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THOUGHT LEADERSHIP BRIEF

Fostering an AI-Competent Trade Workforce in the APEC Region

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KEY POINTS

- An acute AI skills gap represents the biggest challenge to business transformation. The WEF projects a net gain of 78 million jobs globally by 2030, a massive transition that will demand reskilling or upskilling nearly 60% of the workforce.
- AI expertise is highly centralized in advanced economies (e.g., Singapore, United States, Japan, Korea, Canada, New Zealand, Hong Kong, China). Lower-income economies and traditional sectors have much lower densities of AI-skilled professionals.
- Upskilling must include data privacy, bias mitigation, and decision-making principles to ensure safe, fair, and accountable AI use.
- Governments, industry, and academia should collaborate on workforce development through university-led, industry-tailored AI education programs for working professionals, complemented by AI and ICT training within customs administrations.

ISSUE

The APEC region is rapidly transitioning from basic automation to the adoption of generative AI and agentic AI (autonomous systems) to eliminate operational inefficiencies. A key example can be seen in regional banking, where AI is utilized to automate transaction profiles, reducing front-office processing time by up to 50%. In the trade facilitation context, economies are leveraging AI to modernize trade infrastructure, making customs and logistics operations more agile, efficient, and resilient. With its robust background in policy development on trade facilitation and digitalization, as well as capacity building mechanisms and multistakeholder convening power, APEC has an important role to play in supporting practical, interoperable, and responsible AI adoption in trade facilitation.

At the same time, significant barriers remain in the region's readiness for AI adoption. Workforce capacity represents one of the greatest challenges. 71% of the region's employers report difficulty filling open positions, with AI-related skills among the hardest to recruit. AI

expertise is concentrated in a small number of economies and sectors, particularly trade finance, while sectors such as warehousing, storage, and wholesale import and export lag behind. As AI becomes more deeply integrated into trade facilitation, approximately 60% of the workforce will require upskilling or reskilling.

ASSESSMENT

The World Economic Forum (WEF) identifies skill gaps as the biggest barrier to business transformation between 2025 and 2030, a hurdle cited by over 60% of employers. For SMEs, this barrier is immediate. They often lack the digital infrastructure and the specialized talent (e.g., big data, AI and cybersecurity experts) required to integrate into these new AI-driven supply chain platforms. Without accessible tools and digital literacy, smaller firms in emerging APEC economies risk being cut out of global supply chains altogether. Fundamentally, this talent shortage stems from a broader global workforce transformation, where AI is generating new, specialized demands rather than simply eliminating work. The WEF projects a net gain of 78 million jobs globally by 2030 (170 million created versus 92 million displaced), a massive transition that will demand reskilling or upskilling nearly 60% of the workforce. This dynamic is already evident in recent C-suite barometers in the Asia-Pacific: rather than displacing workers, AI is actually driving headcount growth and reshaping workforce composition.

Over 40% of APAC business leaders report that AI has created new roles within their organizations, significantly outpacing the percentage of those who say it has replaced jobs. The trade finance sector offers a prime example of how this evolution plays out in practice. As AI is heavily utilized for document-intensive, manual processes including verifying bills of lading, commercial invoices, and letters of credit using Optical Character Recognition (OCR) and Natural Language Processing (NLP), the required skill set for human workers is shifting. Professionals are moving away from routine administrative tasks to higher value strategic roles, such as advisory, complex risk assessment, and relationship management.

Given that such a transition requires significant investment in education and infrastructure, AI readiness has become geographically polarized. Research output and specialist talent remain concentrated in a small number of countries. According to Stanford HAI's AI Index, within APEC, the United States and China lead global output; and advanced economies like Japan, Korea, Singapore, Australia, and Canada boast strong AI talent pipelines and industry investment. The International Monetary Fund's (IMF) AI Preparedness Index reveals a highly uneven landscape across Asia Pacific—exceeding 70% in advanced economies such as Singapore, Korea, Japan, and the United States, but falling below 30% in lower-income economies like Papua New Guinea. This "great divergence" poses a barrier to region-wide AI integration in cross-border trade and commerce. The Hong Kong University of Science and Technology's ongoing study on AI talent distribution across regions and sectors reveals a similar disparity. As Figure 1 illustrates, the proportion of professionals with AI skills in trade- and logistics-related industries ranges widely across APEC economies.

