National Trades Union Congress

CAREER PROGRESSION MODEL FOR THE SKILLED TRADES

Research Partnership between **National Trades Union Congress (NTUC)** and **Singapore University of Social Sciences (SUSS)**

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Executive Summary

1. Low fertility and population ageing are threatening the viability of Singapore's skilled trades industries. The skilled trades industry is heavily reliant on foreign manpower as there is an insufficient pool of local workers to replace tradesmen who are retiring.

2. These challenges aside, the skilled trades sector is also facing difficulties in recruitment because of the poor image that many have of the sector i.e., "dirty, dangerous and demeaning".

3. Low wages are another area of concern. Wages in the sector have remained low despite wage increases experienced in other sectors. In addition, a gender pay gap exists within the skilled trades sector.

4. The proposed Career Progression Model (CPM) aims to cover the following aspects: 1) secure a pipeline of vocationally trained apprentices; 2) maximise the potential for new career tradespersons through a holistic apprenticeship pathway; and finally, 3) ensure the competitiveness of local tradespersons with relevant qualifications frameworks and skill upgrading opportunities.

Applying Public-Private Partnerships (PPP) to Address the Supply of Apprentices

5. The dual system model, originating in Germany and common in European countries, equips early-career apprentices through both "school-based" and "workplace-based" vocational skills training via cooperation between small and medium-sized companies and public vocational schools which is regulated by law. The dual training system involves employers voluntarily and employers view this as an investment for their future workforce by training them according to their business needs (ILO, 2017).

6. The dual system model allows students to learn vocational skills from a wide range of fields. There are also pre-apprenticeship programmes, or basic vocational training, offered to those unable to find suitable apprenticeships. Apart from having on-the-job training and career pathways, education also plays a crucial role in the dual system model.

7. In this highly subscribed system, close to half of all general education school graduates enter this channel. German students learn necessary skills and vocational knowledge in the skilled trades industry, while concurrently acquiring an internationally accredited education. Thus, a significant advantage of this system is that students become more employable through their exposure to both on-the-job training and a rigorous, recognised education pathway.

8. An establishment of intermediaries such as industry organisations, employer groups, trade unions, and chambers of commerce helps employers navigate the apprenticeship system by mobilising businesses, seeking appropriate training places and negotiating with the government, improving engagement of employers in apprenticeships. These established intermediaries require extensive knowledge of both the training system and local knowledge to translate national schemes into practice and provide advice where required. Germany also has a programme to improve the placement of trainees in enterprises (named “PV”) by working together with local Small and Medium Enterprises (SMEs) to ensure that SMEs can get talent from the dual vocational training system.

Developing Skilled and Motivated Workers: The Role of Apprenticeships

9. Australia introduced competency-based training to meet demand in vocational training by implementing the National Skills Framework (NSF) that ensures the quality and consistency of Vocational Education and Training (VET), provision of national qualification across educational institutes, as well as establishing recognisable standards to assess skills across sectors. As part of the development of skilled tradespeople, apprentices go through both on-the-job and off-the-job training, during which apprentices can either be contracted directly by employers, or by Group Training Organisations (GTO) to be exposed to multiple worksites (ILO, 2017; OECD, 2010 as mentioned in OECD, 2018).

10. GTOs are composed of private and non-profit companies, primarily funded by host employers, with a secondary source of funding coming from government grants. It forms an integral pillar in the management of apprentice pathways by mediating the needs of apprentices, employers, and the government. Alluding back to the earlier mentioned points on PPPs, the GTOs’ ability to comprehensively manage apprenticeship pathways is predicated on strong community and grassroots support. One reason for its popularity is that it “de-risks the employment relationship,” since apprentices are contracted to the GTOs, rather than the employer (Apprentice Employment Network [AEN], 2022; ILO, 2017).

11. Through school-based pre-apprenticeship programmes, potential apprentices are exposed to various pathways, career options and how they could acquire the necessary skills in each industry. GTOs serve as an intermediary that connects apprentices with multiple worksites to develop their work experience through on-the-job training (ILO, 2017), playing a crucial role in screening and matching apprentices to employers, presenting the advantage of tapping into a larger pool of potential apprentices. For example, GTOs have recently explored creating apprenticeship pathways that are targeted at a more diverse demographic, such as attracting young women into the skilled trades.

12. Another useful learning point about GTOs is that they are receptive and have established procedures to manage attrition. Identifying uninterested or mismatched apprentices significantly helps in mitigating “instability and unnecessary” financial costs for both apprentices and employers. Moreover, GTOs also ensure that mismatched apprentices do not immediately contribute to the attrition rates but instead, apprentices are presented with re-deployment or if appropriate, re-qualification opportunities (AEN, 2022).

13. GTOs “reduce employer burden” in administrative matters to deliver positive training experiences. Most Australian employers that utilise the services of GTOs are SMEs which significantly benefit from the array of workplace support offered by GTOs. Examples of workplace support include managing Workplace Health and Safety (WHS) requirements for apprentices as well as core human resource functions. In some instances, GTOs do provide additional training, beyond the primary vocational skills that are provided by employers i.e., literacy and numeracy lessons (AEN, 2022).

14. There are dedicated and experienced GTO career mentors who specialise in handling workplace psychosocial issues. Thus, GTOs are better positioned to establish conducive work environments that support the sustained well-being of apprentices. Relating to Pearce’s (2019) research regarding learning environments in apprenticeships, securing positive workplace relationships is imperative in allowing employees to maximise their potential by “feeling safe and confident”. In this manner, GTOs could serve as a trusted neutral party in resolving workplace disputes and understanding workplace dissatisfaction.

Developing a Qualifications Framework

15. The National Qualifications Framework (NQF) is an instrument that classifies and develops a common definition of qualification providing a basis for improving quality, accessibility, and labour market recognition within a country and internationally according to criteria covering learning outcomes, knowledge, skills, and wider competencies, including occupations (Tuck, 2007). Implementation of NQF can help reform the VET system to improve labour market responsiveness, establish pathways between VET, general and higher education, improve the quality and flexibility of VET, and lastly shift from an input-based to an outcome-based VET system (Allais, 2010; Chakroun, 2010). Over the years, the qualifications framework for skilled tradespersons across different economies has evolved in its definition and purpose. Such changes in the qualification framework reflect evolving industry needs for apprenticeships throughout history—a point that is highly pertinent, considering the landmark transformations observed in the Fourth Industrial Revolution employment landscape.

16. An overarching framework that covers compulsory education, VET, and higher education into a single system could be developed to aid students interested in

pursuing a career or formal education within the VET system, where similar frameworks were already employed in several OECD economies. In this framework, the qualifications attained are independent of the VET institutions, allowing for: 1) validation of prior learning supporting credit accumulation; 2) transfer, as well as ensure quality assurance when formalising qualifications, and finally; 3) accrediting institutions, while ensuring quality assurance in the assessments leading to the awarding of qualifications (Chakroun, 2010).

Youth's Perspective of Skilled Trades in Singapore

17. NTUC Strategy conducted a survey in July 2023 to gather additional views and feedback regarding the skilled trades industry by surveying 1,080 participants aged 18 to 35 from a proprietary opt-in panel and asked them a series of 25 questions pertaining to the perception and views of the skilled trades, as well as feedback on the proposed CPM if it were to be implemented.

18. The survey revealed that due to the physical demands, safety concerns, and stigma associated with the skilled trades, many individuals hesitate to pursue a career in these fields. Those observations aside, respondents did indicate that having good pay, flexible working hours, and recognised professional qualifications may encourage them to reconsider.

19. Respondents also believed that trade unions can play a vital role in assisting tradesmen, and should actively advocate fair and competitive wages, workplace health and safety, as well as providing subsidies for relevant training and matching of jobs for tradespersons.

Developing and Enhancing Singapore's Career Progression Model (CPM)

20. In the case of Singapore, there exists a strong foundation upon which the proposed CPM (Figure 1) can be built. This foundation comprises a strong tripartite partnership among businesses, unions, and employers, a mature Technical and Vocational Education and Training (TVET) pathway that extends to the tertiary level, and a strong continuing education.

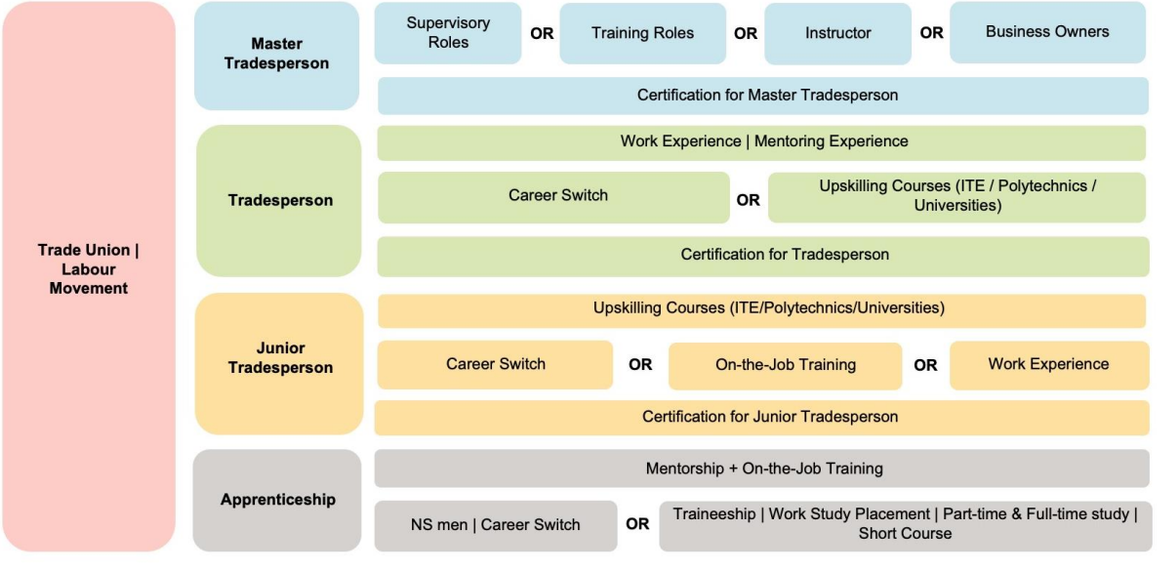


Figure 1. Proposed Career Progression Model

21. Negative perceptions of the skilled trades industry are very apparent, hence there will be a need to erase misconceptions and better inform locals about career opportunities by introducing this industry to secondary school students to showcase the work and progression possibilities.

22. Entry points for the skilled trades could be expanded to include national servicemen in vocations utilising relevant skill sets (e.g. logistics or maintenance), allowing them to join as pre-apprentices in the skilled trades, and the Labour Movement can advocate for future career opportunities for national servicemen as well.

23. The creation of a tripartite-led platform for specialists from both the green sector and skilled trades to work collaboratively and create new career opportunities to attract more youths into the green economy.

24. In a Fourth Industrial Revolution (4IR) economy that requires workers in both technical and non-technical vocations to remain adaptable, the proposed model encourages workers to exercise autonomy in their learning while being supported by a network of mentors and employers. To establish a conducive work environment where apprentices can access a reliable network of learning and career counselling advice, we propose a tripartite-led approach towards establishing a defined mentorship system.

25. In contrast to the Progressive Wage Model (PWM), career progression in the skilled trades requires a longer and more specialised qualification and vocational training pathway that covers education to career progression opportunities.

26. Involvement of tripartite partners to help identify and match interested students with prospective companies to kickstart apprenticeships and increase chances of working in the skilled trades industry like the Australian GTOs.

27. Tripartite partners can consider tracking registered tradesmen and classifying them based on their skill sets, experience, and qualifications according to the proposed CPM for a smoother transition following implementation.

Additional Suggestions for Consideration for Tripartite Partners

28. **Formation of a tripartite innovation lab for the skilled trades.** The lab could expand upon research conducted on the CPM, defining and refining specific problem statements, conducting solution workshops, launching intervention pilot/sandbox projects, and establishing programme monitoring and evaluation protocols to measure the impact of implemented interventions and policies.

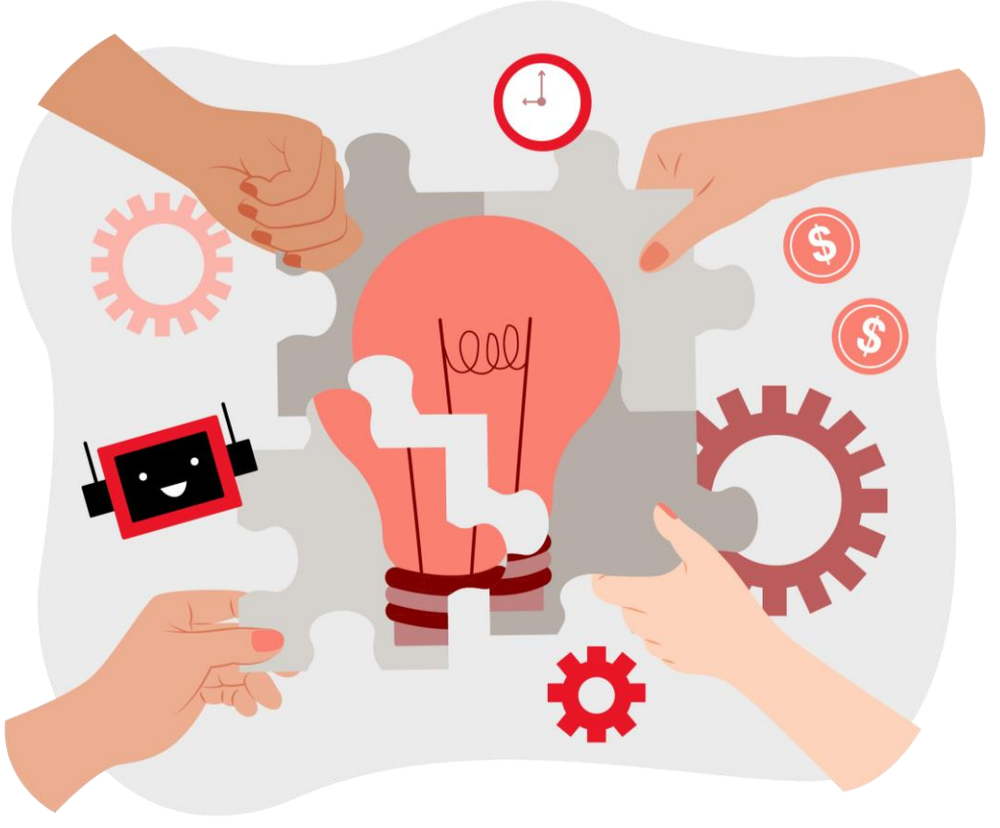
29. **Leveraging the Labour Movement's Training and Placement ecosystem as the "Group Training Organisation" for skilled trades.** With the necessary funding support from the government, the Labour Movement is best positioned to provide relevant training and skill development programmes, curate apprenticeships and work placements, and match tradesmen to available jobs.

