Reaping the benefits of Industry 4.0 through skills development in high-growth industries in Southeast Asia: Insights from Cambodia, Indonesia, the Philippines, and Viet Nam

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Industry 4.0, or the Fourth Industrial Revolution (4IR), has the potential to deliver a range of benefits to ASEAN economies

Area	Key finding/s from various studies
Productivity	• AI technologies could bring about labor productivity gains of **38% to 52%** • Non-digital sectors such as healthcare could reap up to **3 times** the productivity benefits from 4IR, as compared to digital sectors
Incomes	• If low-skill workers learn to perform higher-order tasks that are non-automatable, their real wages could increase by **10%** by 2030
Worker well-being	• Workplace injuries could fall by **11%** with automation • With more time freed up for higher-order tasks, 4IR adoption could increase job satisfaction levels by **20%**
Jobs	• In Indonesia, it has been projected that in all sectors except manufacturing, agriculture and mining, the income effect of Industry 4.0 alone could lead to **net job gains of 1-7%** by 2028 • In Vietnam, all occupations (except agricultural workers) are projected to see net job gains of almost **1.57 million jobs** by 2028
Workforce participation	• Job matching platforms could create an additional employment of **5.8 million workers** and a GDP boost of about **US$54 billion** across 5 ASEAN economies in 2025 • On average, **60%** of employers in ASEAN are "very likely" to hire freelancers to address skill gaps in the future economy

This study focused on two selected sectors per country, and we applied a range of methods to assess 4IR skill gaps and policy priorities

2 sectors in each country were selected…

🇰🇭	**Cambodia**	Garments	Tourism
🇮🇩	**Indonesia**	F&B processing	Automotive
🇵🇭	**Philippines**	IT-BPO	Electronics
🇻🇳	**Viet Nam**	Agro-processing	Logistics

… and 4IR-related skill gaps and policy priorities were analyzed

- Conducted **employer surveys** to understand their perceptions of the impacts of 4IR on jobs, tasks and skills
- Conducted **training institute surveys** to understand their readiness for supporting 4IR skill development
- Scraped and analyzed **job portal data** in each country to understand potential job and skill shifts
- **Consulted stakeholders** from government, industry, training institutes and non-profit organizations on challenges faced in equipping workers with 4IR skills, and policy approaches required in each country

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What could be the impact of 4IR on jobs and skills?

How prepared are training institutes for 4IR?

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What could be some of the policy priorities going forward?

