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# ASEAN in transformation: How technology is changing jobs and enterprises

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*Gary Rynhart,  
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Jakarta 17 April 2017*

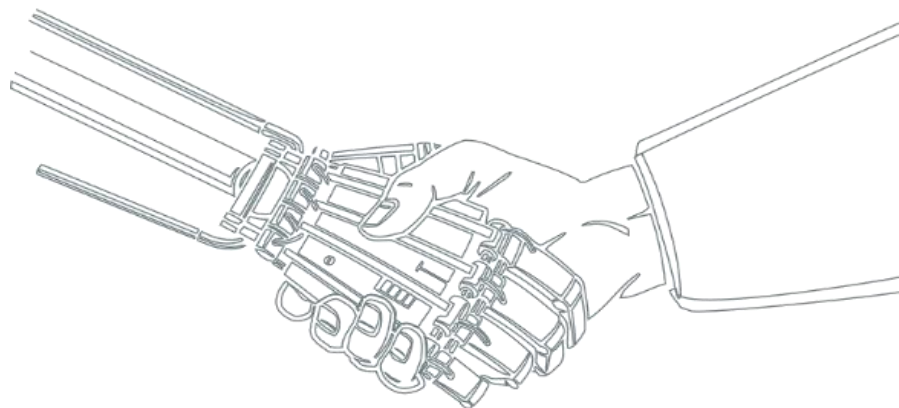


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# OVERVIEW

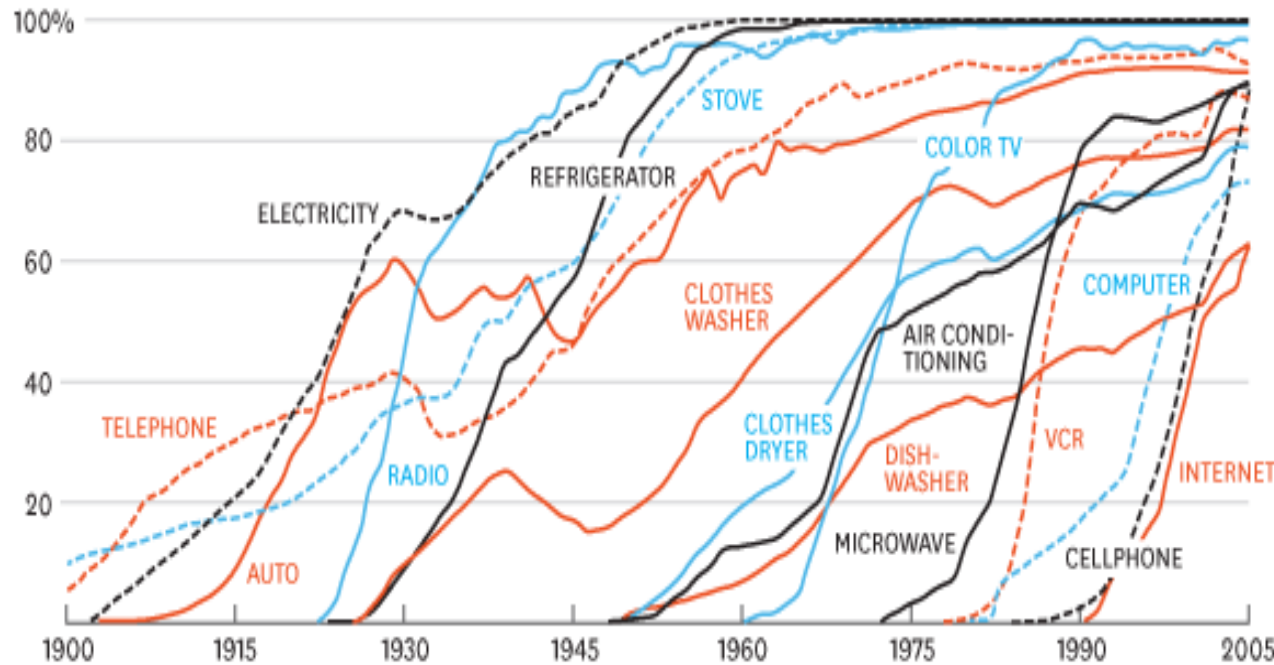
1. Current context and types of new technologies
2. Outline of ILO Research project
  - Initial desk Research (Frey & Osbourne Simulations)
3. Survey Findings
  - *Enterprises and young people*
4. Sector findings
5. Main Implications for Indonesia



# Technological uptake faster than ever before

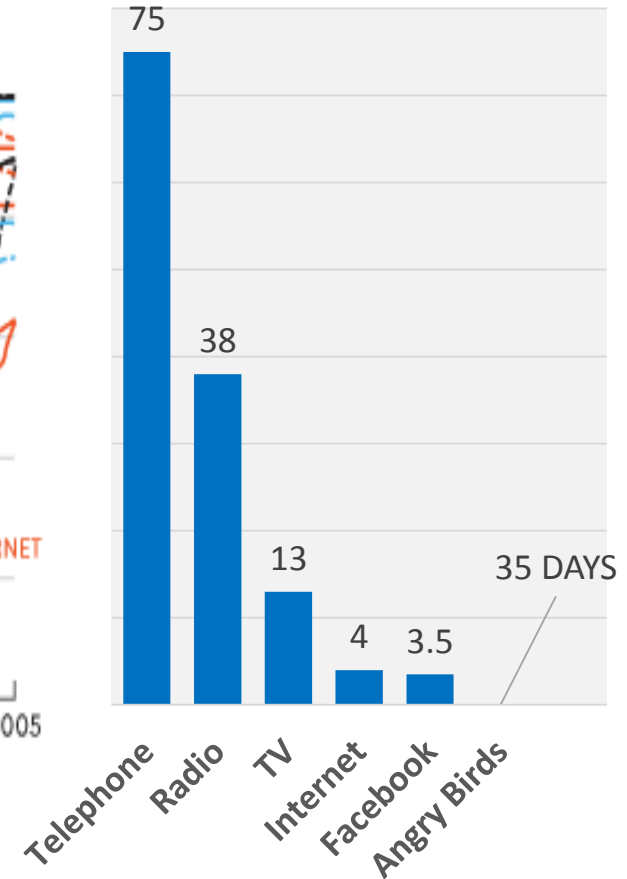
## CONSUMPTION SPREADS FASTER TODAY

PERCENT OF U.S. HOUSEHOLDS



Source: Michael Felton, The New York Times.