30. **Creation of a skilled trades scholarship for youth.** The creation of a skilled trades scholarship could significantly encourage young entrants to the skilled trades industry. A requirement could be instituted for recipients to commit to serving a bond in their chosen trade for a specific period, such as 2 to 4 years or until they achieve the Junior Tradesperson level.

31. **Development of a skilled trade price framework starting with the 3 identified essential trades.** In collaboration with the relevant partners, the tripartite partners could consider developing a skilled trade price framework to formulate an itemised and standardised price guide tied to a Case Trust Mechanism for household jobs, which would increase transparency in service pricing for both tradesmen and consumers.

32. **Creation of a one-stop Skilled Trades Portal for new entrants to practising tradespeople.** A one-stop Skilled Trades Portal could be established to serve as a comprehensive resource, catering to everyone from newcomers to experienced tradespeople. As the Portal evolves, it could transition to a pay-per-use model, facilitating job placement and matching services to streamline connections between trained individuals and available trade positions.

33. **Partnering with social media news channels to showcase real-life stories of skilled trades people**. Showcase “a day in the life of a tradesmen” videos and write-ups to highlight the benefits of a career in the skilled trades and shift public perceptions of skilled trades away from “dirty, dangerous, and demeaning” jobs.



Chapter 1: Introduction

The Skilled Trades in Singapore

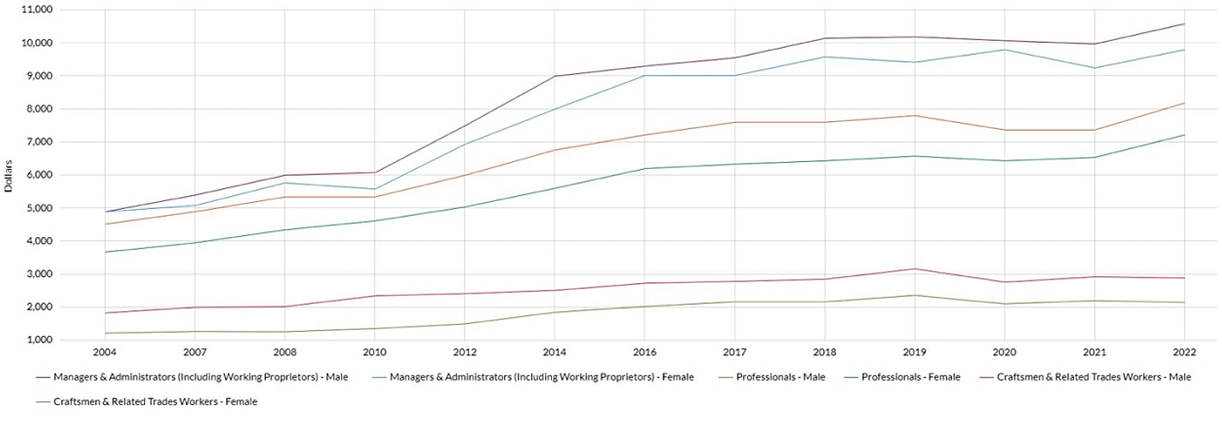
The widening wage gap between graduates from the Institutes of Technical Education (ITEs) and universities has been a concerning trend for the skilled trades industries and policy makers, where the median starting salary for university graduates is almost double that of an ITE graduate (Zalizan, 2022). In 2022, the average salary of trade workers was $2,600, a wage level that remains close to the Workfare Income Supplement (WIS) threshold for lower-wage workers (Yeo, 2023). The long-term objective of establishing a strong local core of skilled tradespersons has been onerous. A significant factor could be attributed to the persistent stigmatisation of the industry as being “dirty, dangerous and demeaning” (O’Reilly-Briggs, 2011). Moreover, Singapore also faces increasing demographic pressures because of its persistent low fertility rate and an ageing population and this is threatening the viability and survival of industries like the skilled trades industries, where there has been a greater reliance on manual labour (Yeo, 2023). According to the Singapore Labour Force Survey 2022 (Manpower Research and Statistics Department [MRSD], 2023), more than 50% of the tradespersons are aged older than 50. Additionally, there was a 40% to 50% decrease in the labour participation rates of locals (Hidaya, 2023).

The National Trades Union Congress (NTUC) has indicated its intentions to build a strong local core of tradespersons, attract local apprentices, and protect skilled trades from becoming irrelevant, and it has identified the need to create well-defined career progression pathways for the skilled trades (Ang, 2023). Emphasising the need for more defined career pathways, Deputy Prime Minister (DPM) Lawrence Wong indicated at the 2023 May Day Rally that “the Government aims to make skills training and lifelong learning a key pillar of its refreshed compact with workers—paying special attention to those in vocational and technical roles, such as ITE and polytechnic graduates, to help them deepen their skills through different pathways, so they can secure better salaries and career paths in the professions they have trained in and have the aptitude for”. He added that having a collaborative tripartite in Singapore will become one of the country’s most sustainable and competitive advantages to help improve the lives of workers while promoting economic growth for all Singaporeans, ensuring social cohesion and stability (Hanhonn, 2023).

More recently in May 2023, the Singapore Plumbing Society (SPS) in partnership with the Public Utilities Board (PUB) launched the Tender/Job Portal, the first platform by an industry body of a skilled trade. This platform will allow the public to have easy access to the services of SPS members, while ensuring accessibility to their members as well (Tay, 2023). It will potentially increase work opportunities at comparative pricing while simultaneously encouraging plumbers to continuously upskill themselves to remain in the industry. In addition, as part of the Every Worker Matters Conversations (EWMC)

engagement NTUC conducted, survey results in March 2023 showed that around 50% of the respondents, aged between 17 to 25 years old, indicated an interest in the skilled trades industry, and of those, 37% of the youths expected a starting salary of at least $4,500. However, according to the Department of Statistics (DOS) shown in Figure 2, craftsmen and related trade workers currently have an average income of $2,500, which might make it difficult to raise the income to the expected salary of $4,500. Additionally, the graduate survey done by ITE indicated that their fresh graduates were earning an average income of $1,800, and $2,200 if they had completed their National Service (NS) (Institute of Technical Education [ITE], 2022). The youths interviewed also recognise the need to better acknowledge and reward workers who do hands-on work, especially those that are essential for everyday life and safety. They also hoped to see that self-employed workers were protected against an unbalanced power relationship as well.[1]

Figure 2 shows the income differences between some of the more popular industries, while Figure 3 presents the current income for craftsmen against occupations such as cleaners and landscape maintenance workers as identified in the Progressive Wage Model (PWM) to uplift the workers in certain occupations (Ministry of Manpower [MOM], 2023).



Footnote: 1. Data are from Comprehensive Labour Force Survey. 2. Residents refer to Singapore Citizens and Permanent Residents. 3. Data exclude Full-Time National Servicemen. 4. Before 2009, full-time employment refers to employment where the normal hours of work is 30 hours or more in a week. From 2009 onwards, full-time employment refers to employment where the normal hours of work is 35 hours or more in a week. 5. Data are classified based on Singapore Standard Occupation Classification (SSOC) 2020. Data for past years which were coded based on earlier versions of the SSOC were mapped to SSOC 2020 as far as possible to facilitate data comparability. Data are not available for 2006 as the level of occupational detail collected in 2006 did not support mapping. 6. Gross Monthly Income From Work refers to income earned from employment. For employees, it refers to the gross monthly wages or salaries before deduction of employee CPF contribution and personal income tax. It comprises basic wages, overtime pay, commissions, tips, other allowance and one-twelfth of annual bonuses. For self-employed persons, gross monthly income refers to the average monthly profits from their business, trade or profession (i.e. total receipts less business expenses incurred) before deduction of income tax. 7. As data are captured from a sample survey, year-on-year income changes are prone to fluctuations and hence should always be interpreted with caution. Income growth studied over longer periods (e.g. 5 to 10 years) smooths out these fluctuations and hence provides a more direct indication of income growth. 8. Data for 2005 are not available as the Comprehensive Labour Force Survey was not conducted due to the conduct of the General Household Survey 2005 by the Singapore Department of Statistics. 9. June 2007 data have been adjusted based on latest revised population estimates from DOS to facilitate comparisons with June 2008 onwards.

Figure 2. Trend of Median Income by Occupation and Gender (DOS, 2023)

Regardless of gender, both the Plant & Machine Operators & Assemblers and the Cleaners, Labourers & Related Workers industries, saw an increase in their incomes. While there is a difference in incomes between genders in both industries, only females working in Craftsmen & Related Trades Workers saw a significantly lower amount of income as compared to their male counterparts. This further highlights a need to pay more attention to how much females are earning when pursuing a career in the skilled trades industry, to address this issue and therefore attract more youths into skilled trades.

1 Every Worker Matters Conversations Engagement Skilled Trades Survey from 2,500 youths aged between 17–25 years old.

These gaps can be bridged because gender stereotypes disappear when females in typically male-dominated occupations demonstrate that they are just as capable as their male counterparts. Hidaya (2023) noted that there were positive reactions from clients after certification for a female plumber, which allowed for increased credibility and increased involvement in larger projects thereafter.

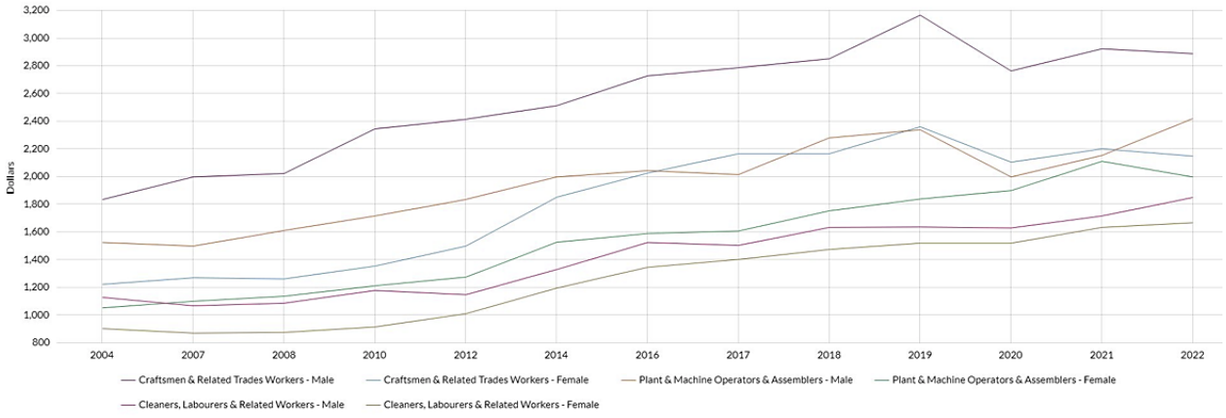


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Figure 3: Trend of Median Income for Craftsmen and Identified PWM Workers (DOS, 2023)

Classification of Occupations in Singapore

The Singapore Standard Occupational Classification (SSOC) is the national standard for occupation classification developed by the Singapore Department of Statistics and used in the compilation, presentation, and analysis of a wide range of statistics, including demographic, social and labour statistics (Department of Statistics [DOS], 2020). The classification is based on two concepts of job and skill, where it broadly classifies occupations by skill level and skill specialisation, where the former separates the nature of work as a function of complexity and range of tasks and duties involved, while the latter is defined by the required field of knowledge, materials, tools, and machinery involved, as well as the type of goods and services produced. The skill specialisation classification within each major group is separated into smaller units of sub-major groups, minor groups, unit groups, followed by occupation, as indicated in Table 1.

SSOC broadly classifies occupations into four different levels based on the nature of work performed for each of the major groups, where at skill level 1, occupations tend to involve simple and routine manual tasks requiring physical strength and endurance. Operationally, occupations at this level require primary or no education. Second, occupations at skill level 2 typically involve machinery operation, usage and maintenance of electrical and mechanical equipment, as well as information storage. Operationally, occupations at this level will require secondary or post-secondary education. Third, occupations at skill level 3 typically involve the performance of complex tasks that require

advanced factual, technical, and procedural knowledge in specific fields. Operationally, occupations at this level require tertiary education leading to an award not equivalent to a university degree or above. Lastly, occupations at skill level 4 typically involve the performance of tasks requiring complex problem-solving, decision-making, and creativity based on the ample amount of theoretical and factual knowledge in a specialised field. Operationally, occupations at this level require tertiary education leading to a university postgraduate degree or diploma. SSOC's use of education to separate between the different skill levels does not imply that the skills necessary for the specific jobs can only be gained via formal education, rather, skills are attained through the accumulation of education, training, and experience. The segregation between skill levels is not meant to compare skill sets between workers of different occupations but rather, it is meant to present the skills necessary to carry out the required tasks and duties of the occupation in a more comprehensible manner. Under the major classification of craftsmen and related trades workers, skilled tradespersons like electricians, plumbers and air-conditioning technicians fall under this category at skill level 2. These tradespersons need to be relatively literate and perform simple arithmetic calculations. They should also possess high levels of manual dexterity and make written records of their work.

Therefore, based on the classification by the SSOC, a tradesperson is someone who possesses the appropriate qualifications and knowledge relevant to skill level 2.

	Classification Level	Classification Title	Classification Code
Skill Level 2	Major Group	Craftsmen and Related Trades Workers	7
	Sub-major Group	Building and Related Trades Workers, Excluding Electricians	71
	Minor Group	Building Finishers and Related Trades Workers	712
	Unit Group	Plumbers, Pipe Fitters and Related Workers	7126
	Occupation	Plumber Pipe Fitter	71261 71262

Table 1. SSOC classification for Craftsmen and Related Trades Workers (DOS, 2020)

Current Workforce Trends

The 2022 Labour Force report (MRSD, 2023) found that more than half of the lower-waged workers were aged 50 and above, with many holding secondary or lower qualifications. The report also showed the general employment trend for all types of occupations locally, where the number of employees working in the Production & Transport Operators, Cleaners & Labourers (PTOCLs) sector has been decreasing over the years. Because the SSOC classification of craftsmen and related trade workers is categorised under the PTOCLs category, this indicated a shrinking workforce in the skilled trades vis-a-vis the Professionals, Managers, Executives & Technicians (PMETs). Figure 4 shows the trends across the different industries, where craftsmen and related trade workers are shown to be decreasing, as opposed to the increasing number of employees working under the classification of managers and administrators, and associate professionals and technician industries.

