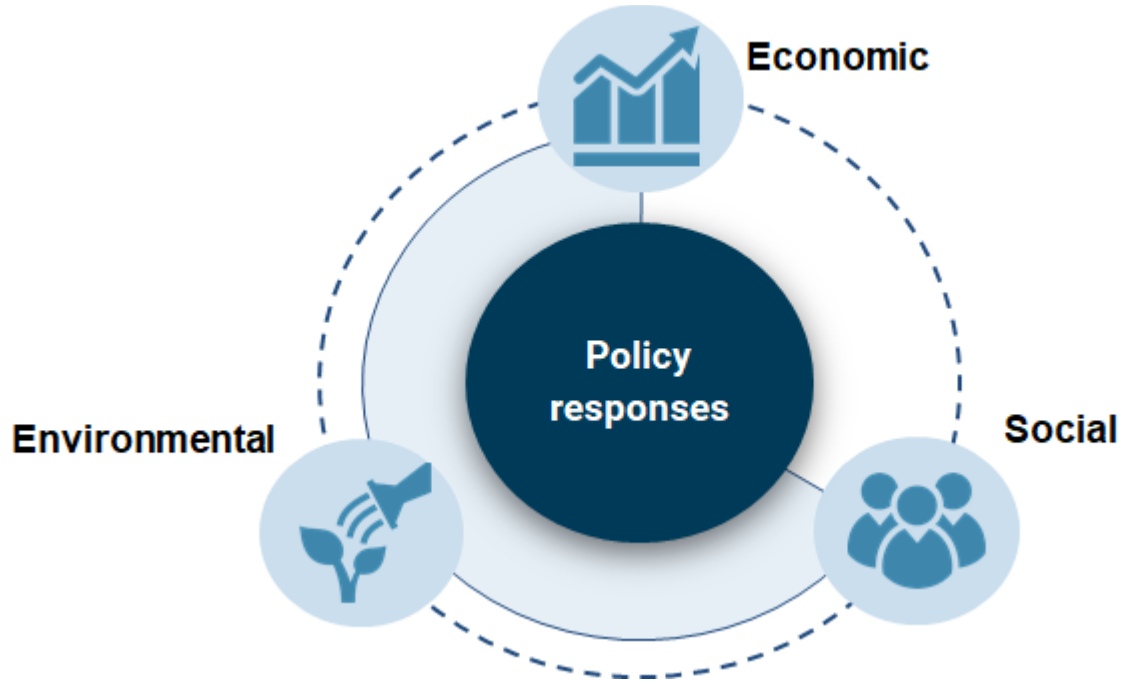
Economic policy must focus on three key aspects

Policy makers need to act in three key areas to promote a knowledge-based economy with a focus on human capital; mainstreaming and targeting

Protected individuals
regulation

Data regulation and privacy protection is critical

- Rise in digital transactions
- 30% of ASEAN countries have privacy legislation
- 60% have consumer protection regulation

Digital infrastructure
investment

Targeted investment for connectivity and innovation is essential

- Focus on internet inclusion (+ gender dimension)
- 4G coverage in Asian countries is rapidly improving

Capacity building
upskilling

Education and training needs to focus on 21st-century skills

- Transform educational curricula to focus on ICT and STEM subjects
- Technical and vocational training & work-based learning

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Social policy has to encompass the following areas

Policy makers need to put appropriate social protections in place to drive positive impact from automating public services in a digital economy

Service delivery

Leverage automation to make public services more efficient, personalised and predictive

- AI can support SDGs by freeing up government resources
- Healthcare is a key beneficiary of data driven services

Security guarantees

Safety nets such as direct cash transfers are important development tools

- Foundation of a resilient labour market
- Can ensure smooth transition of the work force
- DFS, G2P transfer systems

Employment programmes

Counter the pressures of unemployment through alternative methods

- Employment guarantees offer a set number of workdays to most vulnerable
- India's National Rural Employment Guarantee Act

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Environmental policy should promote three main areas

Policy makers can leverage current technologies to achieve environment-related SDGs

Energy efficiency

Emerging technologies can reduce energy use by industries

- IAEA estimates energy use can be reduced between 13%-29% by implementing emerging technologies
- Fiscal incentives (eg custom exemptions) can be explored

Precision agriculture

Precision techniques alleviate challenges of productivity and waste

- Asia is a lead market for alternative agricultural techniques (soilless, vertical)
- Important tool for food security

Resource extraction

Automating mining processes has benefits such as improved efficiency and labour protection

- Robots, virtual modelling and sensors will manage mines "within a decade"
- Allows for extraction of materials that are "problematic"

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What other countries are doing

Singapore represents a holistic approach to IR 4.0; Thailand's national strategy is more narrowly focused on manufacturing, and Vietnam's remains in its nascent stages.

Thailand

Thailand 4.0

In November, the Thai government launched Thailand 4.0, an initiative to develop Thailand into a digital economy and society in 20 years. We expect that Thailand 4.0 will invite more private investment in 2019-22 than in the past five years, with the manufacturing sector the biggest beneficiary, followed by finance, real estate, and wholesale and retail trade.

Vietnam

Made in Vietnam 4.0

IR 4.0 is a priority for the current administration, though policy development has focused on reforms to the general business environment, such as removing foreign ownership caps from some publicly listed companies and separating investment registration and business incorporation. The Made in Vietnam 4.0 Program has few publicly available details.

Singapore

Industry 4.0

Singapore's IR4.0 strategy consists of a number of initiatives, covering research and development, investment facilitation and sponsorship, and human capital across several sectors. The government has also developed technology roadmaps for green data centres, energy efficiency, electro-mobility, industry energy and solid waste management.

Research framework

Sponsored by UNDP, EIU is developing research on Malaysia's IR4.0 potential

Research will yield specific policy insights on harnessing IR4.0 in the 12th Malaysia Plan

Economic	Social	Environmental
Information Infrastructure	Human capital development	Waste management
Technology investment policy	Last mile linkages for social service delivery	Energy policy
Labour market policy	Equity in education	Land use management

- EIU will develop recommendations for nine pillars across three categories: economic, social, and environmental policy
- Research will be based on national planning documents, IR4.0 literature, and discussions with Malaysian government officials and development experts
- We will synthesise our findings in a 25-page research paper. We would welcome the opportunity to present our findings to the Malaysian government in August

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Questions our research will address

How do these technologies make it easier to provision quality and equitable social services–specifically, education and healthcare–in Malaysia?

What are the risks that mismanagement of these technologies would pose, in terms of education and healthcare access, quality and inequality?

Which of these technologies are most consequential for Malaysia's social services delivery?

Thank you!

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