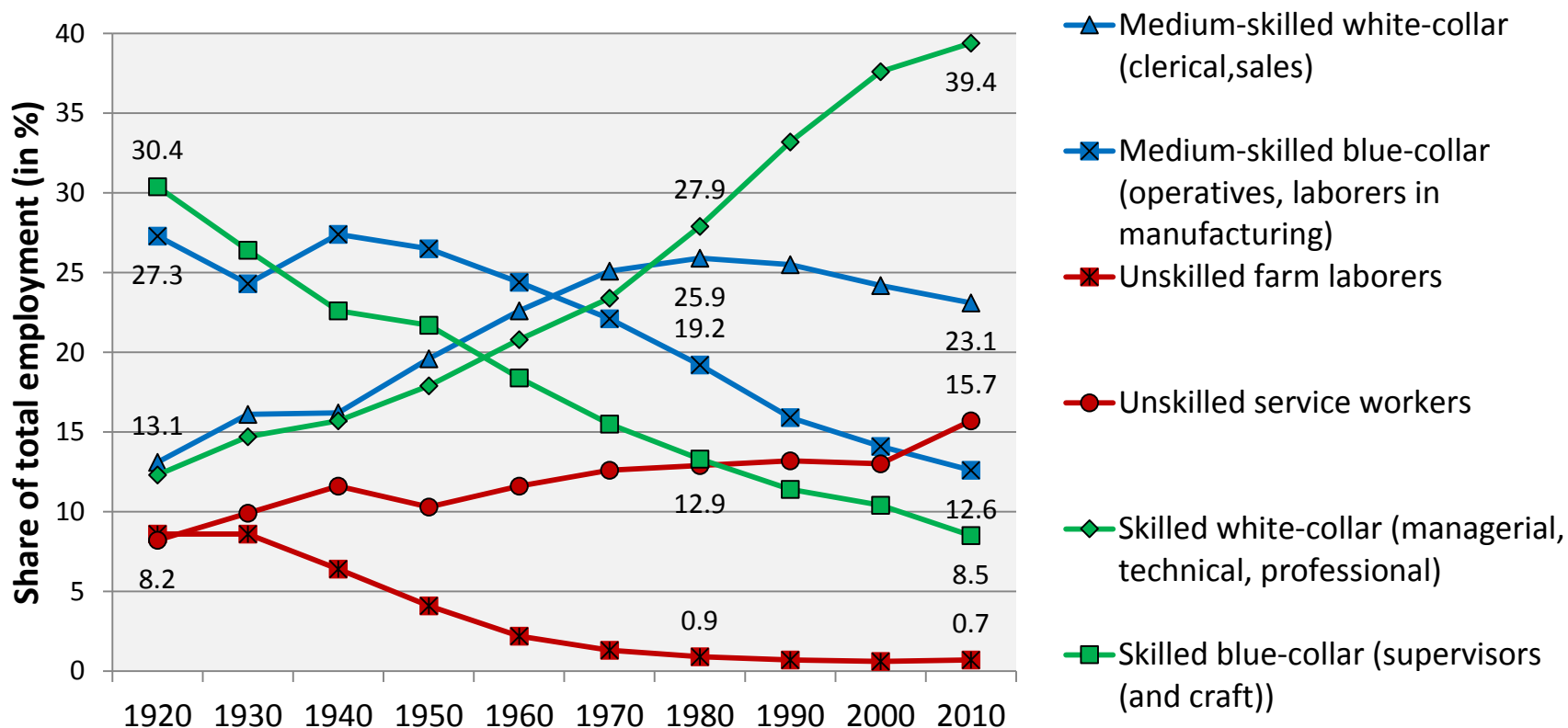
## YEARS TAKEN TO REACH 50 MILLION USERS



# The Upward Skills Curve

- Industrial Revolution: technology benefited low-skilled jobs
- 20<sup>th</sup> century: middle-skilled, “routine” task content became automated

*Job polarization in the US occupational distribution after 1980*



Source: Katz and Margo (2013).

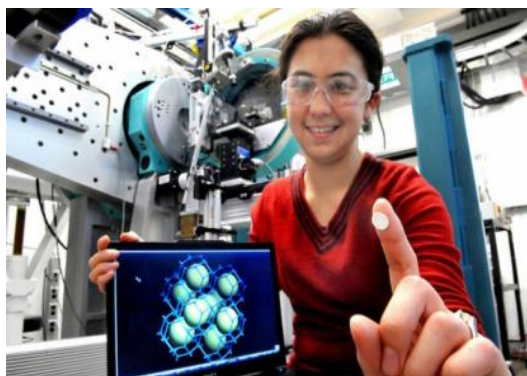
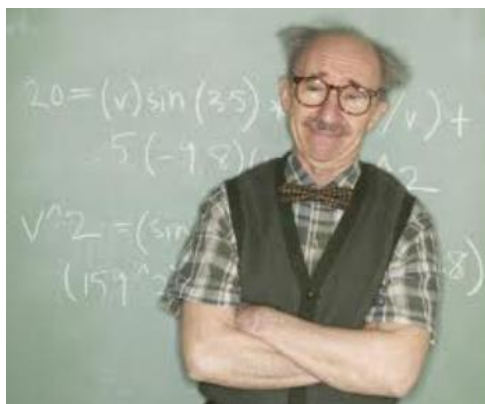




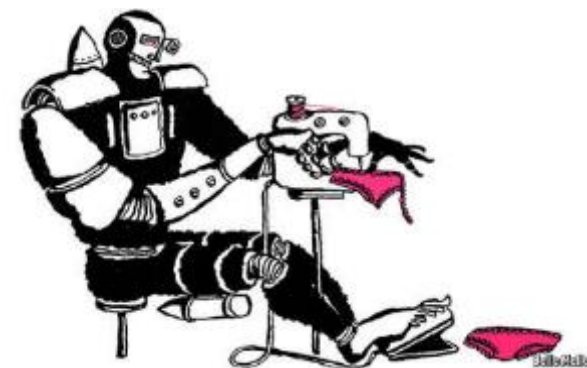
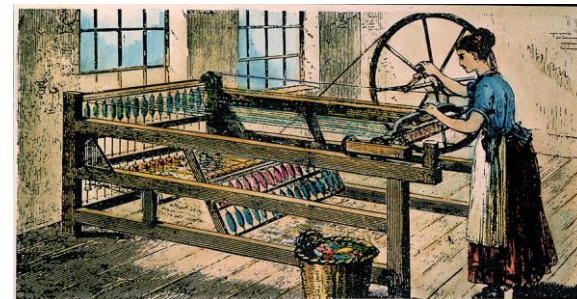
Routine, **medium-skill** occupations now compete with computers



Abstract, **high-skill** occupations have benefited from computers



Repetitive, **low-skill** jobs now being automated for the first time



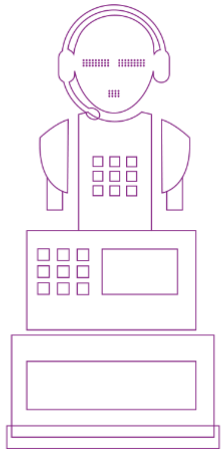
# HOW THE RESEARCH WAS CONDUCTED

## RESEARCH METHODOLOGY

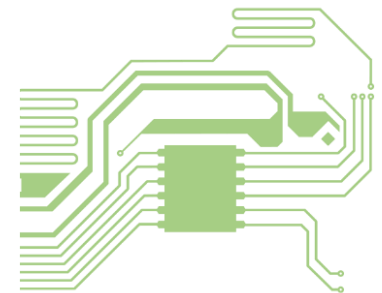
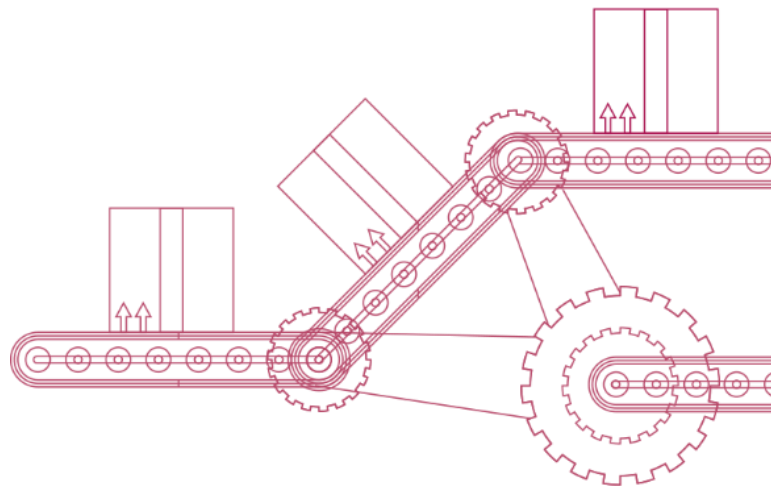
1. Frey & Osbourne
2. Enterprise and student surveys
  - 330 interviews
  - Over 4,000 enterprise surveys and 2,700 student surveys
  - 6 national and regional consultation meetings
  - Extensive secondary research
3. Sectoral approach of five prominent sectors in ASEAN
4. Textile and E&E sectors in China also included