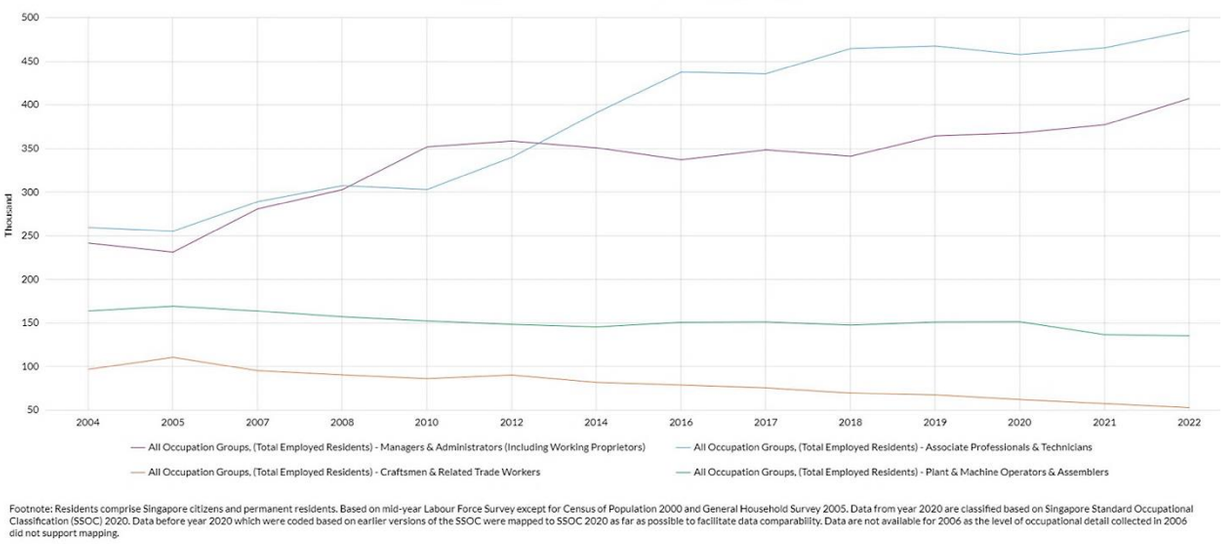

Figure 4. Trend of Employed Residents by Occupation (DOS, 2023)

Data from the Labour Force report in 2022 (MRSD, 2023) also showed that there was a shrinking workforce in the craftsmen and related trade workers classification across all ages (categorised as part of the PTOCLs), as shown in Figure 4, the number of workers employed as craftsmen and related trades were decreasing. Upon segregation by age (Figure 5), there was an exception in the increasing employment of craftsmen and related trade workers among those aged 60 and older (DOS, 2023). While Figure 5 shows a slight decrease in the number of workers aged between 20 to 29, there is a sharp decrease in workers aged between 30 to 59. With the share of seniors over the age of 55 increasing from 2012 (19%) to 2022 (27%), alongside an increase in labour force participation (from 46% to 51%) during this period (MRSD, 2023), this increasing trend for workers aged 60 and above might be attributed to the ageing population instead.

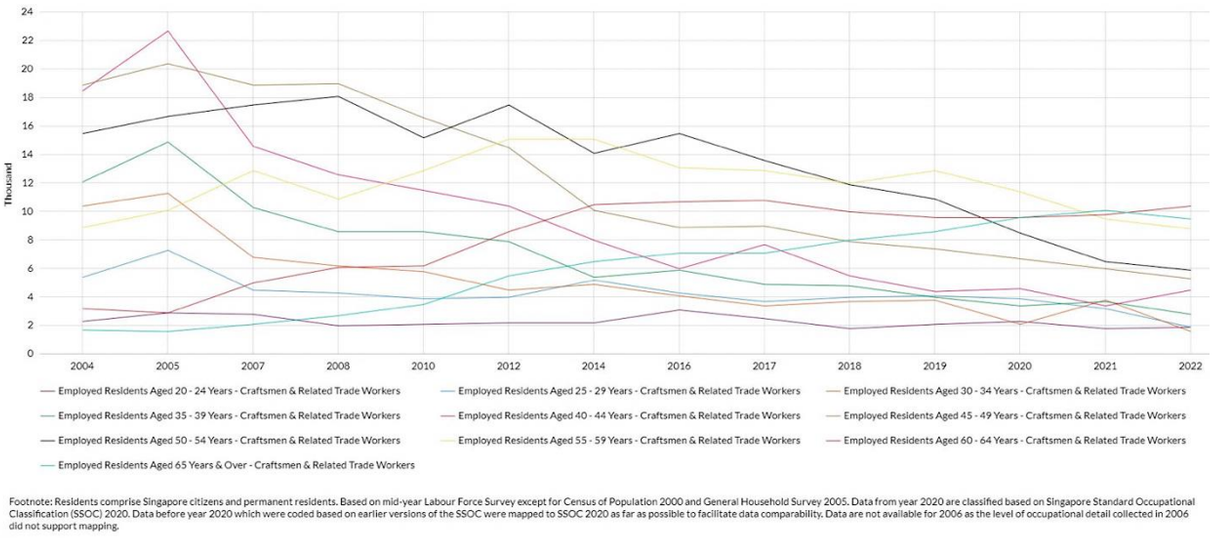

Figure 5. Employed Residents in Crafts and Related Trade Work by Age (DOS, 2023)

Trade Work and Tradesperson

The Canadian Council of Directors of Apprenticeship (CCDA, 2007) defined the skilled trades as occupations that typically include complex activities, where technical skills and ample knowledge about a specific trade are essential (as mentioned in Pyper, 2008). In addition, highly skilled trades such as carpenters and electricians require specialised education and training, whereas low-skilled trades generally require little or no training and instruction (Vereen, 2013; as mentioned in Albattah et al., 2017). Therefore, any skilled manual worker who utilises their specialised knowledge and dexterity (O'Reilly-Briggs, 2011) to hone their skills through years of practice and understanding (Chan, 2013), is a tradesperson. Webster and Jarvis (2003) stated that relevant skills in each trade could be attained via three pathways: 1) formal training—to learn practical skills and ad-hoc supplementation, 2) education—to gain theoretical knowledge of the industry and required analytical skills, and 3) career experience—to learn on the job by practice. Therefore, to provide individuals with a lifelong career in these trades, there is a need to ensure that career and mentorship pathways go hand in hand with adequate training and education.

Reasons for Professionalising the Trade Industry

To ensure that current tradespeople and new entrants can find a sustainable career in the skilled trades industry, there is room to improve the career pathways for them in Singapore. With the current landscape for the identified essential trade workers having a basic skeletal pathway that can be attained from ITEs or Institutes of Higher Learning (IHLs) and sufficient working experience, it will allow them to progress in the industry.

First, a holistic development pathway is recommended for the trades that not only include apprentices but also more experienced tradespersons. For this to be useful, the insights gleaned from workers' behaviours and mindsets are important factors to consider when developing such a pathway as it highlights which areas can be targeted to attract more workers into the industry. Pillay et al. (2010) found that blue-collared workers reported having fewer opportunities for transition into less physically demanding jobs after retirement, as well as the lack of recognition and formal education, thus making it unattractive for workers to carry on in trades (O'Reilly-Briggs, 2010). In another study, Ochiba et al. (2022) found that trade work could be attractive to the younger generation by having an attractive remuneration package, opportunities for career progression, and a conducive work environment for the skilled trades industry.

Second, the younger generation is less likely to choose to become a tradesperson for reasons like the negative perceptions that accompany trade workers (Pearce, 2019), the undesirable working environment, the low participation rates of females, or the lack of adequate training and education. Reportedly, the trade industry was seen to have fewer career advancement opportunities and was considered a low-status job with unattractive pay, further driving youths to look at alternative career options. Ochiba et al. (2022) proposed that there is a need for increased career advancement opportunities before the younger generation will seriously consider a career in the skilled trades. Similarly, Yrjanainen (2008) found that with higher educational qualifications, workers were also more likely to find jobs that did not entail physical and manual labour (as mentioned in Pillay et al., 2010). Therefore, to attract more youths to join as tradespeople, it is necessary to provide an attractive remuneration package, and a clearly defined career progression pathway, as well as to build a conducive work environment (Clarke & Herrmann, 2007; Webster & Jarvis, 2003). Beyond targeting the youth, the retention of older tradespersons presents another viable strategy, especially considering that their accumulated knowledge and work experience are highly valued in the skilled trades (International Labour Organisation [ILO], 2017). The proposed CPM must be inclusive and acknowledge the value of the experienced tradesperson who is likely a mature worker capable of contributing to the advancement of the trades by having clear mentorship pathways.

Finally, concerns regarding the widening wage gap in a knowledge economy have been long-standing. Indeed, DPM Lawrence Wong has brought up the fact that Singapore has placed too much emphasis on intellectual "head" work, while undervaluing "hands-on"

technical jobs or “heart” work in service and community care (Khanna, 2022; Zalizan, 2022), fuelling the continued overreliance on foreign labour sources causing unsustainable and detrimental harm for the local skilled trades industries. With the Singapore economy placing a larger priority on jobs requiring cognitive abilities, workers in these roles earn considerably more than those in the technical hands-on work, as well as jobs in services and community care. DPM Lawrence Wong stated that there was a need to respect workers in careers using both their hands and hearts, and to provide them with equal status as others on other career paths, deviating from the emphasis on a person’s academics (Khanna, 2022). This was also reiterated by DPM Lawrence Wong during his speech in Parliament where the government was making changes to the education system by changing the PSLE grading system, as well as the segregation of streams in secondary schools. While he notes that the change will not be immediate, since the importance of grades and qualifications have been so deeply ingrained into every Singaporean, DPM Lawrence Wong hopes that in doing so, the mindsets will slowly shift away from that, and instead focus on continuous learning and upskilling throughout their working careers (Prime Minister’s Office [PMO], 2023) since the skilled trades remain valuable components of Singapore’s economic progress (Choo, 2020). For example, a sustainable core of well-trained workers is needed to ensure a steady supply of clean water, waste disposal services or running electricity in Singapore (Ooi, 2023). Without a well-defined pathway and career progression, workers remain unaware about their career choices and, more crucially, the necessary steps required for their career progression. In turn, this uncertainty towards future job insecurity and viable career progression opportunities in the skilled trades would further disincentivise locals from considering a career in the skilled trades.

Chapter 2: Salient Features of Different Professionalisation Frameworks

This section discusses three aspects that are pertinent to the development of a career progression model (CPM) for the skilled trades industry. First, it provides a broad understanding of the fundamental principles which underpin CPMs in the skilled trade industries through country examples. It throws the spotlight on the need to establish reliable Public-Private Partnerships (PPPs) as a cornerstone when developing the CPM. It will also present approaches that enhance the apprenticeship journey after graduation from the more foundational phases of vocational education and training which are found in some of the country examples. Lastly, it outlines how a recognised qualifications framework may help secure sustainable wage growth.

In the process, it hopes to demonstrate how these aspects can offer a working CPM for the skilled trades that will: 1) secure a pipeline of vocationally trained apprentices; 2) maximise the potential for new career tradespersons through a holistic apprenticeship pathway; and 3) ensure the competitiveness of local tradespersons with relevant qualifications frameworks and skill upgrading opportunities.

Fundamental Principles in Professionalising the Skilled Trades Industries

Mostly implemented to address shortages in skilled labour, this is a strategy that has proven promising results across a diverse range of economies. The prevalence of PPPs in vocational education, training and career progression strategies lies in its effectiveness as a blend of both “administrative and market-based regulation tools” accommodating the features of both “market and centrally controlled” economies (Vertakova & Plotnikov, 2014). Thus, economies with strong PPPs could rely on the synergy between public and private capital in managing collective skills formation systems. Concomitantly, effective PPPs could result in more “effective resource mobilisation and improvement of educational quality” and thus, serve to close the specific skill gaps in labour markets (Amornvuthivorn, 2016). Thus, PPPs can be applied to professionalise the skilled trades. Most pertinently, a fundamental step in developing CPMs is to establish strong institution-industry collaboration to secure a reliable talent pipeline, which would then provide greater opportunities for career progression in the skilled trades industries.

Indeed, a strong core of vocationally trained graduates remains a key feature in economies which demonstrated success in developing CPMs for the skilled trades industries. With skill-based education and training paradigms undergoing constant changes, having reliable PPPs could help ensure that the skilled trades industries remain relevant and equipped with the necessary resources in their professionalisation strategies.

Applying Public-Private Partnerships (PPP) Mechanisms to Address the Supply of Apprentices

Amornvuthivorn's (2016) analysis of different PPP strategies in Singapore and the United States suggests that, in the context of career progression pathways, PPP strategies could be institutionalised for Singapore's "highly centralised government" as well as a more "decentralised government system" in the United States. Amornvuthivorn also identified that in terms of programme design, Singapore's ITE presented strong connections with the private sector; for example, Centres of Excellence, traineeships, industry-approved training centres, certified "On-The-Job" training centres, industry project opportunities, career service centres and training grant funding. Like Amornvuthivorn, Tucker (2012) found that the Vocational Education and Training (VET) system encourages up-to-date training that emulates real-world challenges by engaging the industries as a close partner, combining both an apprenticeship and a school-based system. Students are required to work occasionally in firms, and teachers must be working in the same field as their subject material to foster a close linkage between the VET system and the industry (as mentioned in Oviawe, 2018).

On the other hand, the United States has adopted a "less systematic" approach, with the launch of its Career Academy (CA) model. The CAs were first created to support the "vocational preparation" of prospective students in the skilled trades but have since evolved to also prepare students for college education. The CAs are also heavily supported by strong PPPs, in terms of both attaining funding and employment opportunities. However, unlike Singapore's ITE system, the CAs rely on a comparatively more diverse and decentralised network of private and community partners, with funding of programmes provided by "local school districts, local employers and business groups". Having a more decentralised strategy and one that is not as centrally administered as Singapore's vocational education model, provides local actors i.e., local school districts, with greater influence in implementing workforce development programmes (Amornvuthivorn, 2016).

The prevalence of PPPs in both more centralised and decentralised types of political economies is fundamental towards developing strategies for CPMs, especially when establishing a pipeline of well-trained and qualified apprentice tradesperson. The case study presented next illustrates that the success and sustainability CPMs depend on the extent of government intervention in national apprenticeship systems.

