



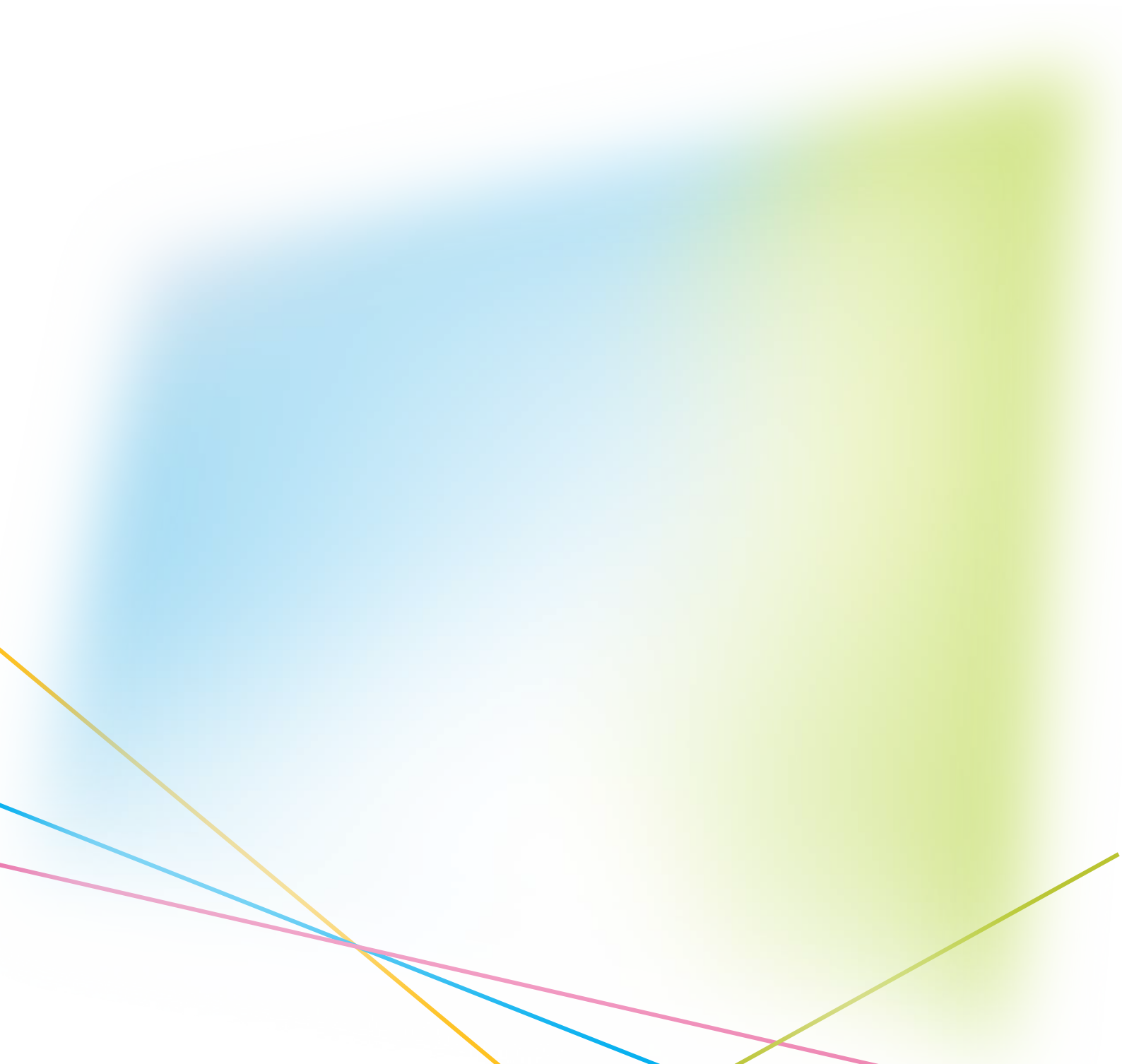
Manpower Update Report Manufacturing Technology Industry

2022



ACKNOWLEDGEMENT

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Introduction

Background

The Manufacturing Technology Training Board (MTTB) of the Vocational Training Council (VTC) is responsible for determining manpower demand of the industry, assessing whether the manpower supply matches manpower demand, and recommending the development of vocational and professional education and training (VPET) to meet the assessed training needs.

To better reflect the dynamics of the manpower situation, one manpower survey collecting quantitative results is conducted every four years, and is supplemented by two manpower updates focusing on qualitative feedback. The MTTB completed its manpower survey in 2018 and the first manpower update in 2021, followed by the second manpower update in 2022.