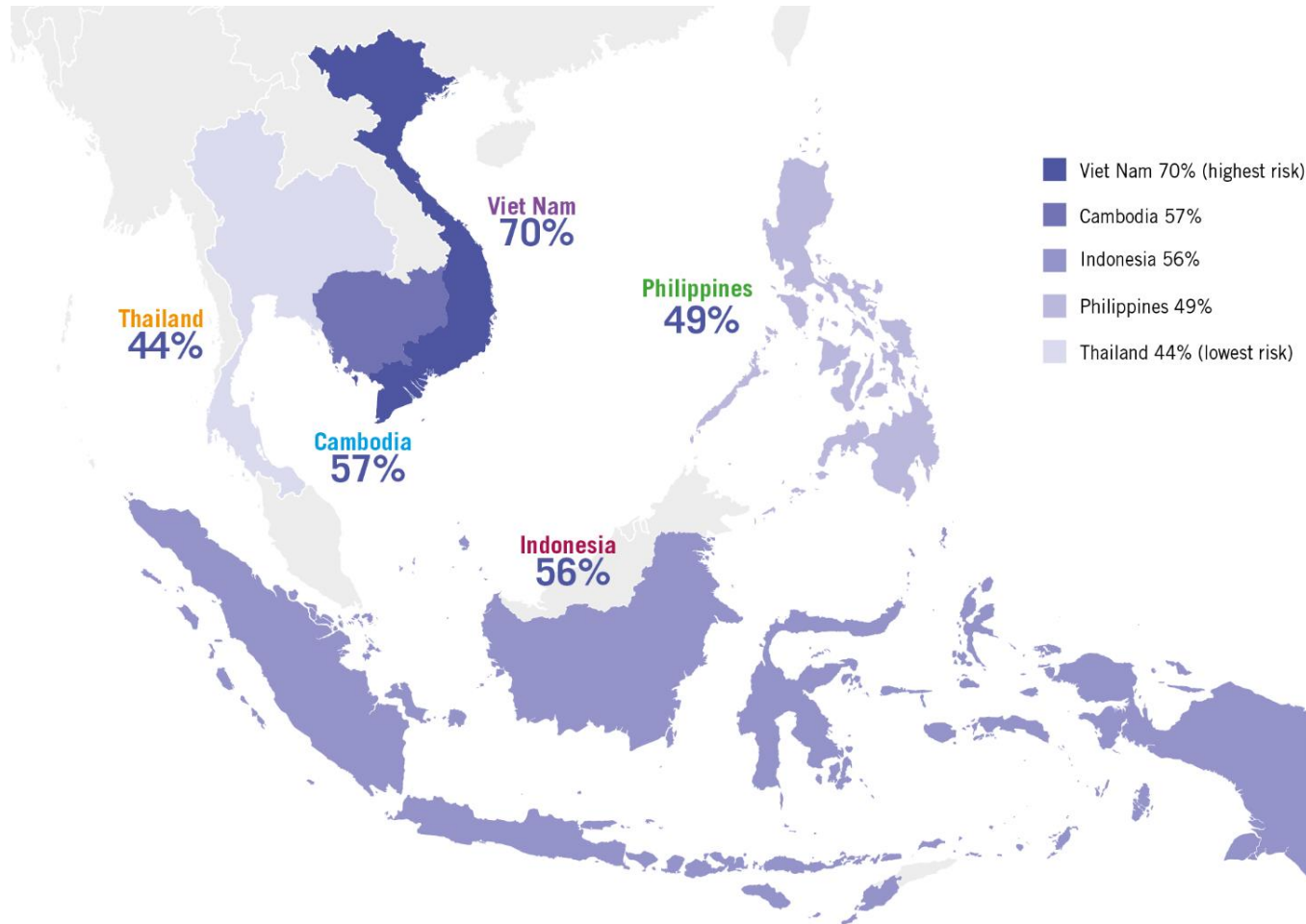
# ASEAN IN TRANSFORMATION: HOW TECHNOLOGY IS CHANGING JOBS AND ENTERPRISES



## INITIAL RESEARCH FREY & OSBOURNE



# WAGE WORKERS AT HIGH-RISK OF AUTOMATION IN ASEAN-5 SIMULATIONS ON JOBS SUSCEPTIBLE TO DIGITALIZATION



Source: *ASEAN in transformation: Future of jobs at risk of automation* (ILO, 2016)



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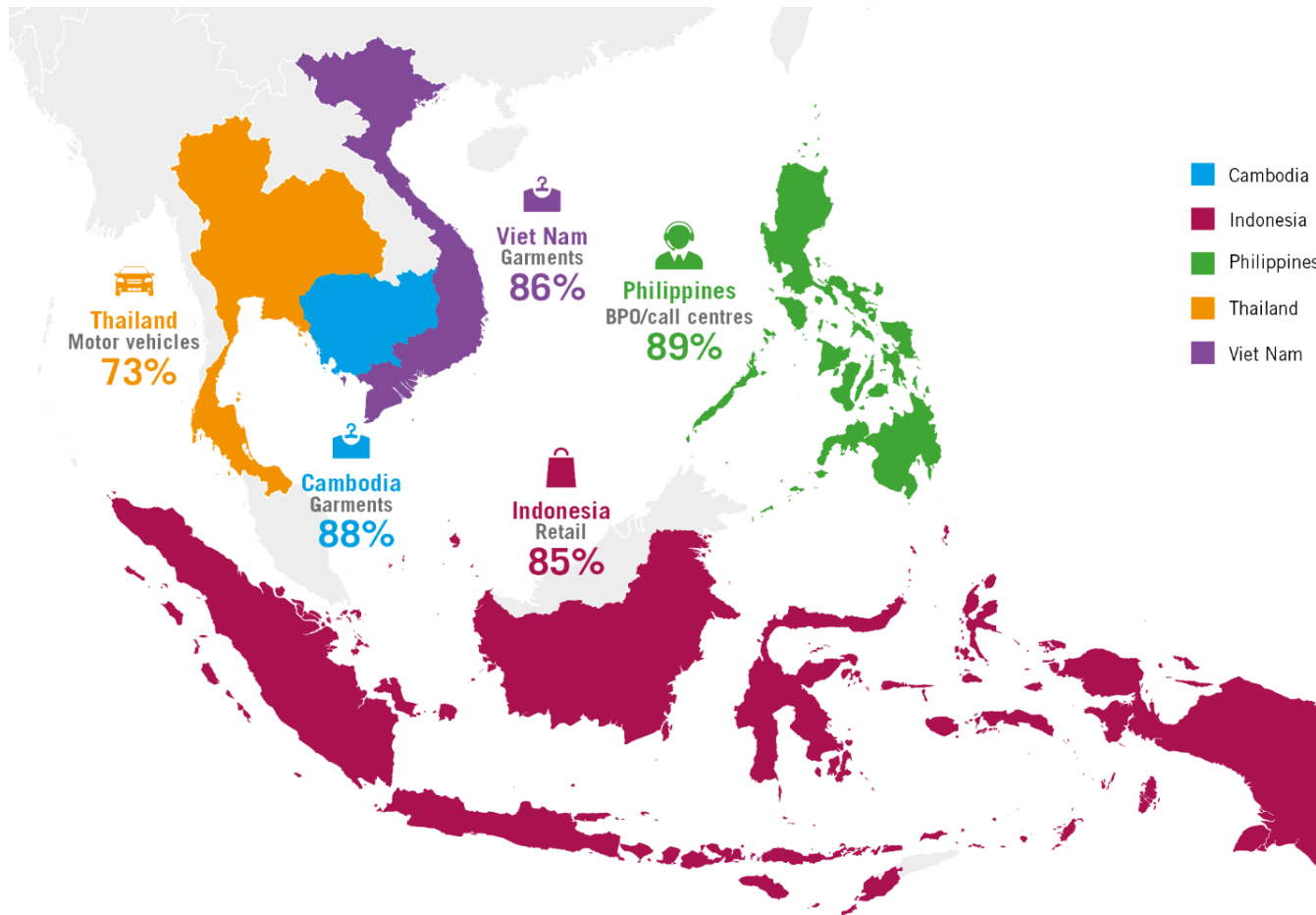
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# WAGE WORKERS AT HIGH-RISK OF AUTOMATION IN KEY SECTORS IN ASEAN-5