Country Study: The Dual System Model

One practical example of how PPP is salient in the VET of the skilled trades is the "dual system of vocational training and education". Originating in Germany and mostly employed in European countries, the dual system model equips early-career apprentices through both "school-based" and "workplace-based" vocational skills training via

cooperation between small and medium-sized companies and public vocational schools which is regulated by law. The dual training system involves employers voluntarily and employers view this as an investment for their future workforce by training them according to their business needs (ILO, 2017). According to Remington (2018), the German model is “highly regulated under federal law”. Federal regulations stipulate that the bulk of time in VET, up to 70%, should be “devoted to practical on-job training”. Thirty percent of the remaining time would be dedicated to classroom education in schools. Although the dual system model has been more prevalently used to address the supply needs of a broad range of skilled trade professions (primarily the “higher-skilled” trades), it offers useful lessons for the “low-skilled” trades. For example, in Germany, the dual system is highly subscribed, with close to half of all general education school graduates entering this channel. With apprenticeship pathways for over 330 occupations, the dual system model is a fundamental pillar in securing the labour supply of qualified skilled workers (Federal Institute for Vocational Education and Training [BIBB], 2016).

The dual system model in Germany is regulated by both the Federal and State governments, where the State, or Länder, is responsible for schools and higher education, while the Federal government regulates the VET system. All training regulations need to be nationally recognised after development and endorsement at the federal level, while curricula for part-time vocational schools are developed and endorsed by public officials from the Länder (Organisation for Economic Co-operation and Development [OECD], 2022; ILO, 2017). Additionally, social partners and employers may propose changes to the regulations or introduce new training, allowing local stakeholders to assert some influence in the development of vocational training curricula.

Lastly, chambers play an important intermediary role in the German VET system assisting in monitoring, consulting and controlling institutions. They provide guidance to participating companies to assess the suitability of the company and its instructors (Hellwig, 2006). Chambers are trade unions (ILO, 2017), and they are also responsible for conducting nationally standardised examinations to ensure the recognition of apprentices’ qualifications. There are inter-company training centres established in Germany which help small and highly specialised companies to engage in apprenticeships when the company is unable to cover all aspects of the training. Regulated and funded by the Federal Ministry of Economic Affairs and Energy, these training centres are nonetheless owned by the chambers (BMWI, 2022 as mentioned in OECD, 2022).

The dual model system allows students to learn vocational skills from a wide range of fields. There are also pre-apprenticeship programmes, or basic vocational training, offered to those unable to find suitable apprenticeships. Apart from having on-the-job training and career pathways, education also plays a crucial role in the dual system model. In this aspect, Germany follows the International Standard Classification of Education (ISCED), an international classification reference for organising education programmes and related qualifications by levels and fields, with nine education levels

ranging from 0 to 8, starting from early childhood education to a doctoral or equivalent level (Eurostat, 2023). Most commonly, enrolled apprentices are at ISCED level 3, and any upper secondary graduates seeking occupational training or VET graduates looking for a career change will apply for “second cycle” programmes which are at ISCED level 4. Working graduates who wish to upskill can enrol into higher vocational preparatory courses which upon completion of the level 5 examination allows them to hold the title of a certified occupational specialist for example. Alternatively, VET graduates may take up courses offered by trade and technical schools (ISCED level 6), take up professionally orientated tertiary education (ISCED levels 5 to 7), or pursue a bridging course to enter the academic tertiary education sector in universities (OECD, 2022).

There are several vocational institutions for apprentices to kickstart their career as a tradesperson, or for further training and upskilling, such as vocational schools (*Berufsschulen*), specialised vocational schools (*Berufsfachschulen*), trade and technical schools (*Fachschulen*), health sector schools (*Schulen des Gesundheitswesens*) and vocational grammar schools or gymnasiums (*Fachgymnasien*). The most common institute is the vocational school, which provides off-the-job training in apprenticeship programmes, followed by specialised vocational schools and health sector schools that focus on specialised school-based VET programmes. There are also independent private schools that provide preparatory courses for master craftsmen examinations (OECD, 2022).

With the dual system model, German students would learn necessary skills and vocational knowledge in the skilled trades industry, while concurrently receiving an internationally accredited education. Thus, a significant advantage of the dual system model is that students become more employable due to their exposure to both on-the-job training, as well as a rigorous and recognised education pathway.

Local secondary schools also incorporate skill assessment within career guidance two years before the final year of education, with emphasis on both hard and soft skills related to required skills in potential career paths to assist guidance in students pursuing either vocational or general education. By incorporating career guidance into the secondary school system, students can receive comprehensive and relevant information when making their decisions for the future (OECD, 2014a as mentioned in ILO, 2017).

In the German dual system, apprentices are also able to complete their work-based training through intensive blocs if they wish to do so, enabling apprentices to cater to various considerations such as combining apprenticeships with work or other educational opportunities. Such flexibility would also encourage mature-aged workers or females to pursue modules and curricula that suit local skill needs and expand their skill sets at their own time (ILO, 2017).

Employment Intermediaries

The establishment of intermediaries, such as industry organisations, employer groups, trade unions, and chambers of commerce could help employers in navigating the apprenticeship system by mobilising businesses, seeking appropriate training places, and negotiating with governments to improve employer engagement in apprenticeships. These intermediaries will require extensive knowledge of both the training system and local knowledge to communicate national schemes into practice and provide advice where required.

Germany also has a programme to improve the placement of trainees in enterprises (PV) by ensuring that SMEs can access to talents for dual vocational training by working together with local SMEs. PV agencies will determine skill needs and recruit apprentices from local technical education schools and recruitment events. They also provide counselling, possible workplace-related training and placement assistance for trainees and apprentices. According to the International Labour Organisation (ILO, 2017), it was found that both SMEs and apprentices held the usefulness and efficacy of PV agencies in high regard in connecting the appropriate apprentices to the different SMEs.

In addition to PV agencies, Germany also has other initiatives such as NordChance and VerA to help improve employment services. NordChance is a model developed by the employer's association, Nordmetall, that encourages individuals interested in a metal or electronics job, who were unable to find vocational training opportunities within the placement period, to enrol into NordChance to be trained and prepared by an educational training institution for five months before being placed in a firm. Similarly, VerA was developed by the Senior Experten Service (SES) foundation in cooperation with umbrella organisations to provide expert opinions to the younger generation. Volunteers are retired professionals who act as training companions offering their support on various issues like exam preparation, technical advice, as well as personal aspects like motivation and self-confidence (Les, 2013 as mentioned in ILO, 2017).

To gain insight into how socio-cultural factors have influenced the development of VET in Germany, the team has analysed using Hofstede's cultural dimensions. Germany's relatively high scores in individualism and uncertainty avoidance, when compared to Singapore, suggested characteristics such as loyalty to the company, a strong sense of duty and responsibility, and a heavy reliance on expertise training (Hofstede-Insights, 2023). These cultural attributes have played a crucial role in establishing Germany's reputation as an industrial and manufacturing nation, with a deep-rooted commitment to refining expertise and maintaining high standards in skilled trades. These cultural attributes may contribute to the development of a CPM through the high retention rate of apprentices in the dual system model. For example, the German Federal Statistical Office reported that in 2015, close to half (43.8%) of trainees remained in the same occupational field after graduating from vocational education programmes.

Due to established partnerships between employers and vocational institutions, up to 66% of trainees were employed after graduation. One reason for such strong partnerships and buy-in by employers and trainees could be attributed to the high marginal returns on employers' financial investment in apprenticeships. For example, the Federal Statistical Office estimates that in 2015, such returns in terms of worker output were as high as 76% and this could incentivise greater investments and sustained participation of employers (BIBB, 2016). Thus, a virtuous cycle is established: the prospect of employment and the creation of quality vocations create a dependable supply of trainees to meet the demands of employers in the skilled trades.

Developing Skilled and Motivated Workers: The Role of Apprenticeships

Considering that there are multiple elements to consider in the design of apprenticeship pathways for a skilled tradesperson, it is also useful to examine relevant literature pertaining to apprenticeships and continuous education programmes for skilled tradespersons. This section has identified that supportive workplace relationships could be fostered through conducive learning environments as illustrated by Australia's Group Training Organisations (GTOs) model.

Workplace Relationships and Learning Environments

Increasingly, research which looks at the determinants of successful apprenticeship models has emphasised the importance of building conducive workplace relationships and work environments. Workplace relationships play a fundamental role in improving employer-apprentice relationships. Through a comparison of the inherent differences between "off-job" and "on-job" training, Harris et al. (2003) looked at how different learning objectives and training environments played a role in developing a "competent tradesperson". Their research found that competency was "heavily dependent" on the adaptability of apprentices in "integrating and synthesising" a diverse array of vocational knowledge taught by vocational trainers, at various points in an apprenticeship. Practically, this means that it is important for apprenticeship programmes to focus on developing a core of skilled tradesperson that remains adaptable in learning, as well as acquiring an array of both technical knowledge and soft skills. According to the Future of Jobs Report (World Economic Forum [WEF], 2023), "self-efficacy" skills such as being adaptable and resilient have presented themselves as core skill sets, that employers most value today. In fact, soft skills are equally as important as more technical skill sets in the Fourth Industrial Revolution (4IR).

Attracting Women Into Skilled Trades

The number of males and females is skewed towards the former in the skilled trades industry. Bastalich et al. (2007) found that the emphasis on altering the engineering culture to attract and retain more women shows that engineering is dominated by its masculine cultural style and has practices hostile to women, whereby barriers exist in preventing women entry to and succeeding in the skilled trades industry. Some of the reasons include a lack of understanding about women's ability to succeed in modern times, the failure of professional associations to take responsibility for the problem, a dissonance between the masculine image and the feminine image that women uptake, the lack of female role models, as well as the hostility and perceptions males hold regarding women being unable to do the work they do.

Zhang et al. (2021) also found no increase in the number of female professionals in the construction sector despite the higher percentage of females completing built environment courses in higher education (Ling & Leow, 2008). With the various barriers women face at each career stage, such as the industry's poor image, gendered recruitment practices and procedures, non-transparent promotion system, and the masculine characterisation of the industry, it comes as no surprise that women's participation in the sector is limited. Clarke and Herrmann (2007) found that more can be done to encourage ethnic minorities and females to join by collaborating with schools and allowing them to experience trade work. They also found that the normal channels where tradespeople found work might inevitably cause females to be questioned about applying for manual work.

Similarly, Zhang et al. (2021) found that a women's experience early in their career will significantly influence their subsequent professional pathway. Promotions are another viable option for companies to build up manpower internally. Allowing the promotion of females could help attract and encourage others to join as well. Another study has also found that women in the industry were keen to continue if there were some changes such as flexible working arrangements, childcare practices, or advance notice periods for overtime to be implemented, allowing women to have a work-life balance. The researchers also found that promoting more women in management can allow increased chances of making changes to better attract and suit (Ling & Leow, 2008).

In Webster et al.'s (2001) research, they found that tradespeople in Australia reported having an average level of satisfaction, while those possessing post-school qualifications excluding trade qualifications were associated with higher non-monetary satisfaction. Those with trade qualifications had fewer job opportunities which might cause qualified tradespeople to instead take up non-trade jobs at a lower pay. Researchers also found that qualified tradespeople were leaving their jobs due to a desire for change, seeking a better financially rewarding occupation, and dissatisfaction in skilled trades, with little chance of returning. Tradespeople stated that some of their reasons for returning would be when there was no other work available, or if there were better career prospects.

Additionally, tradespeople believed that promotion would be unlikely despite having undergone training, causing most to feel that any further training was unnecessary.

However, Dainty et al. (2000) noticed that while women were attracted to the skilled work industry, they might not have a realistic understanding of the culture, as well as the associated difficulties of working in a male-dominated career. As such, the women were more likely to be unable to come to terms with the male-dominated aggression and conflict or achieve an appropriate work-life balance (Menches & Abraham, 2007 as mentioned in Zhang et al., 2021). Women were assumed to be unable to handle physically demanding work and harsh work conditions, invariably causing women to prove their worth (Ling & Leow, 2008). Therefore, there is a need to raise awareness of the social and economic benefits of pursuing careers in trades, enhance the visibility of trade pathways for women, and foster the presence of female trade ambassadors by working with the Labour Movement to increase advocacy efforts to encourage more women to enter the skilled trades (NSW Education, 2023).

Skills Beyond Technical Competency

One long-term strategy to facilitate holistic skills development is to inculcate a mindset for continuous learning and skills training in a skilled tradesperson, preferably facilitated with support from a network of supportive apprentices. In his research, Pearce (2019) pointed out that apprentices would maximise their potential in their transition towards becoming skilled tradespersons if an emphasis is placed on developing self-directed and motivated apprentices. Beyond the accumulation of vocational skills to achieve “minimum occupational standards,” apprentices would be well-poised to thrive in the 4IR economy if they have developed “greater autonomy and responsibility” as well as an “enhanced capacity for reflection” in their apprenticeship journey.

To this end, Pearce found that the best learning environment to achieve self-directed learning is one where both “professional and personal relationships” are present between “self-directed learners, employers and vocational teachers”. In such environments, apprentices will benefit from a supportive network where they are given “the opportunity to learn” and “make decisions,” which motivates even greater self-directed learning and on-the-job confidence. Pearce’s research focused on apprenticeship training in the Australian construction industry. Most apprentices in the Australian Building and Construction industry are recruited by Group Training Organisations (GTOs), a useful case study, with features that could be adapted to Singapore’s CPM.

Country Study: Australia

Australia introduced competency-based training to meet demand in vocational training by implementing the National Skills Framework (NSF) that ensures the quality and consistency of VET training, provision of national qualification across educational institutes, as well as establishing recognisable standards to assess skills across sectors.

As part of the development of skilled tradespeople, apprentices go through both on-the-job and off-the-job training, during which apprentices can either be contracted directly by employers, or by GTOs to be exposed to multiple worksites (ILO, 2017; OECD, 2010 as mentioned in OECD, 2018).

GTOs are composed of private and non-profit companies, primarily funded by host employers, with a secondary source of funding coming from government grants. There are two types of GTOs—specialist (occupation/industry specific) and generalist (non-occupation/industry specific). GTOs form an integral pillar in the management of apprentice pathways by mediating the needs of apprentices, employers, and the government. Alluding back to the earlier mentioned points on PPPs, the GTOs' ability to comprehensively manage apprenticeship pathways is predicated on strong community and grassroots support. One reason for its popularity is that it "de-risks the employment relationship", since apprentices are contracted to the GTOs, rather than the employer (Apprentice Employment Network [AEN], 2022; ILO, 2017).