Key insights on 4IR readiness and impacts on jobs, tasks and skills

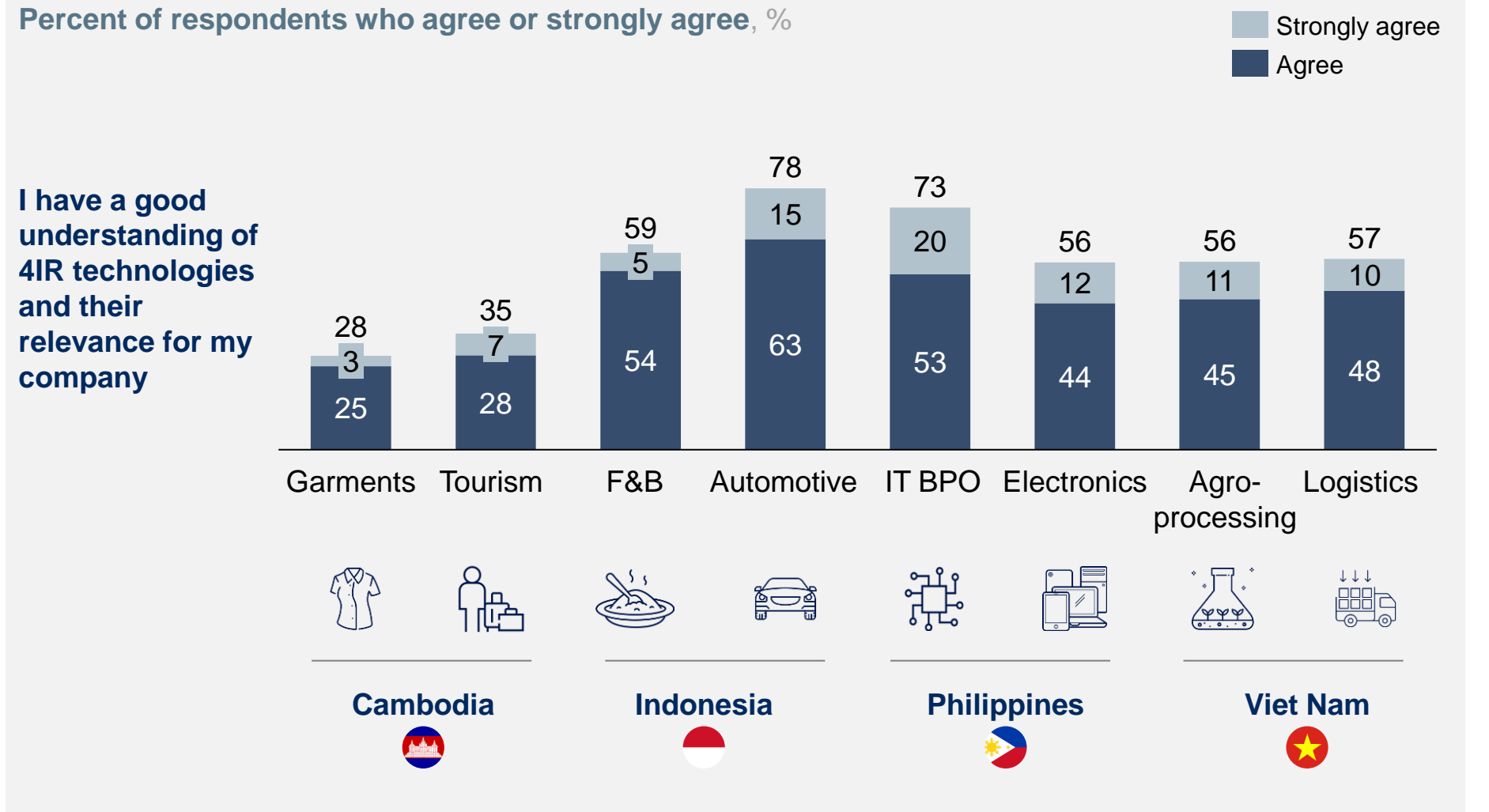| Insight	Findings
4IR readiness	• Though employers understand that 4IR's returns could be large, some have a weak understanding of it
Jobs	• 4IR's job creation potential is large, and can outweigh job losses – with the right policy settings • However, in some sectors, jobs held by women are likely to be disproportionately impacted
Tasks	• 4IR will lead to a shift from routine to non-routine and analytical work
Skills	• Critical thinking, judgement and numeracy skills are likely to become more important with 4IR • A significant share of the required training will have to take place through both on-the-job and longer professional training

Some sectors demonstrate a limited understanding of 4IR technologies – e.g., only 28% of garment firms in Cambodia say they understand them

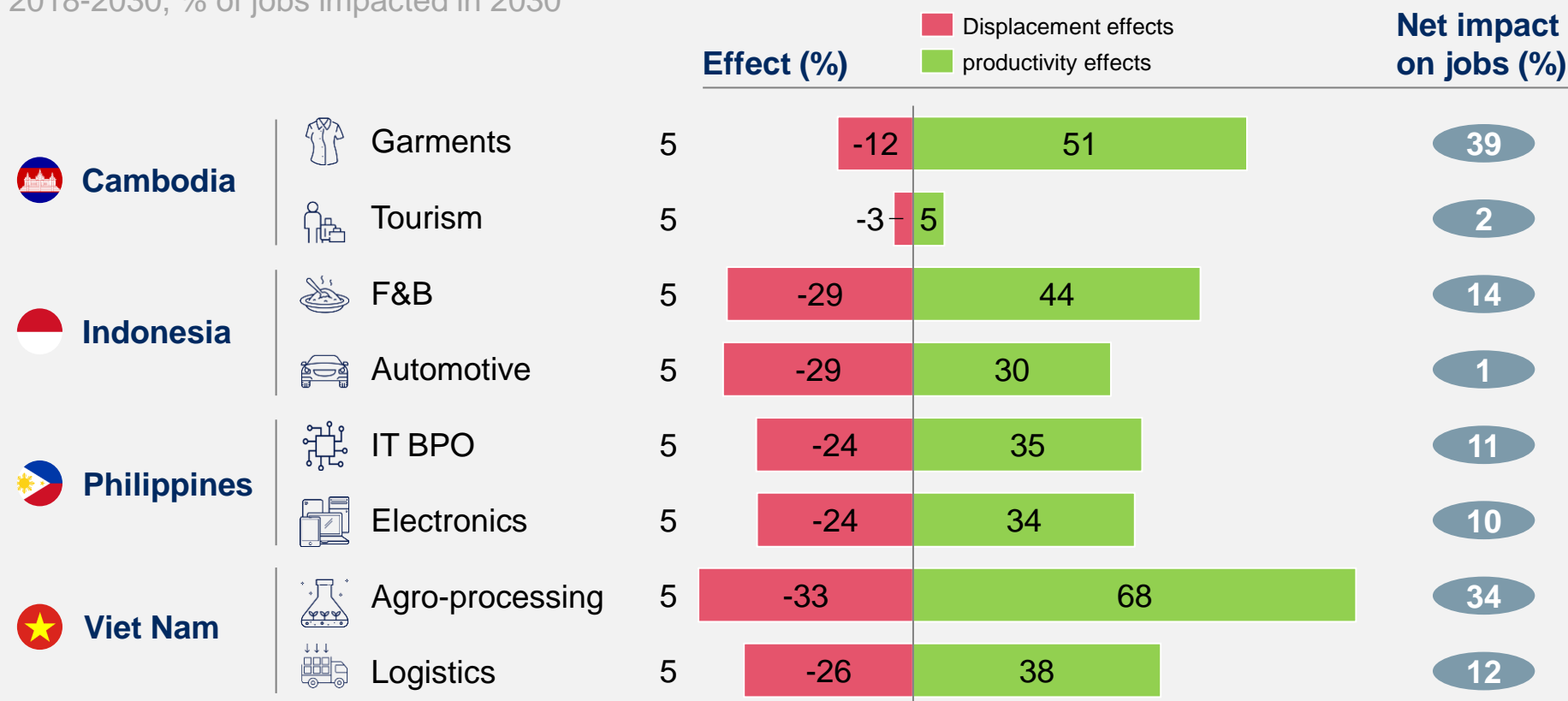## Sentiments towards Industry 4.0 in different sectors and ASEAN Member States