## SIMULATIONS ON JOBS SUSCEPTIBLE TO DIGITALIZATION



Source: ASEAN in transformation: Future of jobs at risk of automation (ILO, 2016)



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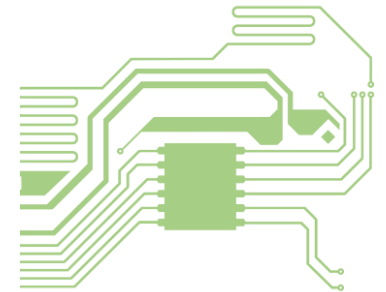
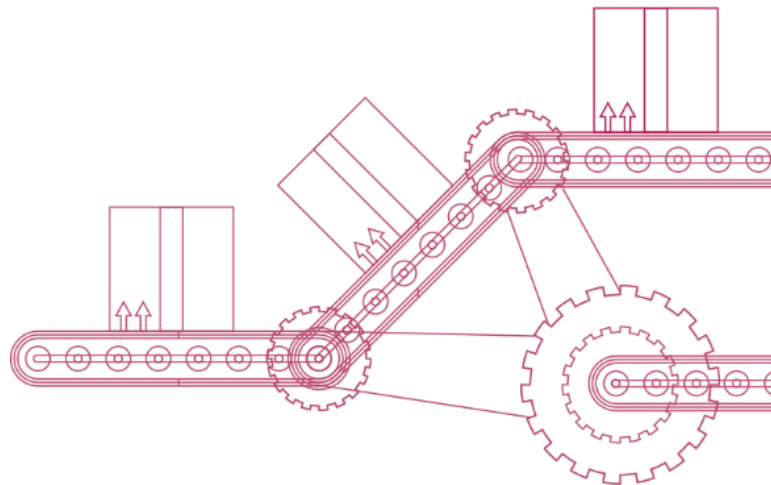
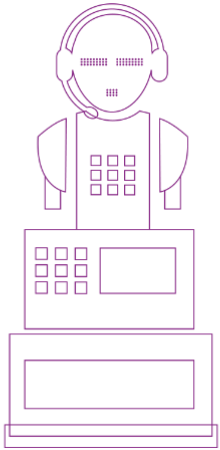
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# ASEAN IN TRANSFORMATION: HOW TECHNOLOGY IS CHANGING JOBS AND ENTERPRISES

## KEY SURVEY FINDINGS



# YET ASEAN'S INCOMING WORKFORCE IS OPTIMISTIC ABOUT FUTURE WORK OPPORTUNITIES

**2,700 students** in ASEAN-10 say that 2025 will bring greater opportunities for

Good work for young women

**63%**

Starting a business

**58%**



Interesting and rewarding work

**58%**

Maintaining relevant skills

**54%**

Productive and well-paid work

**56%**

Source: *ASEAN in transformation: Perspectives of enterprises and students (ILO, 2016)*



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# YOUNG PEOPLE'S AREA OF INTEREST

**Top choice of study:** Business, commerce and finance is the top choice of study in ASEAN (almost 30%)

## STEM+ICT uptake



**Male student**  
**ASEAN 49%**  
**Indonesia 50%**



**Female student**  
**ASEAN 27%**  
**Indonesia 24%**

## Top career choice— Male



**ICT 14%**



**Finance or insurance 9%**



**Manufacturing 8%**



**Finance or insurance 11%**



**ICT 10%**



**Arts and entertainment 8%**

## Top career choice— Female

*Source: ASEAN in transformation: Perspectives of enterprises and students (ILO, 2016)*



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# ASEAN AND INDONESIAN BUSINESSES ARE NOT AT THE FOREFRONT OF TECHNOLOGY INNOVATION

Of 4,000 enterprises in ASEAN-10 and 732 enterprises in Indonesia:



**ASEAN 16%**  
**Indonesia 19%**  
Protects IP



**ASEAN 21%**  
**Indonesia 20%**  
Invests in R&D



**ASEAN 27%**  
**Indonesia 35%**  
Upgrades technology



**ASEAN 28%**  
**Indonesia 34%**  
Protects data

Source: ASEAN in transformation: Perspectives of enterprises and students (ILO, 2016)

# ENTERPRISE BARRIERS TO TECHNOLOGY UPTAKE

Enterprises report that **affordability and skills** are the **biggest obstacles** to technology upgrading



High fixed capital  
cost

**ASEAN 29%**

**Indonesia 34%**



Lack of skilled  
workers

**ASEAN 13%**

**Indonesia 14%**



High licensing  
cost

**ASEAN 10%**

**Indonesia 12%**

*Source: ASEAN in transformation: Perspectives of enterprises and students (ILO, 2016)*



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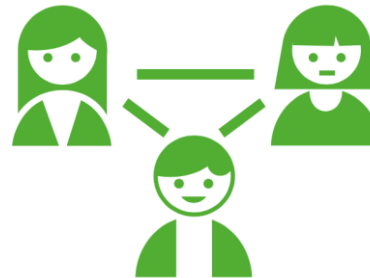
# INCREASINGLY SKILLS DEFICITS & MISMATCHES

Technology is driving up demand for technically-skilled workers who are difficult to find

Skills most important:



Technical knowledge  
**ASEAN 39%**  
**Indonesia 37%**



Teamwork  
**ASEAN 33%**  
**Indonesia 29%**

Communication  
**ASEAN 31%**  
**Indonesia 31%**

Skills most difficult to find:



Strategic thinking and problem solving  
**ASEAN 32%**  
**Indonesia 30%**



Foreign language skills  
**ASEAN 27%**  
**Indonesia 34%**



Innovation  
**ASEAN 25%**  
**Indonesia 32%**



Creativity  
**ASEAN 25%**  
**Indonesia 23%**

Source: ASEAN in transformation: Perspectives of enterprises and students (ILO, 2016)

# LOOKING TO 2025: BUSINESS SENTIMENT IS STRONG

Enterprises think 2025 will bring greater opportunities for:



Rising domestic demand

**ASEAN 39%**

**Indonesia 36%**



Rising exports within ASEAN

**ASEAN 27%**

**Indonesia 26%**



Technological advances

**ASEAN 26%**

**Indonesia 27%**



Falling trade and transport costs

**ASEAN 20%**

**Indonesia 18%**



Indonesian enterprises were slightly less optimistic about the opportunities created by skills upgrading among the local workforce (**22%**) in comparison to ASEAN neighbours (**24%**)

Source: ASEAN in transformation: Perspectives of enterprises and students (ILO, 2016)