First, through school-based pre-apprenticeship programmes, potential apprentices are exposed to various pathways, career options and how they could acquire the necessary skills in each industry. GTOs serve as an intermediary that connects apprentices with multiple worksites to develop their work experience through on-the-job training (ILO, 2017), playing a crucial role in screening and matching apprentices to employers, presenting the advantage of tapping into a larger pool of potential apprentices. For example, GTOs have recently explored creating apprenticeship pathways that are targeted at a more diverse demographic, such as attracting young women into the skilled trades. One strategy is to build their "confidence and self-worth" through career coaching and establishing a support network through strong workplace relationships (AEN, 2022). Another useful learning point about GTOs is that they are receptive and have established procedures to manage attrition. Identifying uninterested or mismatched apprentices significantly helps in mitigating "instability and unnecessary" financial costs for both apprentices and employers. Moreover, GTOs also ensure that mismatched apprentices do not immediately contribute to the attrition rates but instead, apprentices are presented with re-deployment or if appropriate, re-qualification opportunities (AEN, 2022).

Second, GTOs "reduce employer burden" in administrative matters to deliver positive training experiences. Most Australian employers that utilise the services of GTOs are SMEs which significantly benefit from the array of workplace support offered by GTOs. Examples of workplace support include managing Workplace Health and Safety (WHS)

requirements for apprentices as well as core human resource functions. In some instances, GTOs do provide additional training, beyond the primary vocational skills that are provided by employers i.e., literacy and numeracy lessons (AEN, 2022).

Finally, there are dedicated and experienced GTO career mentors who specialise in handling workplace psychosocial issues. Thus, GTOs are better positioned to establish conducive work environments that support the sustained well-being of apprentices. Relating back to Pearce's (2019) research regarding learning environments in apprenticeships, securing positive workplace relationships is imperative in allowing employees to maximise their potential by "feeling safe and confident". In this manner, GTOs could serve as a trusted neutral party in resolving workplace disputes and in understanding workplace dissatisfaction.

While GTOs play a part in the early transition for students to become interested in trades and become apprentices, it does not signify the end of their progression to becoming a tradesperson. Prior to the completion of the training with GTOs, apprentices will be mentored by a Trade Development Manager in career goal setting. Additionally, the apprentices will attend a business course to learn about the various aspects of business operation and hear from previous graduates about their personal business experience, and apprentices are also entitled to financial support and loans upon graduation (ILO, 2017).

When examining the relationship between socio-cultural factors and the development of VET in Australia, similarly, the research team has employed Hofstede's cultural dimensions. Australia's relatively low score in power distance and high score in individualism, compared to Singapore, imply certain characteristics, such as easy accessibility to superiors, encouragement of informal conversation in the workplace, and a strong emphasis on demonstrating initiative and self-reliance among employees (Hofstede-Insights, 2023). These cultural traits underscore the significant importance placed on continuous development and learning among apprentices, supported by a robust network of assistance from superiors.

Declining Appeal of Apprenticeships

While the literature suggests that apprenticeships are useful and practical in their application for newcomers to gain experience by working under a skilled craftsman. However, with an increasing premium placed on qualifications and academic pedigree in a knowledge economy, the aspirations of the younger generations also reflect a waning interest in the skilled trades. For example, since the 2000s, research has found a declining trend of youths who are interested in careers pertaining to the skilled trades (Clarke & Herrmann, 2007).

Education and training for the skilled trades require very specialised skill sets and youths are more inclined to pursue careers in non-technical trades (King, 2023). Specifically, Mann et al. (2020) found that current generations of students tend to prefer careers in the computer and data-related fields as compared to the skilled trades. One reason for this shift in preference could be attributed to increased accessibility to higher-skilled trades as more students acquire the necessary qualifications for such employment.

Certainly, entrenched stereotypes and stigmatisation of the skilled trades have rendered it a challenge for the sector to attract youths. In their research, Ochiba et al. (2022) found that an individual's experiences during their formative years of education or work experience significantly influence their career interests. The researchers also found that both genders held negative perspectives towards the skilled trades, which might suggest that stigmatisation of the skilled trades is not significantly gender biased.

Finally, it is important to consider the inherent challenges and expectations faced by apprentices, especially in a digital age where upskilling and reskilling become increasingly prevalent. Neyt et al. (2020) found that even with access to specific vocational education and on-the-job training, skill redundancy remains a primary challenge amidst rapid technological advances. Moreover, an overemphasis on generic vocational education would hinder apprentices from acquiring an array of other important skills such as cognitive skills, problem-solving, and critical thinking.

Developing a Qualifications Framework

The National Qualifications Framework (NQF) is an instrument that classifies and develops a common definition of qualification providing a basis for improving quality, accessibility, and labour market recognition within a country and internationally according to criterions covering learning outcomes, knowledge, skills, and wider competencies, including occupations (Tuck, 2007). Implementation of NQF can help reform the VET system to improve labour market responsiveness, establish pathways between VET, general and higher education, improve the quality and flexibility of VET, and lastly shift from an input-based to an outcome-based VET system (Chakroun, 2010; Allais, 2010).

Over the years, the qualifications framework for skilled tradespersons across different economies has evolved in its definition and purpose. Such changes in the qualification framework reflect evolving industry needs for apprenticeships throughout history—a highly pertinent point, considering the landmark transformations observed in the 4IR employment landscape.

In their comparative analysis of different European apprenticeship models, Markowitsch and Wittig (2022) argued that after the Second World War, the notion of apprenticeships evolved significantly. First, apprenticeships had served the purpose of a “skilled worker qualification,” where the notion of apprenticeships subsequently expanded to become an employment status, which was redefined as a “master-apprenticeship relationship” and finally, a dual system model, as illustrated by the German dual system model discussed earlier.

The researchers pointed out that because most modern European economies increasingly define apprenticeship as an employment status, there is little relevance to developing “pedagogical models” or “skill levels” in the form of formal training programmes and qualification frameworks (O’Reilly-Briggs, 2010; Sparks et al., 2009). Instead, apprenticeship models are now defined by formal employment contracts and the maintenance of such an employment status. Nevertheless, the de-emphasis on a qualifications-based or pedagogical approach in apprenticeships might pose significant challenges in Singapore's context, where the skills premium has been increasing due to its pivot towards a knowledge-based economy. Indeed, it would be unfair for tradespersons to be trapped in low-wage situations with limited career progression opportunities, solely because they possess vocational skills instead of formal qualifications.

As such, an overarching framework that covers compulsory education, VET, and higher education into a single system could be developed to aid students interested in pursuing a career or formal education within the VET system, where similar frameworks were already employed in several OECD economies. In this framework, the qualifications attained are independent of the VET institutions and this allows for: 1) validation of prior learning supporting credit accumulation; 2) transfer, as well as ensure quality assurance

when formalising qualifications, and finally; 3) accrediting institutions, while ensuring quality assurance in the assessments leading to the awarding of qualifications (Chakroun, 2010). Practically, it is possible to apply it to Singapore's context since there already exists a VET system, albeit rudimentary. However, the tripartite partners in Singapore can work towards ensuring that tradespeople are able to attain the appropriate qualifications and make training accessible to everyone. Alongside the implementation of the CPM model, the existing pathways are to be built upon to improve and make them more definitive. This includes paving a continuous pathway starting from education to work placements to change in pay wage.

Allais (2010) states that countries successful in the implementation of NQFs integrated the framework rather than substituting the existing institutional capabilities. Therefore, when developing a CPM for skilled tradespeople in Singapore, it is pertinent to examine ways in which the new qualifications framework could be used to supplement the existing frameworks for other vocations, even beyond the three identified skilled trades.

Country Study: France

Like most countries, France has compulsory education for youths following the ISCED classification for the distinct levels of education attainment. However, upon completion of lower secondary education, students in the last year of lower secondary can opt for a career orientation scheme to discover trade work and receive guidance to complete their upper secondary education in VET studies or prepare for vocational qualification in an apprenticeship training scheme. Therefore, students in upper secondary have three pathways— “general, technological, and vocational”, all of which lead to a final exam to attain the nationally recognised upper secondary school leaving baccalaureate diploma.

However, the qualifications attained via the three pathways differ in the next possible steps available for these graduates. Graduates from the general education pathway will be eligible for higher education academic and technological studies, while graduates from the technological education pathway tend to continue onto tertiary undergraduate or professional bachelor programmes. Lastly, graduates from the vocational pathway will be able to acquire their first qualification within two years and enter the labour market or complete a three-year programme that awards the vocational baccalaureate that allows them to pursue further studies in the tertiary level and attain an undergraduate technician certification. Following from there, there are integrated studies in technological institutes that will allow students to get an undergraduate certificate of technology within their second year (European Centre for the Development of Vocational Training [Cedefop], 2022; Lamb et al., 2011).

In France, the presence of a significant amount of youths who were unable to find employment due to leaving the school system with low or no qualifications led to the development of a school of trust that provides a training guarantee for youths up to the age of 18 to stretch the definition of training towards employment, civic service and support schemes for social and professional integration, in efforts to reduce the number of youths leaving education and training prematurely.

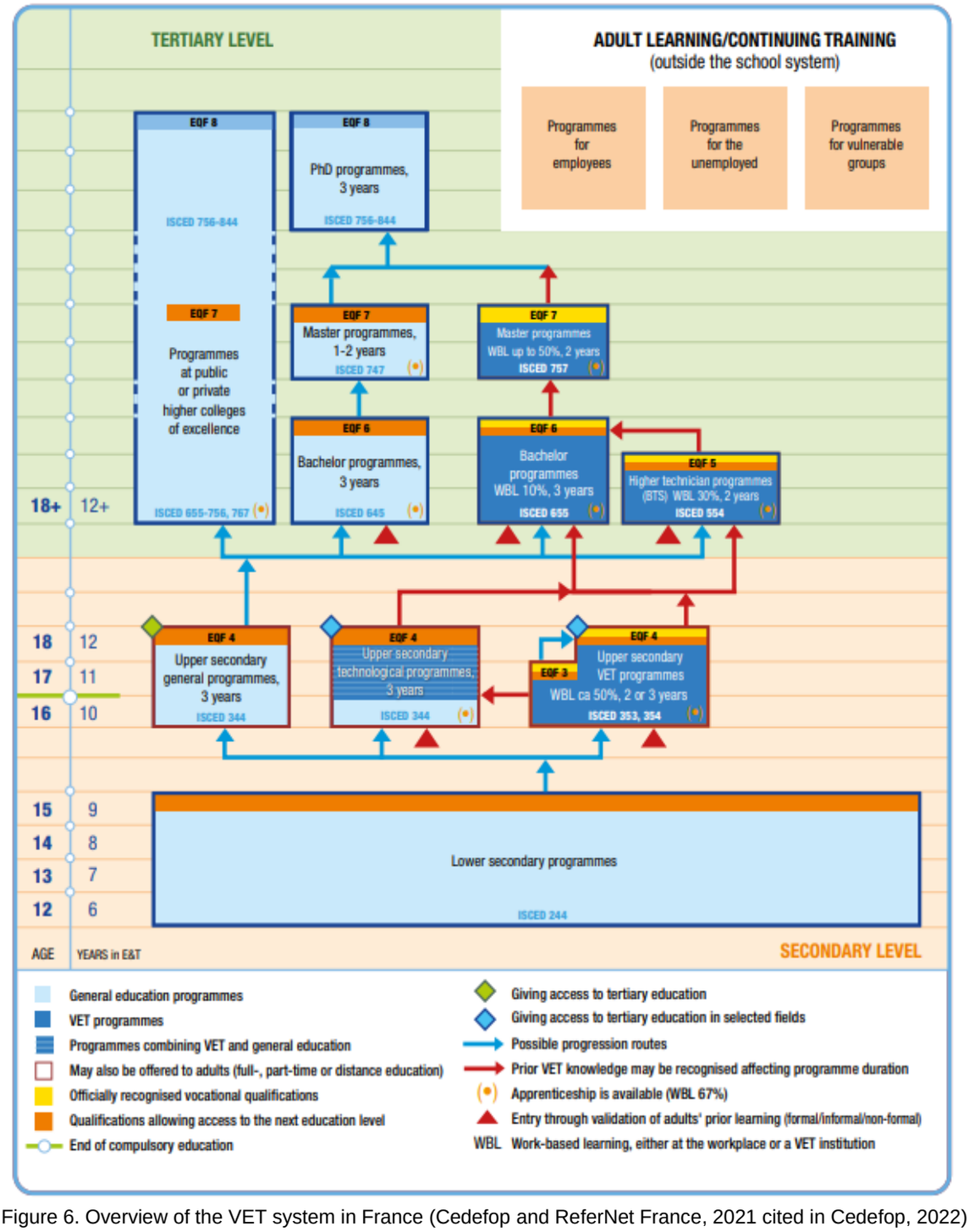

Figure 6. Overview of the VET system in France (Cedefop and ReferNet France, 2021 cited in Cedefop, 2022)

The education system in France introduces the inception of VET pathway early on during upper secondary, where students in both public and private schools have access to flexible pathways that will allow them to find employment or continue their VET studies at higher levels (Figure 6).

The vocational school reform in 2018 altered the programme delivery such that it could align better with the skills necessary in the economy, alongside strengthened career orientation and guidance schemes, where programmes combined general education with VET subjects and made work placement compulsory for students. Thereafter, students can graduate to higher technician programmes that provide specialised education and training across various fields to attain the higher technician certificate prior to having a professional bachelor.

Professional bachelor programmes will impart vocational skills meant for immediate integration into the labour market, that are delivered in universities, providing a holistic education by combining theoretical and practical subjects, along with an internship and supervised assignments (Cedefop, 2022). This system allows students to pace themselves, and the pathway aims to equip them with the necessary skills and knowledge based on their current stage, whether it is to advance their studies in specific fields or to enter the workforce. This is done in efforts to ensure that youths can find employment in the future.

French society tends to exhibit a lower tolerance for uncertainty and ambiguity, often displaying caution when it comes to taking risks. This inclination can be attributed to France's high score in the uncertainty avoidance dimension when compared to Singapore (Hofstede-Insights, 2023). This inherent trait is evident in the clear and structured qualifications framework and career pathways within the VET system.

Furthermore, France exhibits a high level of individualism compared to Singapore, and this can be explained by their cultural values. The French take immense pride in their artisans and their exceptional craftsmanship. They not only recognise the art of creating a masterpiece but also strive relentlessly for excellence. An illustrative example is the 'Un des Meilleurs Ouvriers de France' (MOF) competition, held every four years. This competition symbolises the unwavering dedication and commitment of these artisans to perfecting their skills to the highest level of excellence, a commitment deeply rooted in the French artisanal tradition. This prestigious title is not only revered by professionals but also celebrated by the broader public in France, holding a special place among artisan merchants, including pastry chefs, hairdressers, butchers, and jewellers (Latapie, 2020).