Percent of respondents who agree or strongly agree, %

Strongly agree
Agree

I have a good understanding of 4IR technologies and their relevance for my company

Sector	Strongly agree	Agree	Total
Garments	3	25	28
Tourism	7	28	35
F&B	5	54	59
Automotive	15	63	78
IT BPO	20	53	73
Electronics	12	44	56
Agro-processing	11	45	56
Logistics	10	48	57

Cambodia — Garments, Tourism
Indonesia — F&B, Automotive
Philippines — IT BPO, Electronics
Viet Nam — Agro-processing, Logistics

SOURCE: Employer surveys conducted in Cambodia, Indonesia, Philippines, and Viet Nam

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The net impact of 4IR on jobs is likely to be positive due to its strong productivity effects – given the right policy settings

Modelled impact of 4IR on number of jobs between 2018 and 2030 in different sectors

Displacement and income effects of 4IR on jobs,
2018-2030, % of jobs impacted in 2030

Effect (%)

■ Displacement effects
■ productivity effects

Net impact on jobs (%)

Country	Sector		Displacement	Productivity	Net impact
Cambodia	Garments	5	-12	51	39
	Tourism	5	-3	5	2
Indonesia	F&B	5	-29	44	14
	Automotive	5	-29	30	1
Philippines	IT BPO	5	-24	35	11
	Electronics	5	-24	34	10
Viet Nam	Agro-processing	5	-33	68	34
	Logistics	5	-26	38	12

Note: Figures may not sum due to rounding

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Employers believe that 4IR will lead to a shift from routine to non-routine (e.g. tailored customer service) and analytical work

🟩 Tasks with potentially increased time requirements from 2018-2025

🟥 Tasks with potentially reduced time requirements from 2018-2025

Employers' expected impact of 4IR on working time spent on different tasks between 2018 and 2025 (% of survey respondents)

	Sector		Analytical	Non-routine inter-personal	Non-routine physical	Routine inter-personal	Routine physical
Cambodia	Garments	👚	90	60	53	35	-33
	Tourism		53	56	17	-28	-21
Indonesia	F&B		24	3	-26	-27	-65
	Automotive	🚗	24	-17	-41	-48	-76
Philippines	IT-BPO		25	22	15	-35	-31
	Electronics		49	10	15	-24	-48
Viet Nam	Agro-processing		33	-7	-20	-33	-77
	Logistics		27	14	-5	-45	-74

SOURCES: Employer surveys in each country

While the top skills vary by country and sector, key skills with increased importance are critical thinking, evaluation and numeracy

🟩 Skills of increasing importance from 2018-2030   🟥 Skills with decreasing importance from 2018-2030