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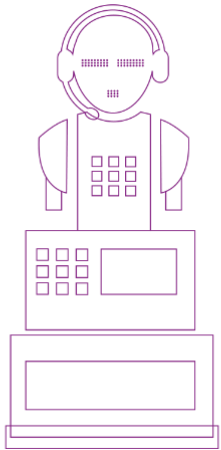
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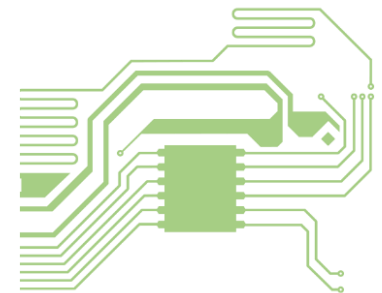
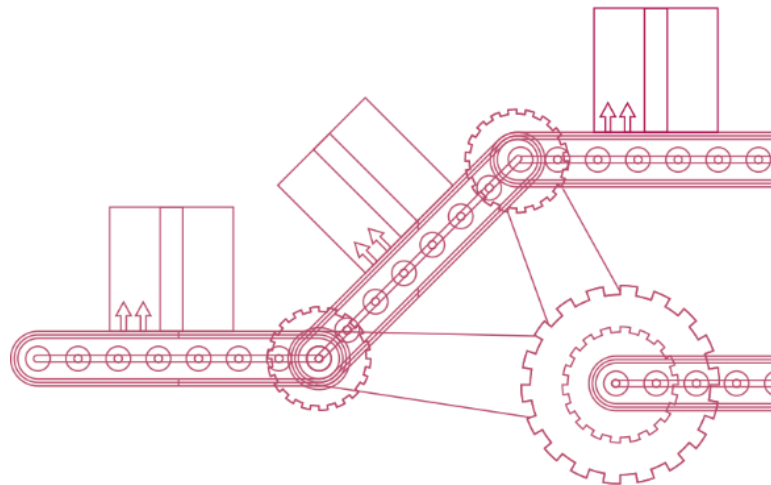
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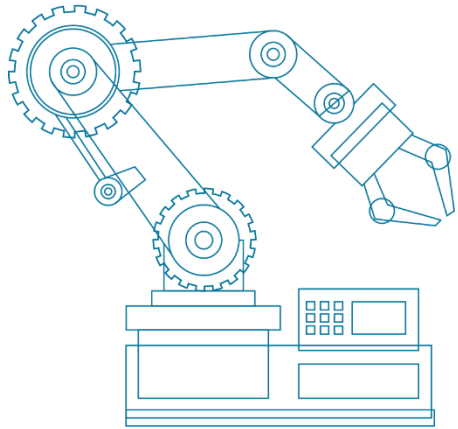
# ASEAN in transformation: How technology is changing jobs and enterprises



## MAIN SECTOR FINDINGS

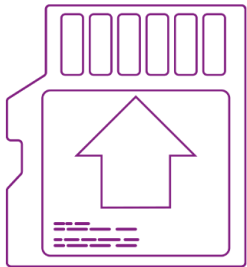


# OVERVIEW OF ASEAN TECHNOLOGY



## Automation and robotics

- Automation is increasingly applied across all sectors
- Automotive (43%) and electronics (21%) sectors are the main drivers of robot growth
- In ASEAN, robots sales increased for Indonesia, Viet Nam, Malaysia and Singapore in 2014

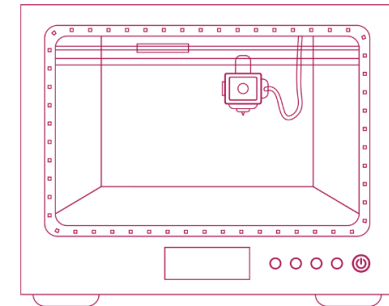


## Internet of Things (IoT)

- Connected devices embedded with sensors to grow from 10 billion today to 30 billion devices by 2020

## Additive manufacturing or 3D printing

- Global market grew 29% between 2012-13

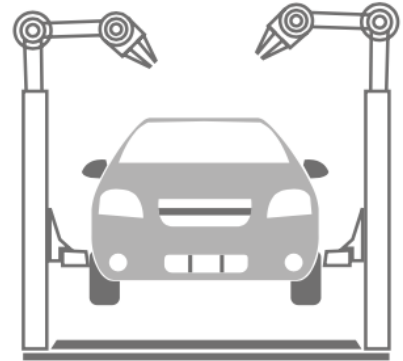


# MAIN SECTORIAL FINDINGS

## AUTOMOTIVE AND AUTO PARTS

### Significance

- ASEAN was the 7<sup>th</sup> largest global producer of vehicles in 2015
- more than 800,000 workers
- Regional leaders: Thailand and Indonesia



### Main technologies in ASEAN

- **Robotic/automation** is becoming more attractive
- Spikes in minimum wages cited as driver to automate

### Impact on enterprises and people

- Robots smaller, cheaper, more adaptable & able to collaborate with people
- Increasingly replacing lower-skilled jobs
- Higher skilled jobs increasingly sought

# MAIN SECTORIAL FINDINGS

## ELECTRICAL AND ELECTRONICS (E&E)

### Significance

- ASEAN's E&E directly employs over 2.5 million workers
- E&E exports almost tripled over the past decade, reaching US\$382. billion in 2014
- Regional leaders: Thailand, Malaysia and Singapore

### Main technologies in ASEAN

- **Robotic automation, the IoT and 3D printing**

### Impact on enterprises and people

- Automated processes are replacing low-skilled jobs in assembling and packaging
- Demand for higher skills with strong technical, engineering and science fields will increase (especially women)





# MAIN SECTORIAL FINDINGS

## TEXTILES, CLOTHING AND FOOTWEAR (TCF)

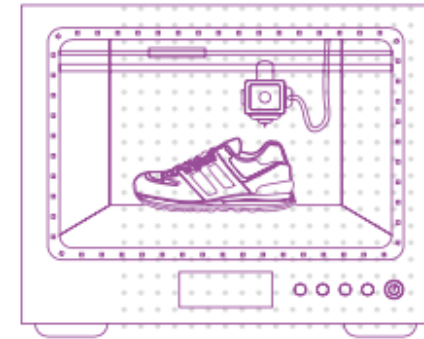
### Significance

- Over 9 million people in ASEAN, the majority of whom are young women
- Indonesia, Thailand and Viet Nam join the top rankings of TCF exports



### Main technologies in ASEAN

- **Robotic automation** and “**Sewbots**” form the biggest future threat to both enterprises and workers in ASEAN’s TCF sector



### Impact on enterprises and people

- Of all the sectors analyzed, TCF is at highest risk of displaced workers.
- This risk disproportionately affects female workers
- More engineers and technical experts will be needed with backgrounds in STEM will be needed



# MAIN SECTORIAL FINDINGS

## BUSINESS PROCESSING OUTSOURCING (BPO)

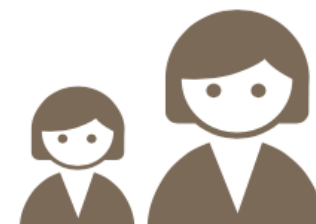
### Significance

- BPO developed in the 1990a
- GDP contribution of 7% in 2016
- Over 1 million workers were employed, mostly young graduates and women (59% of the workforce)



### Main technologies in ASEAN

**Cloud computing** and **robotic process automation (RPA)**



### Impact on enterprises and people

- BPO players need to shift services towards knowledge process outsourcing (KPO), focusing on specialized knowledge and skillsets
- **Highly educated employees** with certifications in medicine, business, law, finance, accounting and data analysis will be required



# MAIN SECTORIAL FINDINGS

## RETAIL

### Significance

- Employs a total of 44.6 million workers in ASEAN (16% of total employment and 44% of employment in the service sector)
- Retail sales in ASEAN countries accounted for US\$767 billion in 2013

### Main technologies in ASEAN

- The **IoT** converging with other technologies (**cloud** and **big data**).