This manpower update report comprises:

- a. **a focus group** meeting with views from industry members on the latest industrial developments, manpower demand, recruitment difficulties, training needs, and measures to tackle the challenges the industry faces; and
- b. **desk research** and analysis of recruitment information from major recruitment portals related to the manufacturing technology industry.

Objectives

The objectives of the manpower update report are:

- a. to examine **the latest trends and developments** of the manufacturing technology industry;
- b. to explore **the job market situation and recruitment challenges**;
- c. to identify **the training needs**; and
- d. to recommend **measures to meet the training needs** and to ease manpower shortage.

Methodology

Overview

This update report aims to provide the latest development of the manufacturing technology industry through views collected from a focus group meeting, supplemented by desk research on job advertisements from major recruitment portals.

Focus Group Meeting

The central theme of this focus group meeting was “Industry 4.0”, an inevitable trend of the manufacturing technology industry in Hong Kong as suggested in the first manpower update report completed in 2021. The discussion questions were set around the theme by the Working Party on Manpower Survey of the MTTB. To collect the best insight possible, the focus group members are representatives from:

- a. industrial internet of things,
- b. smart manufacturing,
- c. artificial intelligence and robotics, and
- d. innovation technology and research and development.

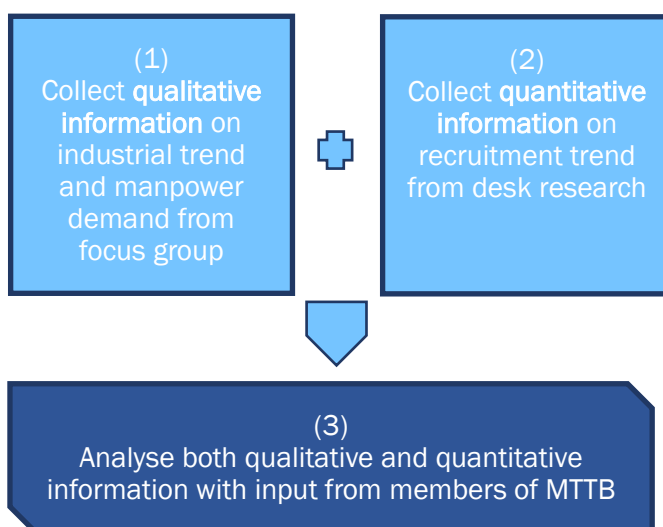
The focus group meeting was conducted on 22 October 2021, and the discussion was recorded and transcribed to facilitate analysis.

Desk Research

An information system was developed to capture relevant recruitment data from major online recruitment portals, covering the period between Quarter 4 of 2020 and Quarter 3 of 2021. Collected information was mapped against the list of companies related to the manufacturing technology industry under the Hong Kong Standard Industrial Classification devised by the Census and Statistics Department. After mapping and removal of duplicated records, a total of 3,539 recruitment records were collected during the research period and served as indicative information of the job market trend.

Data Analysis

The analysis consists of three steps:



Limitations

As this is not a full manpower survey, the findings and recommendations of the focus group meeting are more qualitative in nature and the report focuses mainly on the manpower trends. The information of job advertisements was collected from major

recruitment portals, such as CPjobs, CTgoodjobs and the Labour Department. Other channels, such as recruitment through HR vendors and referrals, were not covered. Since the data collected is a snapshot of a particular period without reference to any historical data, this can only be served as supplementary information to the findings of the focus group meeting.

Findings

Factors Affecting Development of the Industry

Where's Hong Kong on the Industry 4.0 Runway

Rapid technological advancement has transformed the way business is run and the manpower landscape of the manufacturing technology industry. Manufacturing nowadays is not only about automation with robotics but process digitalisation to ensure timely response in production to rapid changes in market demand.

Since mid-2010s, some manufacturers in Hong Kong have already set off on the runway to Industry 4.0 and been enjoying the benefits of it, even at the start of the journey. Since then, they have kept investing more to bring in broader benefits of Industry 4.0 to their enterprises. Some, seeing it from afar, have hesitation in making the first step as they find themselves with limited resources, from money, machinery, and manpower, to pursue

transformation. Some do not see the relevance to their manufacturing as their limited understanding of Industry 4.0 has hindered the pursuit of industrial transformation in this digital era.

Industry 4.0 is a process of transformation, a journey to smart manufacturing and a transfiguration to inno-factory. It is not a return of the good old days, but the establishment of a manufacturing plant producing products with high technology content, advanced processes and innovative design in less physical space. Therefore, all jet planes from different sectors of the manufacturing technology industry are on the Industry 4.0 runway. It is a matter of time the jet planes decide to set off for the journey. The earlier the flyers start the journey, the earlier they enjoy the merits.