Importance of skills by country and industry in 2030, linked to 4IR
(Ranking of 1-10, where 1 is the most important skill in 2030)

Skills	Cambodia		Indonesia		Philippines		Viet Nam	
	Garments	Tourism	F&B	Automotive	IT BPO	Electronics	Agro-processing	Logistics
Critical thinking & adaptive learning	4	6	2	3	6	8	8	5
Written & verbal communication	5	1	3	4	3	5	5	4
Numeracy	3	4	4	7	2	1	2	3
Complex problem solving	8	9	6	8	7	7	7	7
Management	2	5	5	6	8	6	6	6
Social	6	3	8	2	4	9	4	2
Evaluation, judgement and decision-making	1	2	1	1	1	2	1	1
Technical	7	8	7	9	9	3	3	8
Computer literacy	9	7	9	5	5	4	9	9
Digital / ICT skills	10	10	10	10	10	10	10	10

SOURCES: Employer surveys and job portal data for each country

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Training institutes' readiness for 4IR is crucial, but while some positive trends are observed, several areas require attention
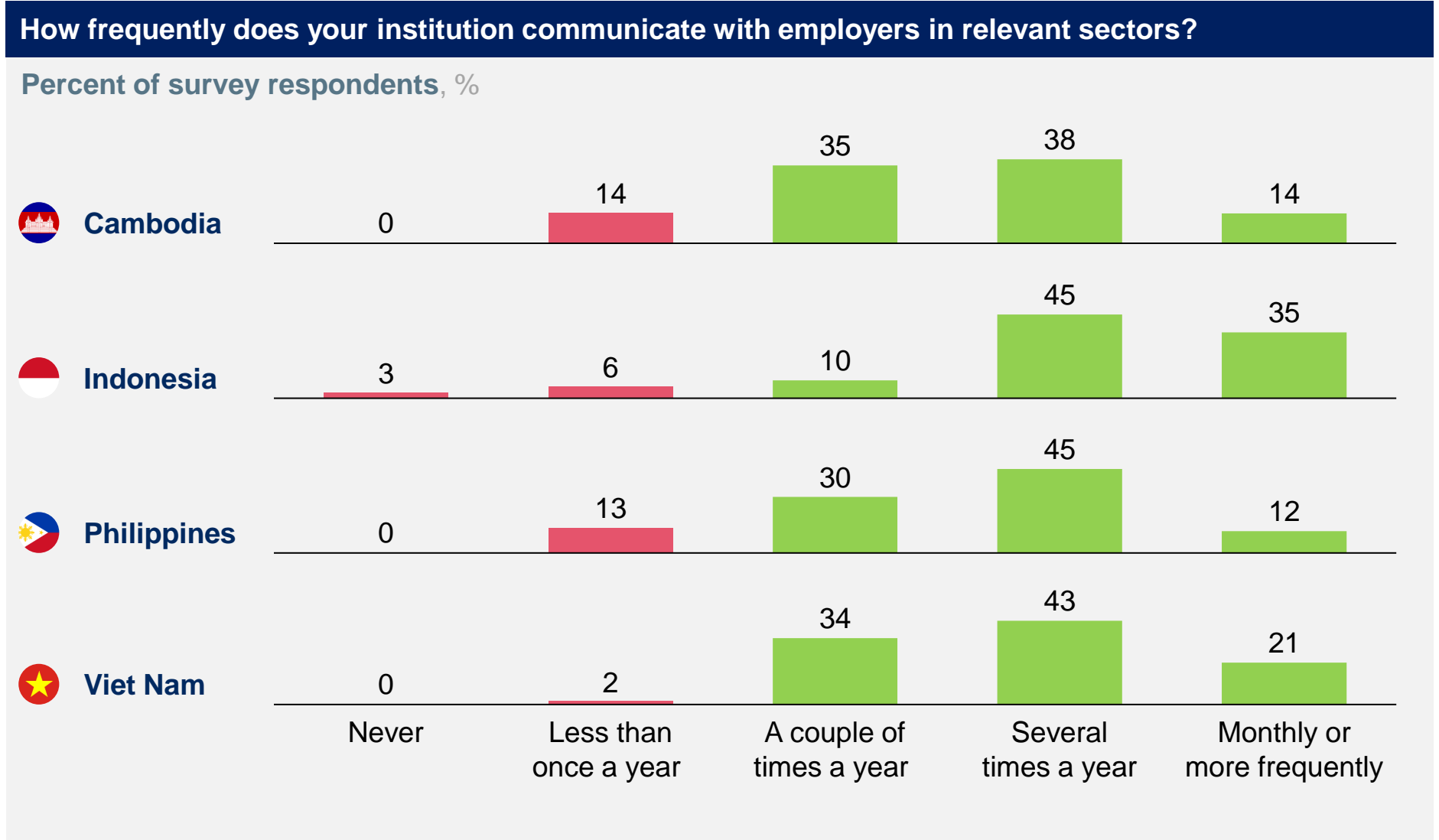
Positive

