

The background of the slide features a close-up of a red emergency light on the right side. The background is blurred, showing indistinct shapes of people in a room. A white, torn paper-like border separates the top text area from a solid black area at the bottom.

# Bridging the Skills Gap in Refrigeration & Air Conditioning

The Importance of TVET and Industry Collaboration in Developing Skilled HVAC Professionals

# Introduction

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HVAC-R industry is evolving rapidly due to technology and regulations

Skills gap remains a major challenge in the workforce

TVET institutions play a crucial role but need industry collaboration

Key Question: How can TVET and industry work together?



# Understanding the Skills Gap in HVAC Industry

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01

Global regulations require energy-efficient and sustainable cooling solutions

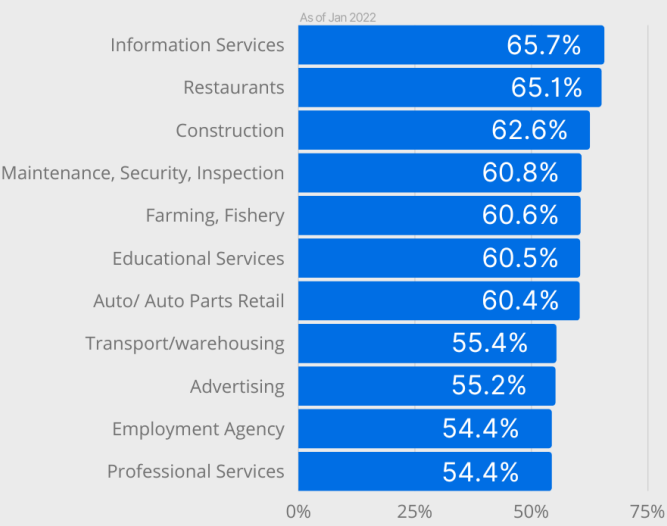
02

Modern buildings require advanced HVAC skills

03

Urgent need for upskilling technicians in new HVAC technologies

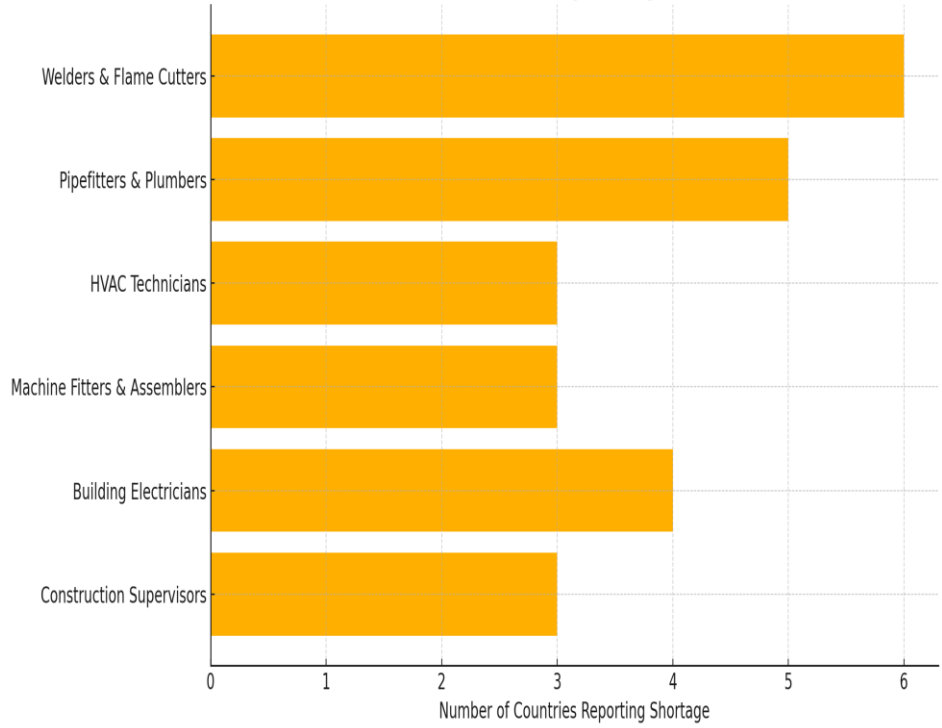
# JAPAN 2022 LABOR SHORTAGE BY INDUSTRY



castplus

<https://www.statista.com/statistics/1113127/japan-full-time-employee-labor-shortages-among-companies-by-industry/12>

Mechanical Construction Roles Facing Shortages Across Asia (2022-2025)



Labour Shortages in Asia 2023		
Country	Top Shortage Sectors	Main Causes
Malaysia	Engineering, Healthcare, IT, Construction	Industrial growth, digitalization, skill mismatch
Singapore	Healthcare, Engineering, IT	Digital economy, aging population
Japan	Healthcare, Construction, IT	Aging population, low birth rate
China	Manufacturing, Healthcare, IT	Aging workforce, youth unemployment
South Korea	Agriculture, Manufacturing, Healthcare	Aging population, declining birth rate