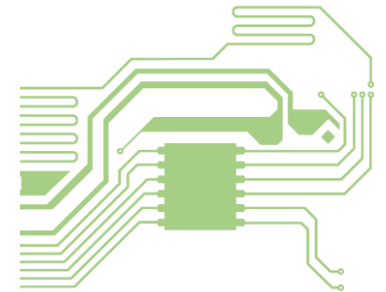
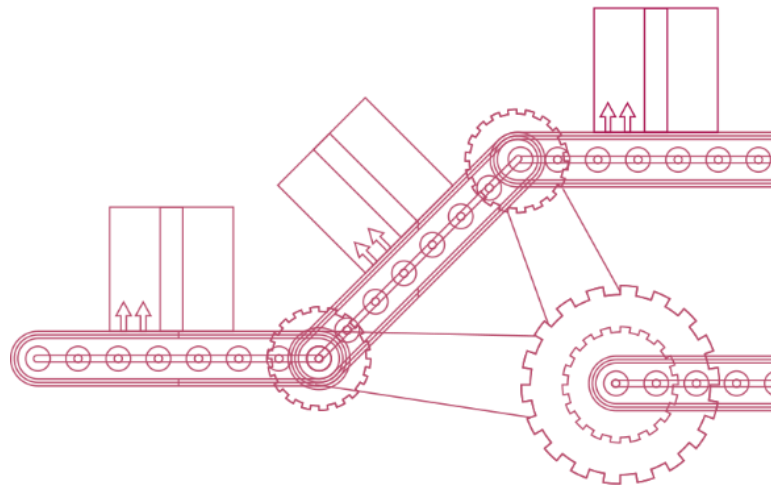
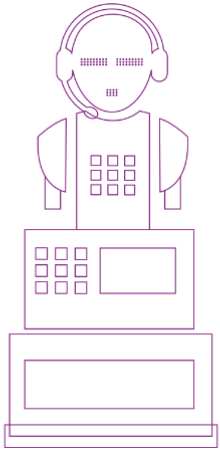
### Impact on enterprises and people

- New technologies will optimize inventory management, product tracking and shopping intelligence
- Future required skills include data management, digital marketing and social media, in-depth product knowledge and soft skills



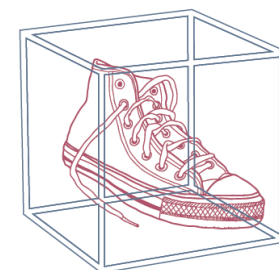
# ASEAN IN TRANSFORMATION: HOW TECHNOLOGY IS CHANGING JOBS AND ENTERPRISES

## INDONESIA KEY FINDINGS



# INDONESIA : KEY FACTS

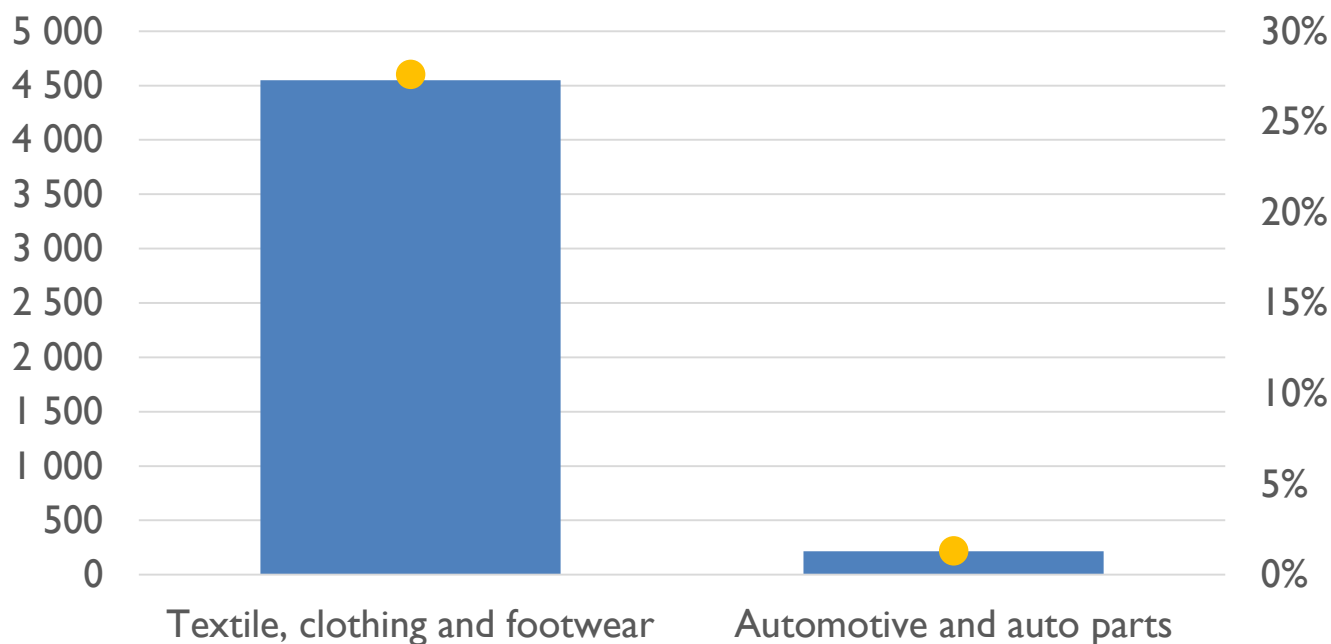
- Two critical manufacturing sectors: **TCF and automotive**
- Indonesia 2<sup>nd</sup> largest TCF exporter, US\$16.3 billion in 2015 (half the regional leader, Viet Nam).
- TCF exports represented 25% of Indonesia's total manufactured exports in 2015 (the largest manufacturing export)
- Indonesia 2<sup>nd</sup> largest exporter of motor vehicles and auto parts in ASEAN, totalling US\$5 billion, about one fifth of the level of the regional leader, Thailand



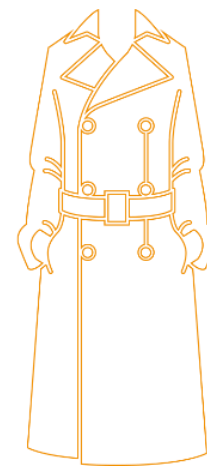
# INDONESIA HIGHLIGHTS

## OVERVIEW

Total employment in TCF and automotive and auto parts (thousand) and share of total manufacturing employment (per cent), Indonesia, 2016