Other Notable Country Examples

In the United Kingdom (UK), there are reforms to help boost apprenticeship rates by ensuring that apprenticeships last for a minimum of 1-year, inclusive of on-the-job and off-the-job learning, as well as providing additional financial aid and grants for apprentices. The UK has also developed an apprenticeship hub that provides guidance and information to youths, engages with employers, and increases the capacity for apprentices by working to promote apprenticeships locally and working with the SMEs. It was also found that SMEs felt that it was imperative to have training providers who were willing to help with recruitment and manage some day-to-day problems apprentices face (ILO, 2017).

In Norway, students have the option to choose from a general education pathway or vocational programmes, where vocational graduates will complete a 2-year education followed by another two years of apprenticeship training at companies. Students are also able to opt for an additional year of education instead of the apprenticeship, which will still allow them to attain the same vocational qualification as students who completed apprenticeship training. Social organisations also participate actively in developing policies at the national, regional, and sectoral levels to ensure market needs are met (Kuczera, Brunello, Field, & Hoffman, 2008 as mentioned in ILO, 2017). Additionally, the schools and employers will discuss the course structure for the following year, to advise on the content of VET programme, trends, and future needs. Norway has Training Offices that are responsible for the recruitment of staff that guide the apprentices, while also ensuring the quality of apprenticeship training. With the close cooperation between the Training Offices and schools, they can better identify more local opportunities and possibilities for better training and educational quality (ILO, 2017; Høst, 2015 as mentioned in OECD, 2018).

Regionally, the Strengthened Technical and Vocational Education Program (STVEP), implemented in the Philippines to increase opportunities for high school graduates to attain certifiable vocational and technical skills and offer more avenues in pursuing a post-secondary career. Schools are provided with financial assistance and intervention strategies, as well as collaboration with the relevant partner agencies such as experts and company representatives working together to develop learning materials, provide training for school staff, and provide funds for hands-on activities. Implementing on-the-job training for students with industry partners depending on their choice of study (Valles, 2012).

Chapter 3: Developing a Career Progression Model for Singapore's Tradesmen

Singapore's Current Training Landscape, Work Landscape and Policies

A common feature observed from the country cases was the presence of effective coordination among government, industry, and key institutions. Another pertinent observation is the need for opportunities to be made available for students who might be interested in pursuing VET during their foundational years of general education.

In Singapore, the development of the Career Progression Model (CPM) for the skilled trades need not start from scratch because essential building blocks are present, for example, an existing Technical and Vocational Education and Training (TVET) pathway that could be deployed to offer a steady pipeline for the trades. This can be attributed to the significant efforts of government and industry to ensure Singapore's TVET system is well-adapted to meet the needs of the 4IR economy. Fundamentally, Singapore presents a reliable and well-resourced general education pathway that equips potential tradespersons with strong fundamentals in numeracy and literacy skills.

In the study of how Singapore's TVET scene has developed and diversified over the years, Abu Bakar et al. (2020) pointed out that the government has emphasised the importance of VET pathways. The authors found that the government has closed the gap between non-vocational and vocational education pathways. Like Germany's dual system model, there have been landmark changes to Singapore's general education policies, including extending the duration for "less academically inclined" students to complete general education requirements. Consequently, a prolonged duration spent in general education has increased opportunities for students to explore a more diverse array of skills and thus, make more informed career options.

Beyond changes made to general education pathways, the government has also increased opportunities for interested students to acquire technical and vocational skills at the tertiary level. With opportunities to pursue applied learning at the Singapore University of Technology and Design (SUTD) and Singapore Institute of Technology (SIT), where graduates tend to gravitate towards managerial or supervisory roles in the vocational trades because of their educational background. Chung et al. (2023) similarly indicated that observation based on participants' responses received during a sharing session organised by NTUC with local tradespersons, as part of the EWMC engagements.

Workforce Development: A Whole of Society Approach

Singapore's TVET model has been recognised as a successful attempt to equip the local workforce with the appropriate skill sets to meet the demands of the 4IR economy. For example, Shafique and Dent (2019) have identified prominent features in Singapore's model, which included: 1) a coordinated "Whole of Government" approach in developing skills policy; 2) adopting a long-term perspective to future-proof skill reform strategies and finally, 3) investing not only in the individual phases of TVET but also, to ensure that apprentices could navigate through a coordinated TVET system. Singapore's heavy investments in establishing "state of the art" ITEs were also recognised. The report also highlighted that another important thrust towards workforce development at a "whole of society" level pertained to the SkillsFuture movement, in which greater focus was placed on "stimulating demand for lifelong learning which nudges citizens towards key industries." In their study, Maddocks et al. (2019) expressed that the younger generation requires access to and participation in post-secondary education to learn skills and capabilities necessary to enter the workforce, as well as having lifelong learning by constantly developing and improving themselves over time.

An emerging challenge is in ensuring Singapore's core of local skilled tradespeople remain competitive in the market with their technical skill sets and vocational knowledge. Although Singapore's TVET model has adequate education and training resources to equip workers with appropriate skills for the 4IR economy, the skilled trades also face the imminent challenge of rising wage premiums due to the emerging demand for other well-paid occupations. These structural shifts in the labour market imply a need for new strategies to ensure that the TVET option remains as competitive as non-TVET options in the tertiary education system.

With competition from alternative career options and a declining labour force, the focus of these strategies should be multi-pronged, with selection and recruitment processes targeted at traditional and non-traditional manpower sources. As such, it would be prudent for the skilled trades sector to remain open to recruiting apprentices from varied vocational backgrounds.

Model Considerations

The primary objective of the proposed model is to provide a defined pathway for current tradespersons and new entrants in Singapore but more importantly to ensure a strong Singaporean Core within the sector. As with other existing workforce development strategies, a well-coordinated effort between the government, Institutes of Higher Learning, unions, and industry is essential to sustain the CPM.

Drawing on the identified frameworks and country case studies, this section identifies key considerations when implementing a working CPM for the skilled trades industry.

Changing Mindsets in Students and Expanding the Talent Pool

In the recent public engagement session by the NTUC through the EWMC engagements, participants shared that the skilled trades are perceived as physically laborious, dangerous and an unconventional career choice, especially for Singaporeans holding a tertiary education certificate (Chung et al., 2023).

> Some of the sentiments picked up from participants from the trades include: 1) looking down on tradespeople—"Do you ever hear a tradesperson going to university?", "No parents will encourage their children to join this trade... Relatives all looked down on ITE. Some would rather go to a private institution than ITE." "There is also a need to manage perceptions of adults and not just young people.", and "The trade is perceived as an 'uneducated trade'"; 2) skilled trades is a low paying job—"Wages not high enough. Even PWM sectors are getting higher than tradesmen—parents would not allow their children to work in such trades", "The share of value is lesser—tradesmen move molecules compared to bankers who move billions of dollars.", and "It is not scalable, with not much prospects and low wages. Since time equals money, and the more the jobs the more income you have, your wages will always be tied to amount of time you have. It is difficult to go on vacation as well." And 3) only foreign workers work in skilled trades—"Licensed electrical workers (LEWs) require licenses … Many companies hire foreign workers as they can multitask, looking to do whatever it takes to stay in Singapore. A lot of work would not require LEWs due to relatively simple and cheap nature of the work.", and "The pay is low as we depend on foreign workers as well." (pp. 4 & 7).

As a way of addressing these concerns, participants recommended that having qualifications and certifications may help enhance the image of the profession, however, the media remains a key platform in engaging the youths and erasing biased misconceptions regarding the skilled trade vocations. Therefore, it is important to expose students to various career opportunities in the skilled trades. By doing so, graduating secondary school students with an interest and aptitude in vocational work are better informed when deciding on their preferred vocational education and subsequent apprenticeship pathways, with both technical institutions and employers, respectively.

In Germany's dual system model, students acquire vocational skills and knowledge, while simultaneously pursuing a general education. Students from as early as upper secondary can opt for VET, and only a small portion of these students pursue school-based programmes (OECD, 2022). Similarly, in France, after receiving guidance from a career orientation scheme, students are presented with the option of choosing between a vocational education, technical education, or general education pathway. Selection of a preferred pathway would determine whether they remain in general education while pursuing their VET studies or proceed to prepare for a vocational qualification in an apprenticeship training centre (Cedefop, 2022).

In Singapore, local students are already exposed to basic technical skills in their Design and Technology (D&T) as well as Home Economics courses. At this stage, the primary objective should not be to focus on promoting specific vocations within the skilled trades, but rather on how the acquired skills are useful life skills. This strategy is also useful since it would help prevent misinformed or rash career decisions for secondary school students. It is also important to introduce the skilled trades industry to youths in secondary school separately through trips and workshops. This will allow them to develop an interest in the industry, and thereafter, interested individuals will be encouraged to enter VET programmes offered in IHLs and ITEs. There is also a need to concurrently assuage and promote changes and improvements in the skilled trades industry across all generations. This entails changing negative mindsets, removing obstacles, and encouraging more youths to join the skilled trades industry. Changing mindsets may be the hardest to do on the extant literature and past experiences, even with the implementation of the CPM.

Are Existing Labour Policies and Strategies Sufficient?

In his 2023 May Day message, Minister for Manpower Dr Tan See Leng noted that the professionalisation of the skilled trades served as a key strategy to protect workers. To this end, he reiterated the Government's commitment to engage and support employers in their transformation needs through "reskilling and upskilling", as well as progressing workers into "better jobs". In particular, the overarching objective in developing the skilled trades as illustrated with wage increases and career progression pertained to "attracting, retaining and rewarding workers." The government also emphasised that this process should be predicated on a "well-coordinated effort across multiple stakeholders." (National Trades Union Congress [NTUC], 2023).

Strong tripartite relations remain a key factor for success in past and current workforce transformation strategies. After all, the tripartite partners have key roles to play in identifying growth opportunities and operationalising development strategies. As emphasised throughout this paper, the cornerstone for building a workable CPM is to secure support and coordination across all relevant stakeholders: government, industry, apprentices, and experienced tradespersons.

The importance of using strong tripartite relations as a basis for workforce development is demonstrated with the Industry Transformation Maps (ITMs) for 23 selected industries. Among other objectives, the ITMs aim to maximise the industry's workforce potential by establishing a "comprehensive ecosystem for skills development and lifelong learning" (Singapore Retailers Association [SRA], 2021). Launched in 2016, the ITMs targeted six clusters of industries that were identified by the Future Economy Council (FEC). In 2021, the Government has complemented the ITMs with the Jobs Transformation Maps (JTMs) to prepare key industries for the rapidly changing employment landscape, especially in terms of managing technological changes (Workforce Singapore, 2023). Notwithstanding, the ITMs were more of a response to structural transformation, which witnessed a pivot towards a knowledge-based economy.

In his reply to a Parliamentary Question on the manpower prospects for jobs in the skilled trades, Minister Tan noted that while resident labour participation in the “higher-valued” industries (i.e., PMET roles) had increased, the share of resident workers in non-PMET roles has declined (MOM, 2022). As such, from the perspective of skills development and career progression, opportunities are available to adapt the transformation maps in developing the skilled trades sector. For example, the ITMs’ focus on job re-design strategies could also be applied to enhance the appeal and relevance of vocations in the skilled trades.

Other policy examples that have resulted in the transformation of essential albeit vulnerable sectors and uplifting its workers include the PWM, Workfare Income Scheme (WIS) and Workfare Training Support (WTS). In implementing strategies to professionalise the skilled trades, the PWM’s emphasis on establishing a “structured progression ladder” presents potential features that might be applicable to CPMs in the skilled trades. Based on the “productivity-to-wage linkage” principle, the PWM seeks to incentivise workers’ individual commitment towards upskilling and performance to boost productivity and eventual wage growth (Sapari & Pitchay, 2022). Since workers have the option to progress along a well-defined career path, the PWM’s main advantage is that it presents an “in-built flexibility” for “social and wage mobility”, where such mobility is crucial for the CPM as it ensures that employers can sustain apprenticeship programmes in the long term, even during periods of economic instability and hardships.

According to the NTUC (2010), the four key components of the PWM are “salary progression, skills upgrading, career advancement and productivity improvement.” Using these four components as a basis, the NTUC recommends a discussion between employers, unions, and employees regarding the evaluation of career development pathways as well as a long-term wage growth strategy. In terms of a progressive wage table, the PWM looks at both productivity and job-related factors. For example, an array of productivity-based determinants including job scope, skill sets, and competency levels were considered alongside job-specific factors such as the level of job hazard and the nature of the work environment.

Nevertheless, there are important caveats which render it difficult to adopt the PWM approach for the skilled trades. First, as a mandatory scheme, the PWM serves as a strategy to uplift wages for low-wage workers, primarily in the cleaning, security, horticulture and building maintenance industries; sectors that present shorter runways for skills development and accumulation of vocational knowledge. On the other hand, the career progression trajectory for the skilled trades requires a longer horizon to attract, educate, continuously upskill, and certify apprentices. Most often, the starting point for an apprentice begins with access to general education. The apprentice is then supported throughout his career, first with training at vocational institutions and subsequently, a mentorship pathway with employers in the skilled trades industries, therefore the proposed CPM will be an extension of the PWM, as the former will be focused on highlighting the career pathways skilled tradespeople can take including education,

attraction and retention of workers, increasing the wages of workers, as well as showing that there is a progression in this industry for workers.

Diversifying the Entry Points for Skilled Trades

Other than examining what the proposed model should encompass, it is also prudent to examine the viability of other manpower pipelines. An alternative career entry point could be created for national servicemen with relevant skill sets to join as pre-apprentices in the skilled trades such as national servicemen who chose vocations like logistics or maintenance, or other vocations that have similar components (CMPB, 2021) could be identified and contacted. Workshops could be organised for these national servicemen during their service to allow them to see that there is progression after learning these transferrable skills in NS.

During the recent engagement session by NTUC, participants shared that full-time National Servicemen (NSF) in related NS vocations could be exposed to the skilled trades, with the possibility of converting these NSFs into full-time pre-apprentices or apprentices after their Operationally Ready Date (ORD). Given that skilled trades are considered essential aspects of a functional Singapore economy, participants pointed out that equipping NSFs with fundamental skills in trade roles could “constitute national service or national building” (Chung et al., 2023). Nevertheless, there are important considerations to note when operationalising this pathway. First, it is necessary for governing authorities (e.g., PUB for the plumbing industry) as well as the skilled trades industries to recognise qualifications attained during NS. This requires close coordination between the governing bodies in each skilled trades sector and respective NS units. Second, considering that the priority in NS is to develop sufficient manpower for Singapore’s defence needs, the training period for NSF to attain foundational vocational skill sets may have to be managed.