Promotion of what Industry 4.0 is to manufacturers is indeed important to get all jet planes mentally ready to set off on the runway. Manufacturers should be well-aware of the government subsidy, technology solutions and professional consultancy available to lead them step by step to actualise Industry 4.0 and transform into smart manufacturing.

It's All About Mindset Change from the Leaders

Leaders matter in manufacturing transformation. Talking from manufacturers' experiences, the transformation will not happen, or happen with success, if the leaders do not have the mindset for such industrial transformation and take an active role to make it happen. The first crucial step is, therefore, to have the top management to see the need, threat and opportunities to pursue Industry 4.0 in this technology-driven era. With the mindset changed, it comes to the middle management to actualise it. Core leaders in middle management should be equipped continuously with the necessary knowledge and latest skills. They are also the ones to pass down the knowledge and experience gained to the technical teams to execute. With this logic, **training for technical staff across job levels is incredibly essential to empower them with skills and confidence to ensure things work in the new environment, new management, new operation, new technologies, and new machinery.**

Data is a Key Raw Material for Industry 4.0

Gathering data during each phase of the production process is the first step toward becoming a data-transformed, Industry 4.0 enterprise. Areas of industrial operation that have seen tremendous value from data-driven decision making include increasing yields, better quality, improved safety, reduced waste, easier compliance, fewer recalls, and operational savings. These outcomes result from the management having insightful information to make better operational decisions. While data collection is important, it is just the start. **Data without meaning and insights can never improve manufacturing performance.** This is, therefore, putting sensors, software, algorithms, data security and data analysis on the agenda of manufacturing enterprises. **Electrical engineering, mechanical engineering, and software are no longer separate worlds. Training institutes should be well aware of the varying talent requirements and design training programmes with the times.**

A Myth: Industry 4.0 = Unemployment?

Undoubtedly, Industry 4.0 creates better prospects in the production process, including mass customisation, flexible production, increased production speed, higher product quality, decreased error rates, and optimised efficiency. With the transition to Industry 4.0, automation and robots do play a key role in performing labour-intensive jobs, which could lead to an impression of job loss. The other side of the coin is, **Industry 4.0 also creates new jobs and employment fields requiring new qualifications and skillsets, which the current manpower pool could further equip for.** As such, the effect of Industry 4.0 on employment issues and the future of work is ambiguous. **What is important is the change in education and training which prepare future manpower with the expected technological competencies and human skills to excel in the Industry 4.0 landscape.**

Career Roadmap for Job Hoppers

The COVID-19 pandemic has sped up a significant paradigm shift to the world of digitalisation and automation. The reality is that many of the changes wrought by the pandemic were underway long before it. COVID-19 only accelerated the trend, driving an unprecedented level of urgency to all industry sectors. Coming along with the emigration wave since late 2020 which has caused great resignation, the manpower population in Hong Kong has lost an impactful amount of technical talents. All these have resulted in the phenomenon of job hopping in the talent marketplace. **Such has called the management to mind the importance of laying out the career roadmap to employees, especially the Millennials and Generation Z who are the current and future workforce, for better manpower retention and succession planning.**

Manpower Demand

High-Skilled Talents for Smart Manufacturing

The HKSAR Government has been actively promoting re-industrialisation in recent years to develop advanced manufacturing industries in Hong Kong that are based on new technologies and smart production. With the rapid technological developments, more opportunities are opened up for high-end manufacturing industries. **Future talents should possess a mix of manufacturing engineering, electronics engineering, mechanical engineering, information technology, and design competencies and mindsets. These high-skilled talents with expertise in industrial internet of things, data analytics and management, automation and robotics, cloud technology and cyber security, product design and innovation are the most sought.**

Human Skills not Fulfilled by Robots

Manufacturing in the era of Industry 4.0 is an industrial transformation to smart factory. It is smart in a way that integrated and collaborative manufacturing systems, which are enabled by the industrial internet of things, can cooperate and communicate with each other and with humans in real time to meet the changing demands and conditions in factories and satisfy varying customer needs. **Human**

assets should add value to the digital world by exercising creativity and empathy, self-organisation and management, teamwork and interdisciplinary cooperation, partner network, and communication.