1. Majority of training institutions generally feel well equipped for 4IR, but request more support with capacity-building and funding

2. Most training institutions report that they engage regularly with employers on skills

3. There is generally strong alignment between training institutions and employers on the skills needed for 4IR. E.g., in the Philippines, both groups agree that technical skills will be most important, followed by ICT and complex problem-solving skills
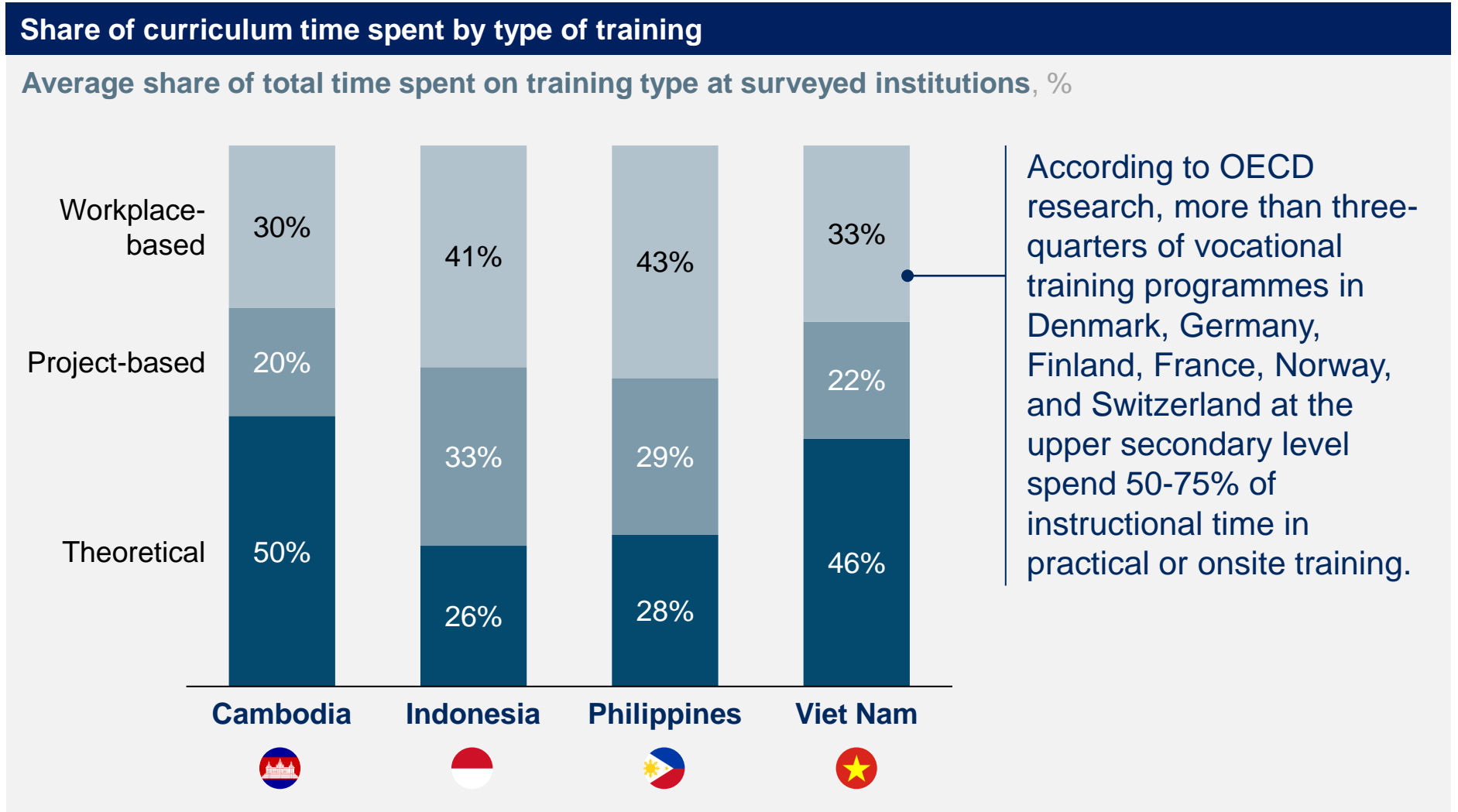
Key areas requiring attention