Another possible career entry point is to tap into skilled workers with relevant skill sets in emerging sectors. One example that illustrates the rise of emerging sectors is witnessed in the growth of the green economy. Increased job opportunities pertinent to the deployment of sustainable technologies have presented attractive career options for new graduates. Considering the increasing importance placed on sustainable technologies across all industries, it is prudent to examine ways in which the skilled trades could employ as well as train newly certified specialists, that are well-skilled in using sustainable technologies to support innovation and sustainability. In other words, it is possible to develop centres of excellence within each of the identified skilled trades. This strategy would attract fresh graduates seeking increasingly popular careers in the green economy while concurrently, opening another channel for existing highly skilled technicians, electricians, and mechanics within the green sectors to be re-trained for the essential skilled trades. One example pertains to the “GreenPlumbers” course, an international upskilling and reskilling course to support the plumbing sector’s green transition. Plumbers who had completed the course were trained in installing energy-efficient

technologies in their trade and were awarded a "GreenPlumbers" license (McCoshan, 2022). While the “GreenPlumbers’ course is an international programme focusing on installing technologies and acquiring techniques to limit water and energy waste, Singapore offers the SGBC Green Mark Professional Qualification Scheme programme, formerly known as BCA Green Mark Specialist programme, which has a Continuing Professional Development (CPD) framework for all Green Mark Accredited Professionals (GMAPs) that aims to uplift, upskill and recognise green building competencies of professionals in the built environment sector (Singapore Green Building Council, 2015).

The Green Mark Associate (GMA) is a foundation-level accreditation for new industry entrants or existing non-technical built environment-related professionals to learn more about built environment sustainability on topics such as energy efficiency, green building materials and technologies, indoor environmental quality, and water conservation. Thereafter, GMAs can move on to become GMAP professionals provided they hold a locally recognised building engineering or building-related degree or diploma. The SGBC Green Mark Professional Qualification Scheme succeeds the BCA Green Mark Specialist programme and aims to uplift, upskill, and recognise the green building competencies of professionals in the built environment sector. GMAP professions cuts across the entire building and construction value chain allowing for more opportunities to enhance all roles of the built environment sector, such as ESD consultants, Engineers, Contractors, energy and carbon specialists, and sustainability professionals. As green building and sustainability continue to gain traction, the demand for qualified green professionals will continue to increase (Singapore Green Building Council, 2015; Building and Construction Authority [BCA], 2020).

Therefore, the creation of a tripartite-led platform is mooted where interested tradespersons could consider embarking in new fields where their trade skills remain relevant for example in the career opportunities available in the emerging green economy.

Demand for Apprentices

Skilled trade training programmes tend to be shorter and more affordable, allowing individuals to begin their careers earlier, however, with more emphasis placed on education and the retirement of the baby boomer generation meant that there is a high demand for skilled tradespeople. Trade workers are also less likely to be impacted in times of pandemic due to the high demand for essential services (Lower Columbia College, 2021; Job Skills, 2021). TradeCareers (n.d.) looks at assessing appropriate channels for effective recruitment of diverse applicants, and company policies to ensure staff are well cared for, and that tradespeople are paid and provided competitive wages and benefits.

Holistic Apprenticeship Pathways, Ready for the 4IR Economy

Balance Between General and Specific Skill Sets

Currently, most TVET courses are offered by ITEs, and they are not specific to a particular trade. Instead, the courses available are broadly defined and cover an array of general skill sets in facility management or the built environment. Certainly, with varying extents of formal qualifications in related or unrelated sectors, VET should remain as adaptable as possible to entrants of varying backgrounds. For example, mechanics interested in acquiring plumbing skills should not face high barriers towards their learning. However, an overemphasis on providing courses with general skill sets at the post-secondary level might also not contribute towards building a reliable pool of labour for the specific skilled trades. Figure 7 shows several pathways an individual can follow in pursuit of their education, however, there is no specific pathway for tradespeople. As such, this paper proposes that the institutional training partners (e.g., ITEs and Polytechnics) seek a balance between imparting specialised skill sets for the three identified trades while being flexible enough in their syllabus to recognise transferrable skill sets for tradespersons in similar industries.

Similarly, upskilling opportunities also remain available for tradesmen to pursue in the ITEs and under the SkillsFuture movement. However, these courses do not provide specialised training that is specific for each of the skilled trades.

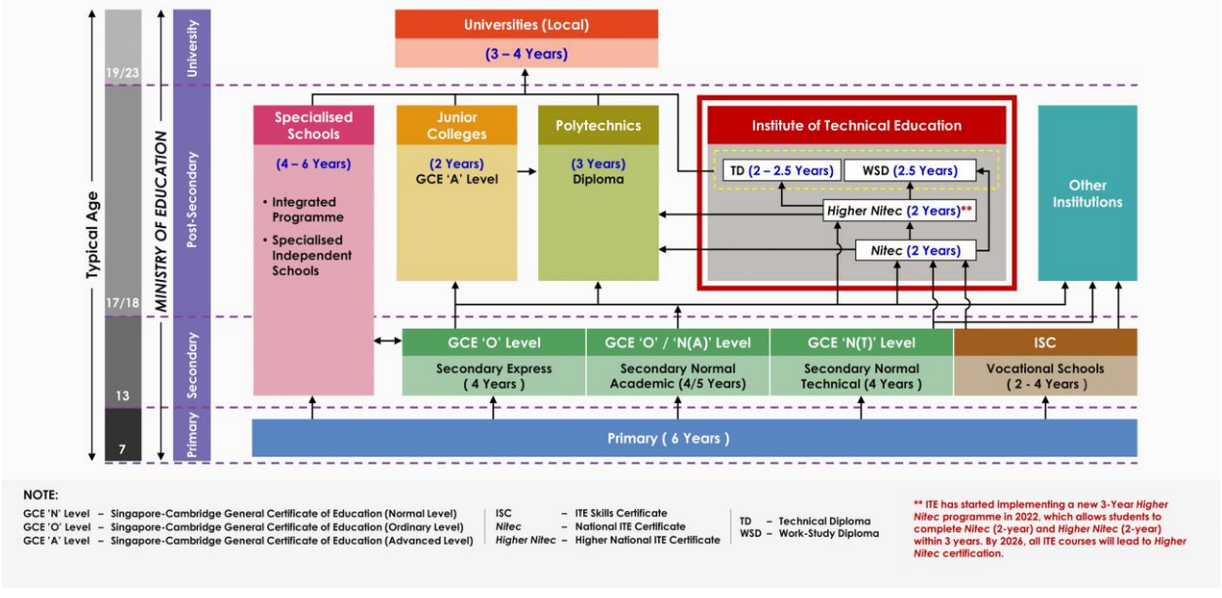

Figure 7. Current TVET system in Singapore (SEAMEO VOCTECH Regional Centre, 2024)

Developing Communities of Practice: Mentorship and Social Support

As highlighted previously, research by Pearce (2019) found that for apprentices to thrive in the 4IR economy, apprentices should present a capacity for self-directed learning. In a 4IR economy that requires workers in both technical and non-technical vocations to remain adaptable, our proposed model encourages workers to exercise autonomy in their learning while being supported by a network of mentors and employers. To establish a conducive work environment where apprentices can tap into a reliable network of learning and career counselling advice, we propose a tripartite-led approach towards establishing a defined mentorship system. Considering that the existing skilled trades mostly pertain to either small enterprise owners or self-employed tradespersons, the primary objective is to establish a support network of career mentors for the skilled trades industries.

The proposed approach is like the Australian GTOs model where apprentices tap on a network of career mentors throughout the entire training contract. For most skilled trades industries, the GTOs have field officers who deliver close mentorship and counselling support, especially for new apprentices. One reason for the relatively high participation and completion rates in the Australian apprenticeship model could pertain to the comprehensive social support that new apprentices could receive. In Buchanan and Raffaele's (2016) study of social support structures for the Australian carpentry apprenticeship model, they found that mentorship arrangements which demonstrated extensive formal and informal social support structures produced both productive and committed employees. Recognising the long-term benefits of a good social support framework, several major construction firms in Australia have incorporated social support structures as part of their business model to grow both competent tradesmen, as well as future leaders.

Chung et al. (2023) noted that some of the suggestions put forth during the recent engagement session held by NTUC, was that local tradesperson wanted a developed specialised track for the workers with a "Master Plumber concept where it is optional to become the highest level if they wish to. However, there can be stepped progression pathways in between to make achieving licensing easier". Local tradespeople too suggested having a "one-on-one industry mentorship whereby new workers can follow seasoned workers around. It helps them to experience the real work first-hand and understand the amount of effort needed". (p. 12).

However, locally some of the mentorship programmes are for secondary and post-secondary school students and early career workers, where platforms such as MentoringSG, MentorCruise, and BoardAgender can be utilised to seek mentoring services depending on the needs and requirements of the mentee. Singapore Institute of Technology (SIT) also has an Industry Mentorship Programme which is a joint initiative with the Centre of Career Readiness and Young NTUC, that provides mentoring for students in the listed engineering, food, chemical and biotechnology programmes

(Singapore Institute of Technology [SIT], 2023). Notwithstanding that, a tradesperson would be hard-pressed to find an appropriate mentor in the skilled trades industry to provide guidance or support, as mentors in other sectors are able to.

Taking reference from the mentorship and social support networks provided by Australian GTOs, as well as feedback from local tradespeople, there is a need to develop a pool of industry mentors who are adequately trained to manage the professional and personal development of apprentices. Singapore's skilled trades industries could leverage its well-coordinated Labour Movement and tripartite partnerships to build communities of practice.

Hancock et al. (2022) hosted a ten-week Accelerator program designed to help employers adopt skills-based practices across their talent pipeline, where most participants were from small- and medium-sized businesses (SMBs). The programme consists of four large workshops and separate one-on-one coaching sessions to better help participants make meaningful changes to their talent strategies to align with the skills-based practices. The authors shared that skills-based hiring can create a more resilient workforce and an effective strategy in preventing attrition since hiring for skills was more predictive of job performance than hiring for education and work experience, and workers without degrees were more likely to stay in their jobs longer than degree holders. Skills-based training should also be included to allow workers to transition into higher wage and in-demand jobs by sharing workers' resumes that match available job openings, digital literacy training and infrastructure improvement for lower-income workers.

Singapore Youth's Perspective of the Skilled Trades

NTUC conducted a short survey in July 2023 to gather feedback and responses regarding the views of the skilled trades industry of Singaporean and PR youth aged 18 to 35. A total of 1080 participants were surveyed by a third-party vendor from their proprietary opt-in panel. Participants were asked a series of 25 questions that sought to understand and learn about the opinions and views of the public. Analysis was conducted using IBM SPSS Statistics 26. The sample demographics are presented in Table 2. Participants were mostly Singaporeans with more than half working full-time (57.9%). More than half had a bachelor's degree or higher (53.2%) and slightly more than a quarter had a diploma or other professional qualification (28.2%). The respondents were mostly Singapore Citizens (91.8%) with 52.7% of them being female and 47.3% being males.

Demographics	Categories	Frequency	Percent
Gender	Male	511	47.3
	Female	569	52.7
Age Group	18 – 24 years old	433	40.1
	25 – 35 years old	647	59.9
Ethnicity	Chinese	913	84.5
	Malay	83	7.7
	Indian	49	4.5
	Others	35	3.2
Citizenship	Singapore Citizen	991	91.8
	Permanent Resident	89	8.2
Highest Education	Primary School (PSLE)	4	0.4
	Secondary School (GCE 'N' / 'O' Levels)	84	7.8
	Diploma or Other Professional Qualifications (e.g., Higher Nitec, Nitec, etc)	305	28.2
	GCE 'A' Levels	112	10.4
	Bachelor's Degree or Higher	575	53.2
Current Employment Status	Working Full-Time	625	57.9
	Working Part-Time	54	5.0
	Contract Work	22	2.0
	Self-Employed	28	2.6
	Casual Freelance or On-Call	10	0.9
	Unemployed	60	5.6
	Studying	249	23.1
	Waiting for NS or School to Start	32	3.0

Table 2. Sample Demographic

Survey results showed that when asked about the challenges or drawbacks of working in the skilled trades industry (Figure 8), the top three choices of respondents were issues due to the physical demands of the job (68%), safety concerns (60%), and lastly, the low-status stigma associated with skilled trades (57%). To test the relationship between these variables, chi-square tests of independence were carried out, and only safety concerns

were found to have a statistically significant relationship χ^2 (1, n = 1080) = 9.03, p = .003, showing that females were more likely to raise safety concerns when considering a career in skilled trades, differing from their male counterparts, as shown in Table 3.

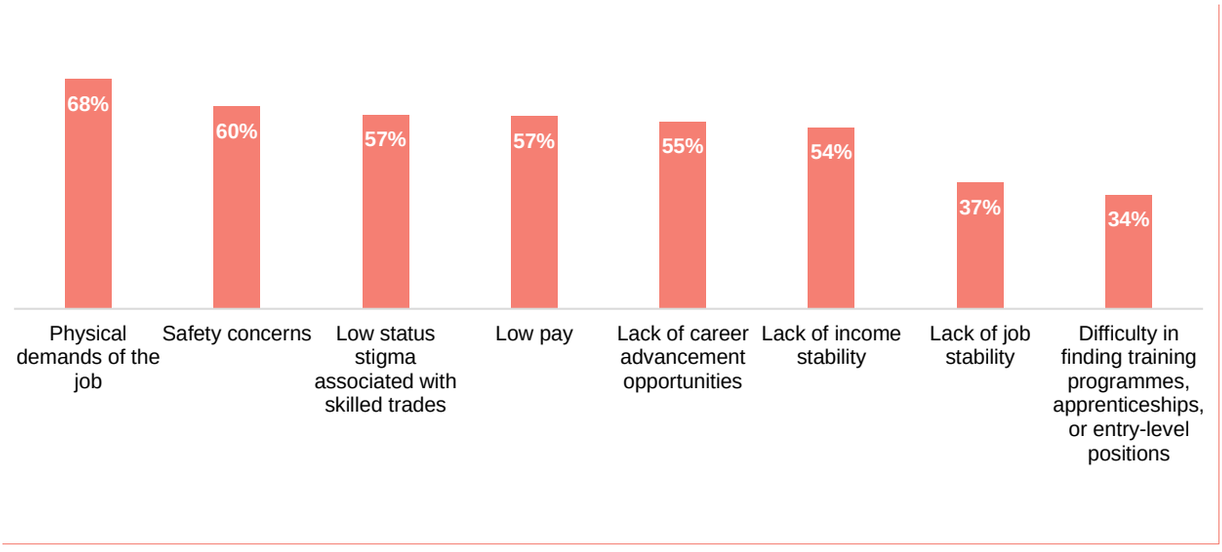

Figure 8. Challenges of Working in the Skilled Trades Industry (n=1080)

			Gender		Total
			Male	Female	
Q8. Safety concerns - What are the challenges or drawbacks, if any, of pursuing a career in skilled trades?	NO TO: Safety concerns	Count	230	205	435
		Expected Count	205.8	229.2	435.0
		% of Total	21.3%	19.0%	40.3%
	Safety concerns	Count	281	364	645
		Expected Count	305.2	339.8	645.0
		% of Total	26.0%	33.7%	59.7%
Total		Count	511	569	1080
		Expected Count	511.0	569.0	1080.0
		% of Total	47.3%	52.7%	100.0%

Table 3. Cross Tabulation for Safety Concerns (n=1080)

Respondents were asked if they have ever considered a career in skilled trades, either for themselves or others. More than half of the respondents indicated that they had never thought about it for themselves or someone they knew. Most respondents felt that the public neither respects nor disrespects (Figure 9) and were indifferent towards the skilled trades as shown in Figure 10. Nevertheless, it seems that while poor public perception may not be the cause, general indifference should not be overlooked.