Figure 1: Distribution of professionals with AI skills in trade- and logistics-related industries across APEC economies

No. of AI-skilled Professionals per 1000 Workers across the APEC Economies	International Trade & Development (Financial Services)	Freight & Package Transportation	Rail & Truck Transportation	Warehousing & Storage	Wholesale Import & Export
Range across APEC Economies	0 – 29.73	0 – 24.87	0.37 – 11.97	0 – 8.60	0.44 – 5.65
Mean of APEC Economies	10.36	5.87	5.62	2.89	2.71
Median of APEC Economies	9.35	3.76	4.85	2.05	2.39
Top Five Economies	Singapore, New Zealand, United States, Canada, Japan	Singapore; Canada; Hong Kong, China; New Zealand; Japan	Singapore; Japan; Chinese Taipei; Hong Kong, China; Mexico	Singapore; Japan; Vietnam; Papua New Guinea; Hong Kong, China	Canada, Chile, New Zealand, Australia, Brunei Darussalam

Note: The dataset is based on LinkedIn member profiles, which primarily represents professionals active on global professional networking platforms. (Source: LinkedIn Talent Insights)

While the ratios of AI-skilled workers remain generally low across trade and logistics sectors (mostly below 2% of the overall sector workers), several economies stand out with notably higher AI talent ratios: Singapore; Japan; Canada; New Zealand; Hong Kong, China; and the United States. This suggests a more mature, system-wide integration of AI into trade and supply chain operations across these economies. In contrast, some economies currently show lower overall AI talent density in these sectors, mostly falling below 5 AI-skilled workers per 1,000 workers—indicating that while automation is spreading, AI has not yet broadly penetrated their traditional trade and logistics workforces.

Furthermore, the data reflects a significant sectoral concentration of AI-skilled workers. More than half of APEC economies concentrate AI workers in International Trade and Development—a financial services function. Sectors like Freight and Package Transportation have relatively strong AI talent distributions. In contrast, sectors such as Warehousing and Storage and Wholesale Import and Export show the lowest AI talent densities overall, with most economies reporting fewer than 3 AI-skilled workers per 1,000. This indicates that storage and wholesale operations remain highly manual or less attractive to AI professionals.

The pronounced difference in AI talent density across economies and sectors is closely tied to how their workforce structures are evolving. More digitized, data-intensive industries, such as financial services, are actively redesigning their workforce architectures—reskilling staff, automating processes, and building cross-functional teams. This redesign accelerates the demand for and retention of AI talent, creating a virtuous cycle: more strategic roles attract top AI professionals, who in turn drive further transformation. Without such workforce redesign, even well-capitalized hubs may fail to retain AI talent, as skilled professionals find few opportunities to apply their expertise beyond isolated tasks. Overall, AI expertise remains highly centralized in established global trade hubs and digitally mature economies, whereas foundational and traditional supply chain activities such as trucking, warehousing, and wholesale import/export are experiencing a substantial shortage of AI talent. This uneven distribution presents a potential bottleneck for end-to-end supply chain optimization. The data suggests that cultivating AI proficiency within the foundational, day-to-day logistics workforce remains a critical challenge for APEC economies.

A Framework for Action: Fostering an AI-Competent Trade Workforce

Bridging the AI skills gap in trade-related industries requires a multi-faceted strategy built on tripartite collaboration between governments, industries, and academic institutions. High-level frameworks like the APEC Internet and Digital Economy Roadmap (AIDER) and the APEC Framework on Human Resources Development in the Digital Age provide a policy foundation for these efforts. Several APEC economies offer scalable models for translating this into action, directly applicable to the trade sector.