1. Almost half of all training institutions review and update their curricula less than annually

2. There is a lower focus on workplace-based training than is seen in leading international vocational training programs

3. While approximately half of the training institutions surveyed provide courses relevant for 4IR, the application of 4IR technologies to facilitate training delivery is mixed

4. While most training institutions are providing career advice to students, fewer are providing information on job market conditions (i.e. wages & job prospects in different industries)

5. Training institutions are more optimistic about the graduates' preparedness for work than employers

6. Up to 72% of training institutions struggle to fill student spots due to trainees' inability to differentiate programs and a lack of knowledge of their courses

Most training institutions report that they engage regularly with employers in their relevant sectors

How frequently does your institution communicate with employers in relevant sectors?

Percent of survey respondents, %

	Never	Less than once a year	A couple of times a year	Several times a year	Monthly or more frequently
Cambodia	0	14	35	38	14
Indonesia	3	6	10	45	35
Philippines	0	13	30	45	12
Viet Nam	0	2	34	43	21

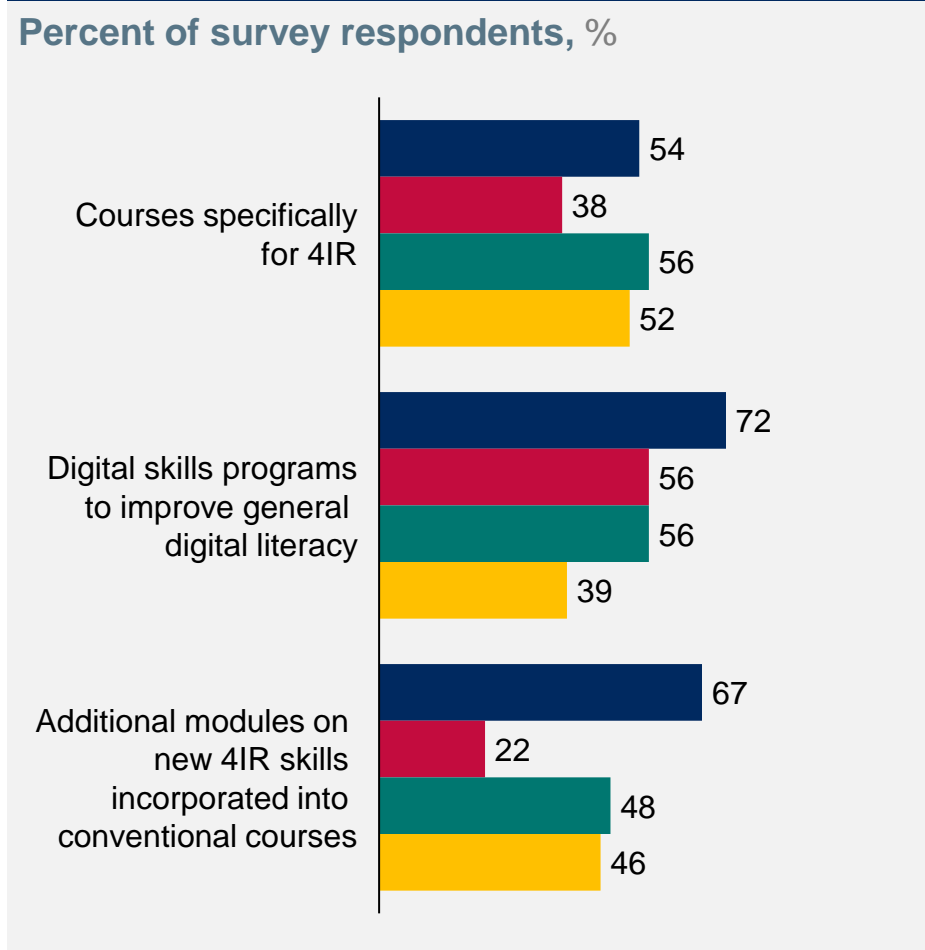SOURCE: Training institution surveys in Cambodia, Indonesia, Philippines, and Viet Nam.