■ Employment (thousand), left axis ● % of manufacturing employment, right axis

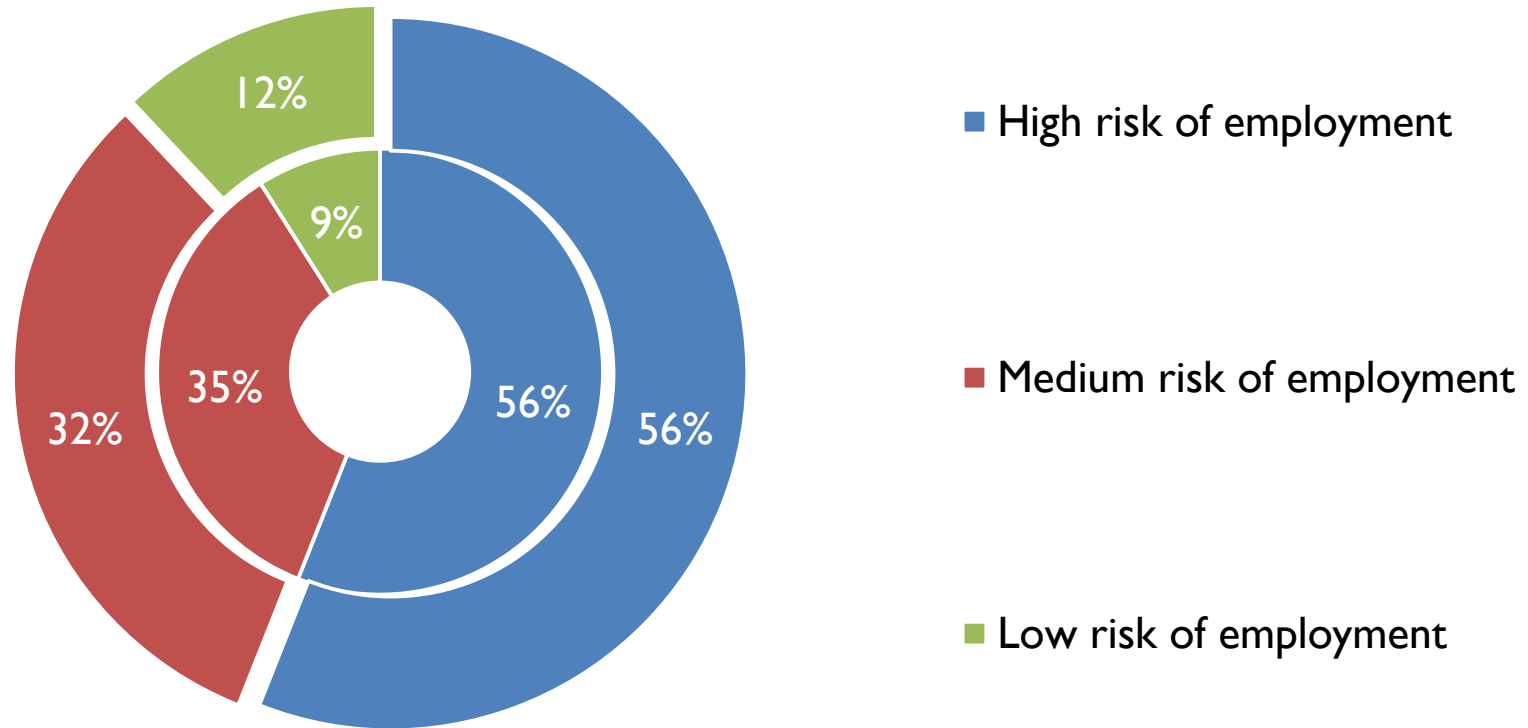


**Source:** Adapted from ILO: *ASEAN in transformation: How technology is changing jobs and enterprises*, op. cit.



# JOBS AT RISK OF AUTOMATION IN INDONESIA

Distribution of employment at risk of automation, ASEAN-5 and Indonesia

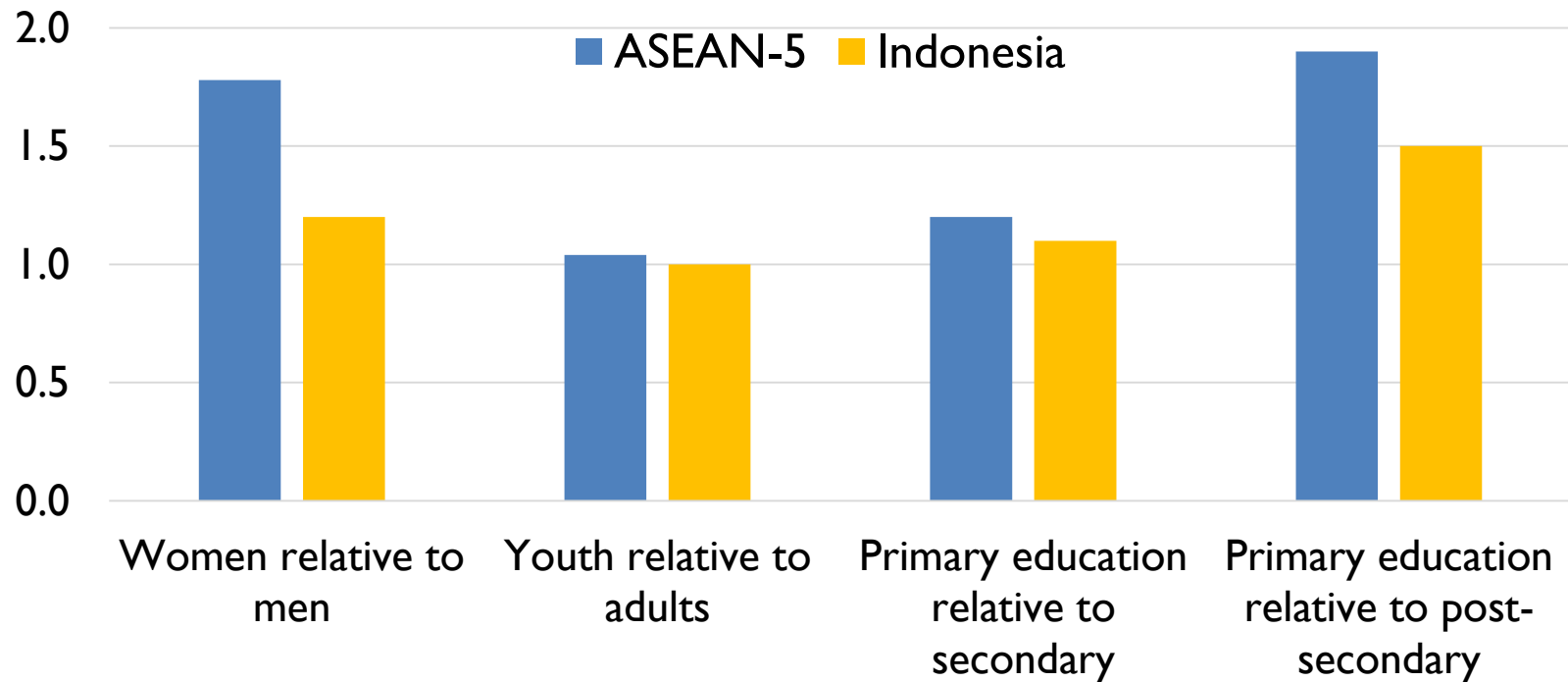


**Notes:** The outer ring represents average risk of automation across ASEAN-5, the inner ring represents risk of automation in Indonesia.

**Source:** Adapted from ILO: *ASEAN in transformation: The future of jobs at risk of automation*, op. cit.

# JOB AT RISK OF AUTOMATION IN INDONESIA

Probability of occupying a high-risk, automatable job by gender, age and education levels, ASEAN-5 and Indonesia



**Source:** Adapted from ILO:ASEAN in transformation:The future of jobs at risk of automation, op. cit.

# INDONESIAN AUTOMOTIVE SECTOR

## *TECHNOLOGY UPTAKE*

- Robotic automation is likely to be the most disruptive technology in Indonesia's automotive sector.
- Automation will reduce the number of low-skilled assembly line workers
- Collaborative robots, or 'cobots' are increasingly
- Also making the workplace safer in the sector



# INDONESIAN AUTOMOTIVE SECTOR

## TECHNOLOGY UPTAKE

- Factors driving robotic automation in the automotive sector include:

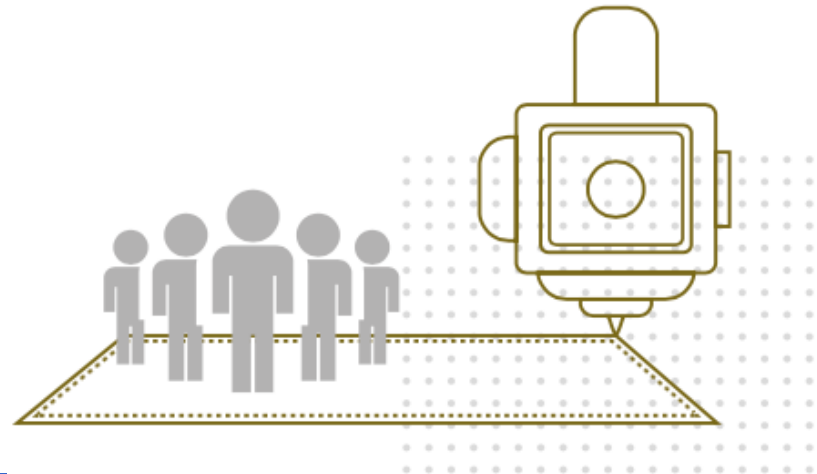
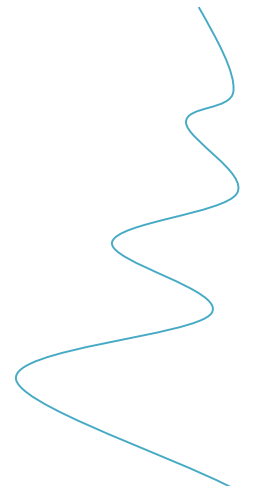
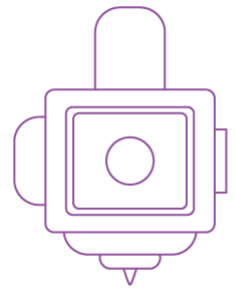
1. **Cost-reduction agreements are driving automation (e.g. the same parts must be made more cheaply/quantity increased with the same resource intensity).**
2. **Increases in minimum wage levels**
3. **Consumer demand for better quality performing cars**
4. **Government regulations to lower carbon emissions and environmental consciousness**
5. **Driverless cars**