Region-wide upskilling programs are essential. **South Korea** has launched university-led, industry-tailored AI courses for working adults in finance and manufacturing, a model readily adaptable to trade professions. Critically, the Korea Customs Service has established its own internal ICT Expert Training Program, which includes training in Python and machine learning, directly building AI capacity for trade facilitation from within.

Hong Kong, China combines a sector-focused training approach for industry professionals and a comprehensive AI-inclusive upskilling strategy for the broader workforce. For example, the Hong Kong Monetary Authority (HKMA) launched the Enhanced Competency Framework (ECF) on Fintech for Banking Practitioners—a certification program developed jointly with the Hong Kong Institute of Bankers and local universities that established transparent competency standards for building a robust tech talent pipeline. Originally designed for the financial services industry, this model is readily adaptable to traderelated sectors such as customs and logistics. To further broaden workforce agility, the government is upgrading its Employees Retraining Board into "Upskill Hong Kong", offering comprehensive skill-based and AI application training from foundational to advanced levels for the workforce.

Looking across the broader APEC region, **Thailand** has implemented the National AI Strategy and Action Plan (2022-2027) with an aim to cultivate AI ethics awareness for 600,000 citizens and train 30,000 AI talents within 6 years. To close professional skill gaps, the government has heavily leveraged public-private partnerships with both local and global tech leaders, including Google and Microsoft. This includes the recent noteworthy "AI for All Thais" initiative—that embeds AI education directly into Thailand's university system for the first time—and various collaborations providing Thai-language AI and digital literacy courses for workers and educators.

Similar government-led targeted workforce AI and digital literacy initiatives are taking shape across the region. These include **China's** large-scale vocational training and education efforts through its AI+ Education Action Plan, which support the broader industrial transformation envisioned by the "AI Plus" (AI+) initiative within its 15th Five-Year Plan (2026-2030); **Singapore's** government-subsidized SkillsFuture for Digital Workplace 2.0 program, which equips citizens and enterprises with essential tech and data skills; and the **Philippines'** "Leadership in the Digital Era" and "AI in the Workplace" courses, which actively upskill its public sector.

Creating a Holistic Ecosystem for Trade Transformation

A comprehensive approach for workforce empowerment moves beyond training to create a sustainable support system for organizations and actors across the trade ecosystem. **Hong Kong, China** exemplifies this approach through a multi-pronged strategy that spans policy steering via a dedicated Committee on AI+ and Industry Development Strategy, practical enterprise AI support through the "HKPC Picasso" platform, targeted SME upskilling via the Transformation Sandbox (T-box) program, and streamlined sharing of cargo and trade data with banks through the "Project Cargox" initiative.

Demonstrating a similar holistic approach, **Malaysia** empowers local exporters and MSMEs with its AI-driven "MADANI Digital Trade" platform, which serves as a unified one-stop hub for market intelligence, business matching, and trade facilitation, effectively reducing cross-border trade costs and unlocking access to global markets. Similarly, **Indonesia** prioritizes comprehensive ecosystem development—spanning essential data infrastructure, ethics, and collaborative innovation—through its overarching National Strategy for Artificial Intelligence (Stranas KA 2020-2045).

CONCLUSION

While industry leaders work to safely integrate AI into trade operations, they must navigate significant hurdles—such as data privacy, regulatory uncertainty, and algorithmic transparency —which are often cited as the top barriers to scaling AI. Overcoming these challenges relies heavily on building stakeholder trust through transparent governance and maintaining human accountability. To achieve this, organizations must establish robust governance frameworks and, most importantly, develop a trade workforce capable of upholding responsible practices and making informed decisions while working alongside complex AI systems. As a result, there is a growing demand across the sector not just for technical AI engineers, but for AI governance and ethical AI professionals.

Translating these principles into practice requires a highly skilled workforce that simultaneously possesses trade domain expertise, AI proficiency, and a deep understanding of legal and regulatory compliance. As the regulatory landscape grows increasingly complex—with varying AI governance and national standards across APEC economies—maintaining compliance has become a top concern for all stakeholders across the global supply chain. Navigating disparate data protection, consumer privacy, and intellectual property regimes across multiple jurisdictions creates significant legal and regulatory complexity, making specialized advisory expertise essential. To address this, workforce upskilling must focus on equipping legal advisors, customs brokers, and logistics intermediaries with specialized training on AI-specific issues and regulations. Building this expertise ensures that organizations can maintain compliance, operational integrity, and consumer trust while safely leveraging AI technologies in cross-border supply chain operations.