There is a lower focus on workplace-based training than is seen in leading international vocational programs

Share of curriculum time spent by type of training

Average share of total time spent on training type at surveyed institutions, %

	Cambodia	Indonesia	Philippines	Viet Nam
Workplace-based	30%	41%	43%	33%
Project-based	20%	33%	29%	22%
Theoretical	50%	26%	28%	46%

According to OECD research, more than three-quarters of vocational training programmes in Denmark, Germany, Finland, France, Norway, and Switzerland at the upper secondary level spend 50-75% of instructional time in practical or onsite training.
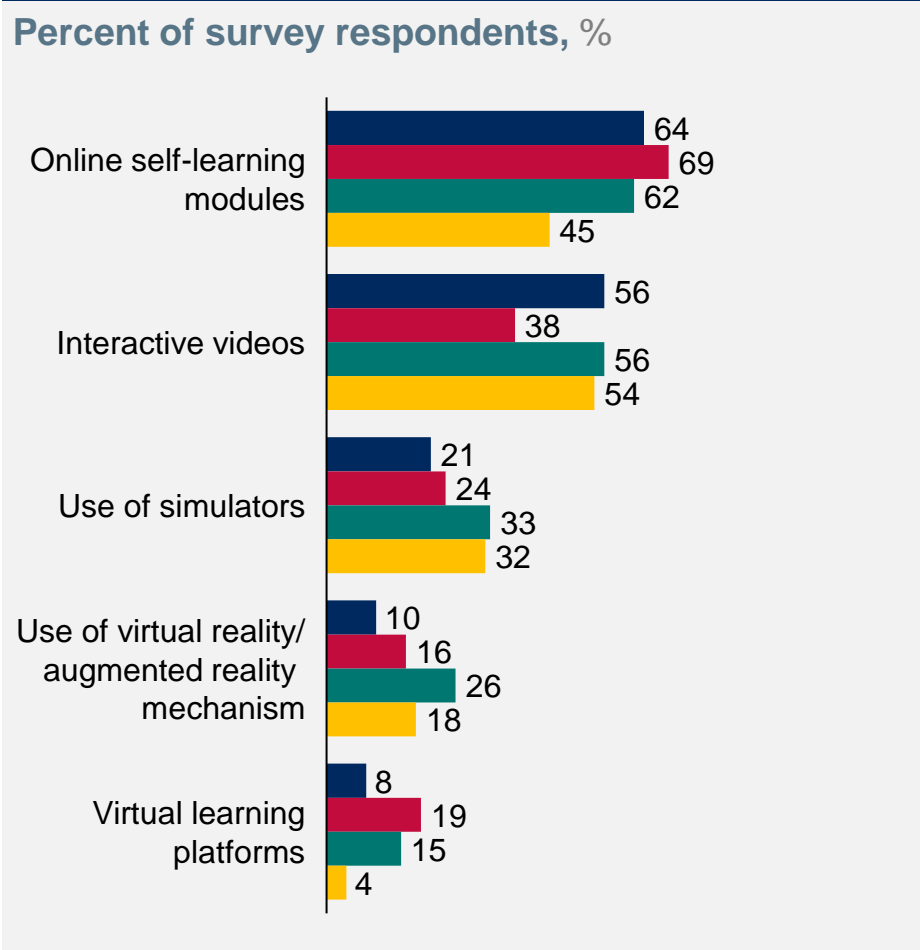
Training institutions provide courses to teach 4IR relevant skills and technologies, but the actual use of 4IR in the delivery of training is limited

Legend: ■ Cambodia ■ Indonesia ■ Philippines ■ Viet Nam

Prevalence of technology related courses at training institutions

Percent of survey respondents, %

Courses specifically for 4IR
- Cambodia: 54
- Indonesia: 38
- Philippines: 56
- Viet Nam: 52

Digital skills programs to improve general digital literacy
- Cambodia: 72
- Indonesia: 56
- Philippines: 56
- Viet Nam: 39

Additional modules on new 4IR skills incorporated into conventional courses
- Cambodia: 67
- Indonesia: 22
- Philippines: 48
- Viet Nam: 46

Prevalence of technology-based delivery in teaching at training institutions

Percent of survey respondents, %

Online self-learning modules
- Cambodia: 64
- Indonesia: 69
- Philippines: 62
- Viet Nam: 45

Interactive videos
- Cambodia: 56
- Indonesia: 38
- Philippines: 56
- Viet Nam: 54

Use of simulators
- Cambodia: 21
- Indonesia: 24
- Philippines: 33
- Viet Nam: 32

Use of virtual reality/ augmented reality mechanism
- Cambodia: 10
- Indonesia: 16
- Philippines: 26
- Viet Nam: 18