# Key Challenges in Workforce

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OUTDATED CURRICULA LACKING  
MODERN HVAC TECHNIQUES

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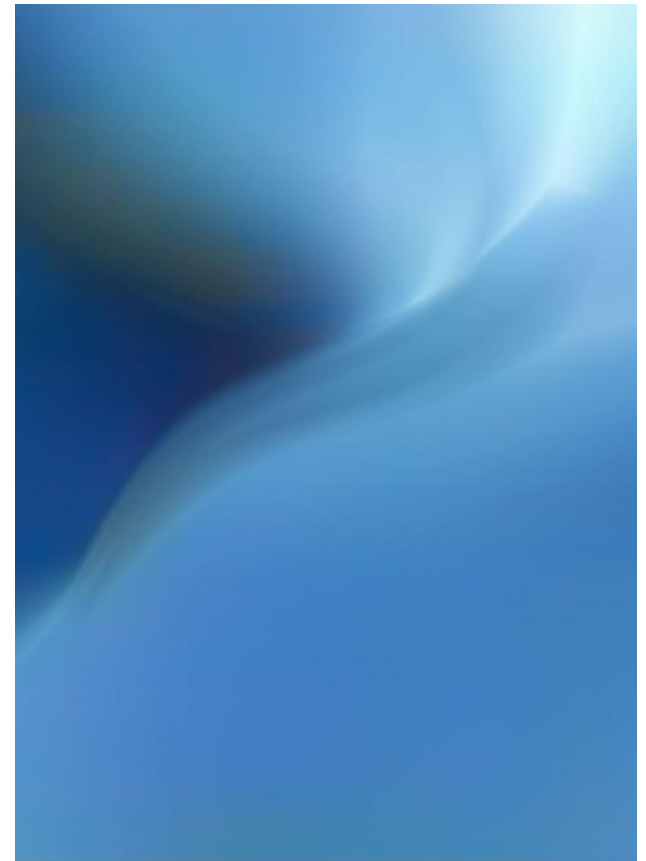
LIMITED HANDS-ON TRAINING FOR  
STUDENTS

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MISMATCHED INDUSTRY  
EXPECTATIONS VS. TRAINING

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LACK OF EXPOSURE TO ALTERNATIVE  
REFRIGERANTS AND SMART SYSTEMS



# Role of TVET in Bridging the Gap



Competency-based training aligned with industry standards



Workplace-based learning (WBL) for real-world experience



Modular training for continuous upskilling in HVAC technologies

# Key Training Areas for TVET



Alternative refrigerants (R-290, R-600a, CO<sub>2</sub>, Ammonia)



IoT and AI-based HVAC Maintenance



Energy-efficient cooling solutions

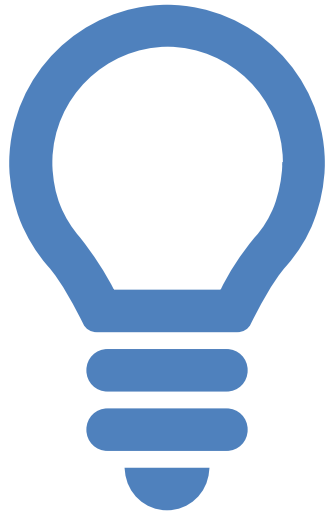


Safety and compliance for flammable refrigerants

# Key Areas That TVET Programs Must Cover

Skill Area	Importance	Current Gap
<b>Alternative Refrigerants (R-290, R-600a, CO<sub>2</sub>, Ammonia)</b>	Compliance with environmental regulations	Limited technician training
<b>IoT and AI-based HVAC Maintenance</b>	Industry moving towards smart cooling solutions	Outdated training programs
<b>Energy-Efficient Cooling Solutions</b>	Sustainability & energy cost savings	Lack of exposure in many TVET institutions
<b>Safety &amp; Compliance for Flammable Refrigerants</b>	Avoiding accidents & legal compliance	Limited focus in technical training





## Current Scenario

### Malaysia:

- **Industry Landscape:** The HVAC-R industry in Malaysia is expanding, with 728 companies operating in the sector. [HVAC Informed](#)
- **Certification Requirements:** While the exact number of certified technicians isn't specified, the growing demand for HVAC-R services implies a need for certified professionals, particularly in refrigerant management, to meet industry standards and environmental regulations.

## Current Scenario

- The **Certification Service Technician Programme (CSTP)** by Malaysia's Department of Environment (DOE), particularly for the year 2021. However, based on the available information, the most recent data indicates that as of 2016, there were 51 Authorized Training Centres (ATCs), 97 Master Trainers, and 2,351 certified service technicians under the CSTP.

# Importance of Industry Collaboration



Industry-driven training  
ensures updated skills



Companies face  
workforce shortages  
and high retraining  
costs



Government policies  
encourage industry-  
academia partnerships

# Effective TVET- Industry Partnership Models



Apprenticeships & Internships  
for hands-on experience



Industry-led curriculum  
development



Work-integrated learning (WIL)  
for practical exposure



Upskilling programs for existing  
technicians

# Case Study: Dual Vocational Training Model

Combination of  
classroom and industry  
training

Strong government and  
industry support

Can this model be  
adapted for ASEAN and  
developing economies?

# Recommendations for Strengthening Collaboration

TVET Institutions  
Should:

Update curricula to  
include modern  
HVAC technologies

Enhance hands-on  
training and  
workplace learning

Partner with HVAC  
companies for  
industry exposure

Industry Should:

Collaborate with  
TVET on  
curriculum  
development

Provide  
mentorship,  
internships, and  
apprenticeships

Invest in technician  
upskilling

Government  
Should:

Incentivize industry  
participation in  
TVET programs

Develop structured  
apprenticeship  
models

Support R&D in  
energy-efficient  
HVAC technologies

# Conclusion: The Future of HVAC Skills Development

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- TVET must modernize training methods
- Industry should actively engage in skill development
- Governments need to support structured workforce policies
- A collaborative approach ensures a skilled, future-ready workforce





Thank You!

The image shows a close-up of a computer keyboard. A single, large, blue key is the central focus, featuring the words "Thank You!" in a white, sans-serif font. The key is slightly raised and has a soft shadow. Surrounding it are several white keys with black markings: a hyphen/underscore key, a left square bracket/brace key, a right square bracket/brace key, and an "alt" key. The lighting is soft, highlighting the texture of the keys.