## INDONESIAN TCF SECTOR

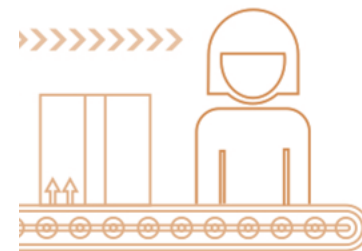
### **TECHNOLOGY UPTAKE**

- 70% of technology out of date (2012 Indonesia's Ministry of Labour)
- *Robotic automation* and automated sewing machines are likely to have the greatest impact on Indonesia's TCF sector
- *Automated sewing machines* are becoming widely available in the market
- in 2016, Adidas (Indonesia) reported using automated cutting to reduce manual cutting to 30 per cent.



# INDONESIAN TCF SECTOR

## TECHNOLOGY UPTAKE



- 1. Inside Indonesia:** improve product quality and labour productivity, increase workplace safety, and reduce environmental impact
  - ✓ *Higher demand for technicians with backgrounds in STEM*
  - ✓ *lower demand for manual workers*
- 2. Outside Indonesia:** Main destination countries (such as US) and major regional competitors (China) will
  - ✓ *Incorporate automation into their most labour intensive production processes*
  - ✓ *Re-shore TCF production to destination countries from Indonesia*

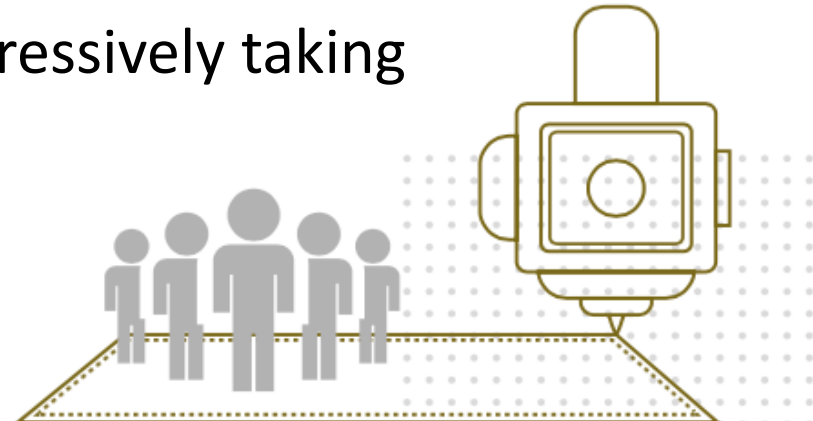




# INDONESIA KEY FINDINGS

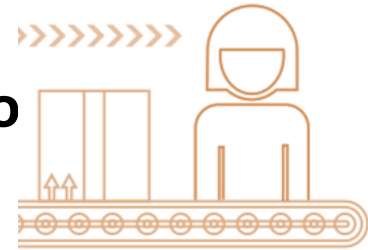
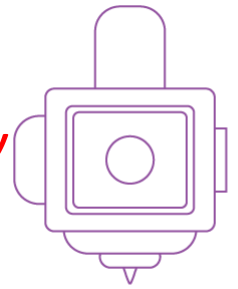


1. Over half of ALL jobs in Indonesia are at high risk
2. Impact greatest on low-skilled workers, women, youth and less educated workers
3. Demand for high-skilled workers with strong STEM backgrounds will increase
4. Co-bots are collaborating with skilled human workers
5. In the TCF sector, robots are progressively taking on dangerous and manual tasks



## MAIN OVERALL FINDINGS

- Technology through automation and robotics is *already happening* across Asia in the TCF sector.
  - ✓ *BOTH 'incremental' and 'game-changing' technology*
- Automation through robotics has resulted in labour productivity/major growth gains in **China's TCF sector** (*with less workers*)
  - ✓ *The rise of the workerless factory*
- Transformative technology will be **externally driven**
  - ✓ *what we call 'game-changing tech -adoption'*
- **Current political discourse** : This increases the chance of reshoring production to market destination countries.



# RECOMMENDATIONS

## 1. Take this really seriously

- ✓ Limited evidence of awareness of threats/more on opportunities

## 2. New sectors will emerge

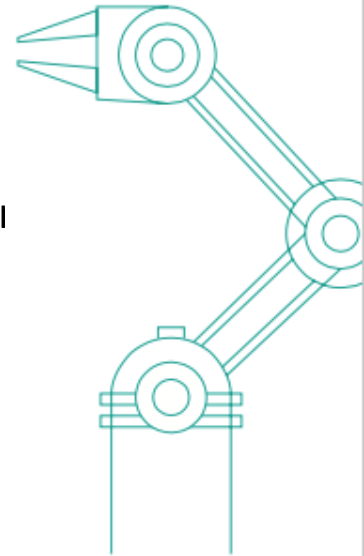
- ✓ Technology will impact on All jobs

## 3. Need to rethink how we skill/educate

- ✓ Definitely need to promote STEM, particularly among young women

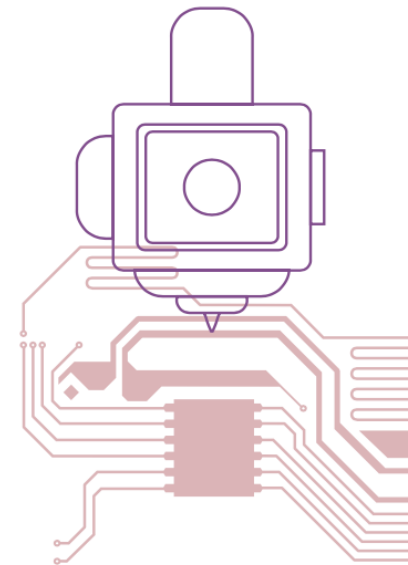
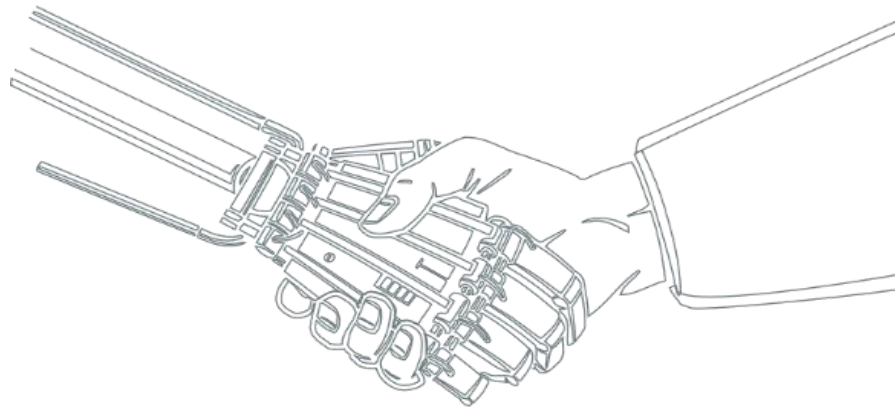
## 4. Address standard structural issues in particular those with a tech focus

- ✓ Address high electricity costs as it constrains technology adoption in manufacturing enterprises
- ✓ Access to finance: major constraint and integral to financing technological adoption



### 3. RECOMMENDATION : *the old development model no longer the route it was*

**DON'T DO  
NORMAL STUFF!!!!**



# THANK YOU

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Senior Specialist on Employers' Activities*



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