Trade professionals must be equipped not only with the technical skills to operate AI-driven systems, but also with the critical principles to evaluate their outputs responsibly. This requires comprehensive training that emphasizes data privacy and handling, bias mitigation, and decision-making. Alongside upskilling, institutional governance and formal "Human-in-the-Loop" guidelines are critical for maintaining safety, fairness, and accountability. Aligning with global benchmarks like the EU AI Act, organizations including the World Customs Organization strongly emphasize that AI must augment, rather than replace, expert human judgment, ensuring that human operators remain ultimately accountable for high-impact decisions in an increasingly automated trade environment. This ensures that while AI can act as a powerful preparatory tool, a licensed individual customs broker must remain actively involved in defining entry decisions and making the final determination for filings. By legally anchoring these strict requirements for licensed broker participation, this ruling underscores that advanced automated systems cannot substitute for the formal licensing, professional judgment, and legal accountability of qualified customs professionals.

Priorities for Action

APEC's Human Resource Development Working Group (HRDWG) released a "HRD Framework in the Digital Age" in 2017 that provided a high-level strategic direction on strengthening regional cooperation in HRD in the face of rapid technological change through joint and regional research activities, policy discussions, and development of joint programs, projects and initiatives.

In the short term, APEC fora should build on Priority Area 2 of the APEC Framework on HRD in the Digital Age — which calls for expanding collaboration between government, academia, and industry to develop 21st century competencies — by encouraging the APEC's HRDWG to create dedicated platforms and events for tripartite cooperation specifically on workforce AI-skilling programs. APEC fora should also advance standard guidance within the SCCP for the creation of domestic ICT expert training programs for customs authorities across APEC economies.

In the medium term, economies with high concentrations of AI-skilled workers should share best practices and lessons learned from workforce training and collaborate through the HRDWG, in line with the Lima Roadmap, to develop scalable models for upskilling. Individual economies should also use APEC capacity building programs to encourage member economies to support firms in fine-tuning open-source models to local customs, legal, and linguistic contexts.

Over the long term, region-wide coordination through the HRDWG and the APEC AI Initiative should prioritize workforce programs that foster hybrid AI skills across sectors to avoid the siloed training pathways that have limited past efforts.

Realizing the transformative potential of AI in trade facilitation across the APEC region requires more than just adopting new technology. It demands a genuine commitment to human capital and ethical oversight. By actively bridging the critical skills gap and fostering an AI-augmented trade ecosystem through tripartite collaboration —among governments, industries, and academia—while also embedding clear ethical frameworks and human oversight into development strategies, economies can harness AI's capabilities safely. Ultimately, this holistic approach is essential for unlocking inclusive economic growth and empowering the region's trade workforce to confidently move into higher-value, strategic roles.



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Currently, her work focuses on research, project management, and strategic communications in areas related to artificial intelligence (AI), fintech, and workforce development, with an emphasis on translating research findings into practical insights that support strategic planning and decision-making, strengthen stakeholder engagement, and inform policy development.

Prior to joining HKUST, Crystal gained experience in trade development within the public sector, supporting government programmes, trade promotion initiatives, and engagement with stakeholders across various sectors in Hong Kong, ASEAN, and other overseas economies. Drawing on her background in science and cross-sector experience, Crystal is particularly interested in the role of technology in shaping the future of work, and how coordinated efforts across individuals, organizations, and sectors can help workers benefit from technological advancements."



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As a researcher, Prof Tam is well known for his contributions in information systems and the diffusion of innovations in organizations. His earlier work on machine learning applications in finance and investment is regarded as pioneer research in Fintech. According to Google Scholar, his publications received over 23,000 citations. Prof Tam is currently serving on the editorial board of a number of academic journals.

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