Talents to Co-innovate

With a free and open economy, a sound legal system and a robust intellectual property protection regime, Hong Kong is an ideal place for industrialists engaging in high value-added and high-tech production to set up their smart production lines locally. However, the industrial transformation efficiency is somewhat restricted by the manufacturers' R&D capability. The shortage of locally-trained R&D talents poses recruitment difficulties to companies to conduct internal R&D. The nature of university research, which is not inclined to applied research and technology transfer and has less consideration on the industrial value of the research outcomes, poses challenges to collaborative research between universities and manufacturers. The normal R&D project timeline is considerably longer, which can hardly match with the product development cycle of only six to twelve months in commercial set-ups. All these pull-back factors slow down the maturity of the local applied R&D capability. **What needs to be encouraged is the co-creation between academia,**

manufacturers and designers to make a concerted effort from first to last for

high value-added, high-technology driven and customer-centric products.

Hot Jobs and Skills on Demand Revealed in Desk Research

A total of 3,539 job advertisements were collected between October 2020 and September 2021 on major recruitment portals. The top five hot jobs on demand are listed in Table 1.

Compared to the data collected for 2019-2020, four hot jobs appeared in both collection periods but with Project Engineer replacing Mechanical Engineer in 2020-2021.

Table 1 Hot Jobs on Demand

| Top 5 Jobs (2019-2020) | Top 5 Jobs (2020-2021) |
|--|--|
| 1. Product Engineer | 1. Merchandiser |
| 2. Merchandiser | 2. Product Designer |
| 3. Product Designer | 3. Technical Sales |
| 4. Technical Sales | 4. Product Engineer |
| 5. Mechanical Engineer | 5. Project Engineer |
| 44% of 3,392 job advertisements | 45% of 3,539 job advertisements |

Regarding the top skills as shown in Table 2, English still ranks at the top of the list as English proficiency definitely enhances the competitive edge of local employees when compared to those in the region or Southeast Asia. Talents with automation knowledge are highly sought after. Although most

manufacturing is not conducted locally in Hong Kong, technical skills together with project management skills and leadership cannot be diminished. After all, **the jobs and skills on demand require a good mix of technical know-how, multi-disciplinary skillsets and cross-team collaboration.**

Table 2 Hot Skills on Demand

| Top 5 Skills (2019-2020) | Top 5 Skills (2020-2021) |
|---------------------------------|---------------------------|
| 1. English | 1. English |
| 2. Product Design & Development | 2. Project Management |
| 3. Testing & Certification | 3. Mechanical Engineering |
| 4. Project Management | 4. Product Design |
| 5. Research & Development | 5. Automation |

Recruitment Challenges

Job Hopping is a New Trend

Millennials (aged 25-40) and Gen Z (aged 18-24) are leading the job hopping trend. They value flexibility and work-life balance. They look for better pay, better benefits, and better opportunities. These characteristics drive them to spend a significantly shorter amount of time in their jobs than older generations. Gen Z's average length of time spent at a job is 2 years and 3 months, and the Millennials spent an average of 2 years and 9 months, while Gen X (aged 41-56) for an average of 5 years and 2 months, and baby boomers (aged 57-75) for 8 years and 3 months¹. The pandemic has further led many millennials to quit their jobs in search of new experiences. **The generational characteristics, the pandemic and the emigration wave have led to massive managerial and technical talent loss, and in turn, catalysing a wave of job hopping in the marketplace.**

Mismatched Talents for Manufacturing Services Support and Manufacturing Operation

Manufacturers in Hong Kong maintain a majority of operation in Mainland. However, Hong Kong graduates are rather reluctant to work across the border, which makes it very difficult for

manufacturers to recruit Hong Kong staff to work cross-border. It is, therefore, important to state clearly to new or potential entrants the job requirements of the industry. **In Hong Kong, expected talents are those with technical knowledge, project management skills and communication proficiency in providing manufacturing services support. In Mainland, expected talents are those with strong technical know-how and industrial experience to manage manufacturing operations.**

There is no Superman

Because of the rapid technological developments and the sudden hard hit of COVID-19, talents in information technology, data science, manufacturing engineering, etc have been sought after in great demand. Employers are somehow looking for talents who are equally at home with data analysis, manufacturing, and the product itself. Therefore, **training schemes for all-round personnel and specialists should be well-defined to address different talent gaps, so that employers are able to recruit the right personnel for the right position.**

¹CareerBuilder. (2021, October 5). *Millennials or Gen Z: Who is doing the most job-hopping?*

<https://www.careerbuilder.com/advice/how-long-should-you-stay-in-a-job>

Training Needs

A Tech-savvy Workforce for Industry 4.0

As the trend to go, the current and future workforce should familiarise themselves with Industry 4.0 technologies, such as industrial internet of things, cloud technology, real-time database, data analytics, artificial intelligence, robotics, 3D printing and 5G. **Among the tech-savvy workforce, some may specialise in technology development and some in technology application so to ensure the talent marketplace has a good balance of innovative makers and tenacious doers.**