Virtual learning platforms
- Cambodia: 8
- Indonesia: 19
- Philippines: 15
- Viet Nam: 4

On average, training institutions are much more optimistic about the preparedness of graduates for work than employers

Perception of graduates' preparedness for entry level positions

Percent of survey respondents who agree or strongly agree with the following statements, %

	Cambodia		Indonesia		Philippines		Viet Nam	
	Training institutions	Employers	Training institutions	Employers	Training institutions	Employers	Training institutions	Employers
Graduates are adequately prepared for entry-level positions	63	16	96	32	90	55	80	38
Graduates have the appropriate "general" skills	88	8	92	39	90	57	80	53
Graduates have the appropriate "job-specific" skills	75	13	92	31	88	59	78	59

SOURCE: Training institution and employer surveys in Cambodia, Indonesia, Philippines, and Viet Nam.

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There is a range of current policies that address 4IR in the four countries, but also further areas to consider

Action agenda	Current policies in the 4 countries	Areas for improvement
Stimulate 4IR adoption by firms and workers	**Clear national roadmap for 4IR adoption.** "Making Indonesia 4.0" strategy **Strong incentives for student apprenticeships.** "JobStart" program **Public-private partnerships on skills.** Skills councils established by gov't and industry to jointly identify skill gaps and plan training	▪ Lack of policies bridging 4IR adoption to skills training ▪ Limited incentives for formal workplace training
Create new flexible qualification pathways	**Strong STEM focus in curriculums.** Elevating STEM in primary education, and addressing soft skills like creativity in vocational programs **Robust skill-based accreditations.** "Basic Education Equivalence Program" in Cambodia	▪ Weak lifelong learning models ▪ Lack of agility in educational curriculums
Build inclusiveness to extend 4IR benefits to all workers	**Financial support for underserved communities.** TVET scholarships awarded to low-income students (2017 TVET policy) **Employability programs for low-income groups.** Offered by Provincial Training Centers and Vocational Training Centers	▪ Social protection mechanisms incomplete for gig economy workers

There are also several challenges faced in the implementation of these policies

Dimension

Policy implementation challenges observed across four countries

Clarity & robustness of plans

- **Absence of national 4IR strategy.** Except in Indonesia, national 4IR strategies have not yet been formally approved, with more effort being focused on making sense of 4IR, and the opportunities and challenges it poses

Strength of coordination

- **Lack of coordination.** In most of the countries there does not appear to be one shared 4IR roadmap. Coordination between government ministries and different levels of government also appear limited.

Aligned financing & incentives

- **Low R&D.** While government financing is somewhat aligned with worker skilling priorities, R&D expenditure appears to be low.
- **Weak incentives.** The incentives for employers and workers to contribute towards skills development also appear weak in each country.

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We have 6 key recommendations to boost workers' preparedness for 4IR

Recommendations

1. **Develop sector-specific 4IR adoption roadmaps**

2. **Develop a series of industry-led TVET programs for 4IR skills**

3. **Implement an incentive scheme for firms to train employees for 4IR**

4. **Provide support for training institutes to incorporate 4IR technologies into courses**

5. **Strengthen quality assurance mechanisms for training institutions**

6. **Strengthen social protection measures in context of 4IR**

International best practice examples

- Singapore's "Industry Transformation Maps" charts 4IR tech adoption for each industry, including the specific skills required to support adoption, and the training options for it

- IL&FS in India offers jobseekers 2- to 3-month vocational boot camps, coupled with job placement programs

- McKinsey's "Generation Program" runs industry bootcamps in 14 countries for entry-level and mid-career workers

- The Singapore government subsidizes employee training course fees and absentee payroll salary costs

- The African School for Excellence in South Africa incorporates free online courses from sources like the Khan Academy, and personalized learning tools

- Quality of training programs can be validated on a regular basis – e.g., surveys indicating demand (Austria), employers' opinions of programs (Denmark and Lithuania), agreements with employers to provide traineeship places (Hungary)

- Increase income security for those working flexible hours

Key takeaways

- With the right policy settings, 4IR technologies could create, rather than take away, jobs

- Training would need to focus on the key skills needed for 4IR – these are evaluation, judgement and numeracy skills

- Such training will need to take place through both informal on-the-job learning, and longer formal training

- Training institutions will need to apply 4IR technologies in their training delivery, and focus more on workplace-based training

- Government policy will need to focus on developing clear national frameworks for 4IR adoption and skilling, strengthening employer incentives for worker training, supporting training institutions' access to 4IR technologies, and strengthening social protection measures for the gig economy