Data Visualisation Skills

Data is revolutionising industrial production. The fast-growing industrial internet of things allows manufacturers to attach sensors to every component of the industrial process, which helps collect an unfathomable amount of data every day. However, the flood of this digital raw material needs to be processed, analysed, and turned into digestible insights that can be used constructively by the manufacturers for timely decision making. Innovations based on collecting, evaluating, and using data are the driving force behind many new business models. **The ability to filter out important data, turn it into new knowledge and contextualise it with meaning is a key qualification for the future.**

Hands-on Experience in Training is Essential

Knowledge acquisition is important, but knowledge application in authentic contexts takes the learning to a higher level of thinking. **Advanced manufacturing requires a large number of technical professionals with vocational training and hands-on experience of industrial operations.** In this regard, training which provides internship helps supply industrial talents who are knowledgeable and work-ready for the development of the industry.

Upskilling the Low-Skilled Workers

It is inevitable that digitalisation and automation will replace existing jobs, particularly those routine and repetitive duties. **As technology progresses, low-skilled workers will have to shift to tasks requiring new technologies or system interface.** As such, retraining programmes help assist these workers to gain new skills and remain productive at work.

Human Skills not to be Overlooked

While machines can do a lot, there is plenty of work machines cannot do. **The current and future workforce need**

to exercise extensively their flexibility in problem handling, creativity in design, and empathy for clients and co-workers. Project management and pitching skills, self-organisation and management

skills, teamwork and interdisciplinary cooperation, partner network, and communication also add tremendous value to the workplace.

RECOMMENDATIONS

The following recommendations are proposed for consideration.

To the Government – Injecting Catalysts for the Pursuit of Industry 4.0 Transformation

The HKSAR Government first introduced re-industrialisation as a policy priority in 2016 with an aim to developing advanced manufacturing based on new technologies and smart production model, and transforming local manufacturing into technology-intensive, highly-automated industry. It is also hoped to inject fresh impetus for developing new drivers for local economy and employment. The government may make further effort to build confidence in the local manufacturers to achieve industrial transformation:

- a. **Reviewing the application requirements for government funding schemes** to encourage traditional manufacturers and SMEs for upgrade and transformation.
- b. **Providing more incentives to encourage employers to open more positions for student interns and apprenticeship training** so to offer

early work exposure to the future workforce.

- c. **Formulating a Qualifications Framework recognised skills development framework** to illustrate the Industry 4.0 career pathway and corresponding emerging jobs and skills which could facilitate a successful manpower development and transition for industrial transformation.
- d. **Strengthening STEM education by introducing new technologies and innovations** to inspire the younger generation of the future of work.

To the Industry - Revitalising the Co-Innovate Industrial Image

Manufacturing in the era of Industry 4.0 refers to the smartness of industrial applications that consist of smart design, smart machining, smart monitoring, smart control, and smart scheduling. This implies that Industry 4.0 will create new jobs and employment fields. The new future of the manufacturing technology industry should be well-revitalised in the public eye by:

- a. **Co-innovating new technologies, products and services among academia, manufacturers and designers** to keep the innovation gears moving in the industry.
- b. **Offering more internship and apprenticeship positions in Industry 4.0 operation** to VPET training so to attract and engage new blood.
- c. **Participating in business-school collaboration** to provide an early understanding of the advanced manufacturing technology industry to teachers, students and parents.
- d. **Organising marketing campaigns** to promote the modern industrial system to wash off the traditional blue collar public perception.

To Training Institutes - Strengthening Vocational and Professional Education and Training (VPET) in Advanced Manufacturing

It is a hard fact that the manufacturing technology industry has been facing industrial talent shortage and high turnover rate. The challenge has become more desperate when the emigration wave causes an outflow of professional and technical talents while new blood is scarce in the manufacturing talent pool. VPET comes in place to prepare talents by:

- a. **Launching new advanced manufacturing related training programmes at different qualification levels** to meet the job-skill requirements needed by Industry 4.0 operation.
- b. **Equipping industrial technicians with extensive practical experience and human skills not fulfilled** by robots to manage a data-driven Industry 4.0 production.
- c. **Nurturing R&D professionals focusing on applied and industrial research with innovation capabilities** to develop core technologies, formulate application solutions, and design new products for enterprises.
- d. **Collaborating with the industry to conduct R&D projects suitable for industrialisation and commercialisation.**
- e. **Designing upskilling programmes for low-skilled workers** to promote upward mobility and encourage life-long learning.