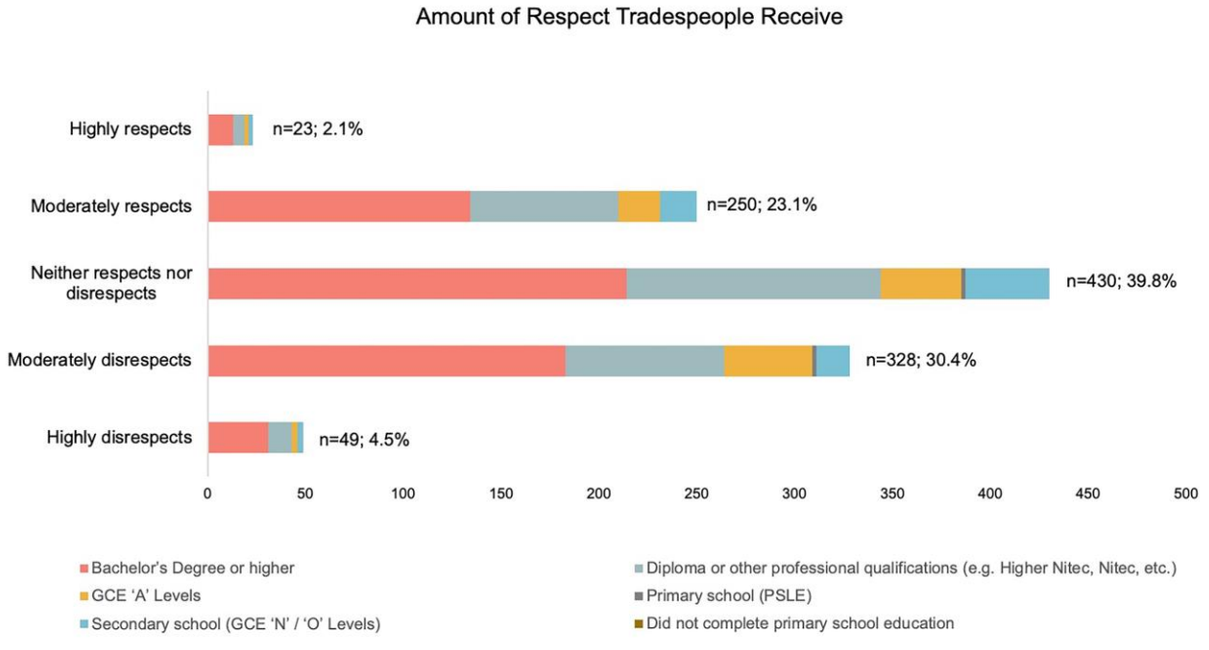

Figure 9. Bar Graph on Respect Tradespeople Receive (n=1080)

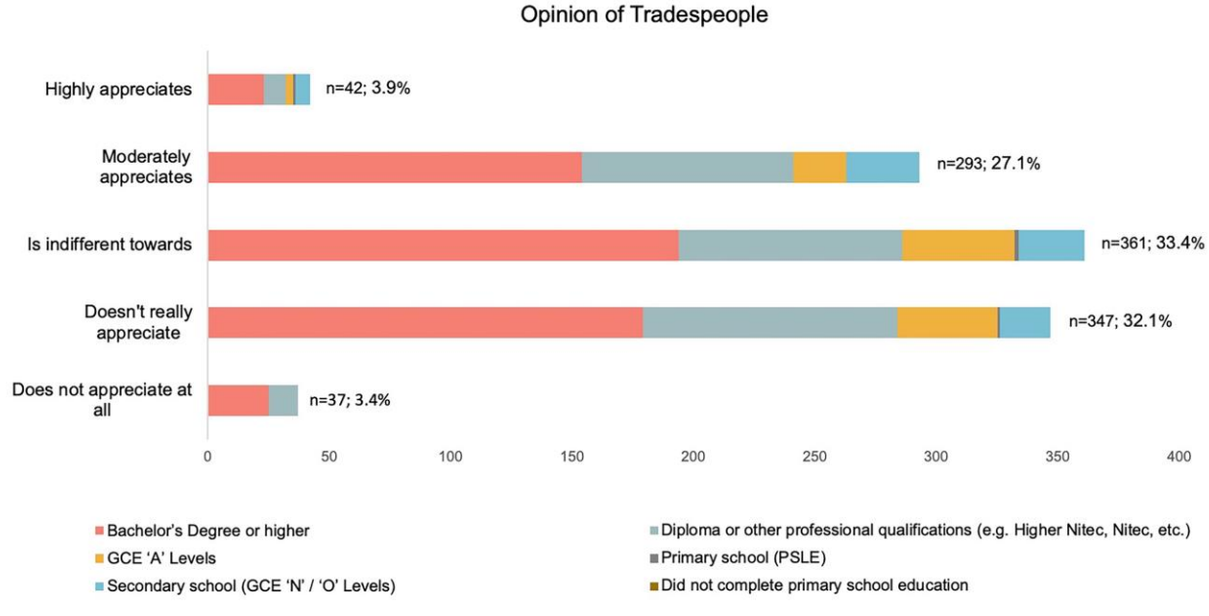

Figure 10. Bar Graph on Opinion of Tradespeople (n=1080)

Respondents were also asked to indicate and rank factors they considered as benefits in pursuing a career in the skilled trades industry (Figure 11). 67% of respondents chose learning practical skills, 54% chose hands-on work, and 51% chose flexible working hours, showing the most selected factors considered as benefits when pursuing a career in skilled trades. A chi-square test of independence was performed to evaluate the relationship, and only the relationship between gender and the benefits of learning practical skills was found to be significant, χ^2 (1, n = 1080) = 6.465, p = .011. This shows that females were more likely to pursue a career in the skilled trades since they considered being able to learn practical skills from the job to be a benefit, compared to males (Table 4). This is an interesting observation and suggests that campaigns to raise awareness of the skilled trades or for recruitment may wish to leverage this factor.

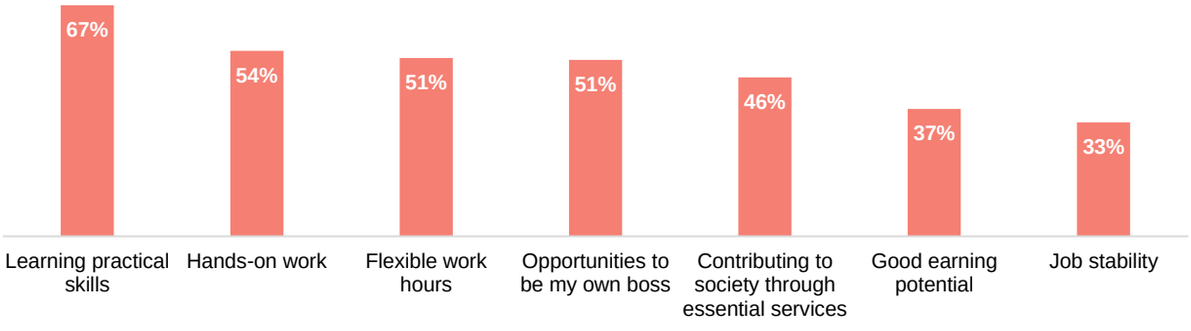

Figure 11. Benefits in Pursuing a Career in the Skilled Trades Industry (n=1080)

			Gender		Total
			Male	Female	
Q6 Learning practical skills is a benefit of pursuing a career in the skilled trades	NO TO: Learning practical skills	Count	190	170	360
		Expected Count	170.3	189.7	360.0
		% of Total	17.6%	15.7%	33.3%
	Learning practical skills	Count	321	399	720
		Expected Count	340.7	379.3	720.0
		% of Total	29.7%	36.9%	66.7%
Total		Count	511	569	1080
		Expected Count	511.0	569.0	1080.0
		% of Total	47.3%	52.7%	100.0%

Table 4. Cross Tabulation for Learning Practical Skills (n=1080)

Respondents were also asked what would most encourage them to pursue a career in the skilled trades. Results from Figure 12 showed that most respondents chose the following 3 factors: good pay (75%), flexible working hours (49%), and recognised professional qualifications (38%). These choices reflect what individuals aged between 18 to 35 will take into consideration if they were to pursue a career in the skilled trades industry. A chi-square test of independence was performed to evaluate the relationship between variables, and only the relationship between gender and flexible working hours was found to be significant, χ^2 (1, n = 1080) = 5.30, p = .021, showing that females were more likely to be encouraged to pursue a career in the skilled trades if there were flexible working hours, compared to males, as shown in Table 5.

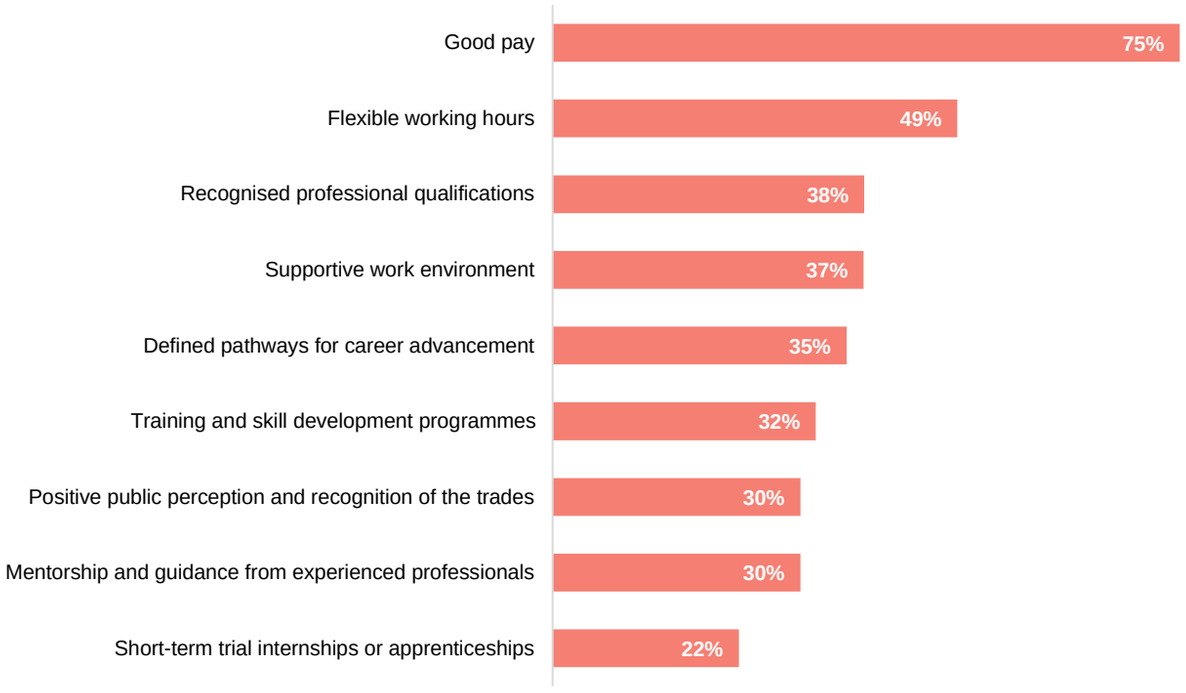

Figure 12. Factors That Encourage Youth to Pursue a Career in the Skilled Trades (n=1080)

			Gender		Total
			Male	Female	
Q13 Flexible working hours would most encourage me to pursue a career in the skilled trades.	NO TO: Flexible working hours	Count	281	273	554
		Expected Count	262.1	291.9	554.0
		% of Total	26.0%	25.3%	51.3%
	Flexible working hours	Count	230	296	526
		Expected Count	248.9	277.1	526.0
		% of Total	21.3%	27.4%	48.7%
Total		Count	511	569	1080
		Expected Count	511.0	569.0	1080.0
		% of Total	47.3%	52.7%	100.0%

Table 5. Cross Tabulation for Flexible Working Hours (n=1080)

Singapore's Career Progression Model for Tradesmen: The Proposed Model

In contrast to the PWM, career progression in the skilled trades admittedly requires a longer and more specialised qualification and vocational training pathway. Moreover, with multiple career entry points it is important to consider that potential apprentices might present diverse skill competencies and academic qualifications. Webster and Jarvis (2003) found that "streams of trade work," are differentiated based on the level of academic and vocational skills. Specifically, trade work in the lowest stream requires a smaller "selection of vocational skills" whereas trade work at the highest stream requires a higher selection of vocational skills. In turn, the level of skills required in each workstream presents key determinants in deciding the apprenticeship duration, with a shorter apprenticeship period defined for the lower work streams. Thus, it is important that the CPM is not interpreted as a one-size-fits-all model, but rather a guide to easily access comprehensive, informed, and accurate advice and information about the available options through the VET and higher education systems for tradespersons (Maddock et al., 2019).

At the apprenticeship level, recruits can come from a variety of sources from educational institutions like the ITEs or polytechnics to alternative career entry points for potential apprentices from non-traditional pathways, for example, National Service (NS) or skilled workers with relevant work experiences and qualifications from other industries like the emerging sustainability sector. As apprentices, they would receive on-the-job training and career mentorship, under the supervision of a master tradesperson, where an apprenticeship would typically last between two to four years (Pyper, 2008; Kuczera et al., 2018; OECD, 2018). Apart from compulsory on-the-job training, apprentices are also required to undergo vocational education courses. Depending on arrangements made between employers, vocational institutions and apprentices, courses of varying durations and intensities are available. Having the flexibility to decide on the course duration and type could help alleviate employers' concerns regarding manpower shortages and constant backlogging of contracts. Flexibility in completion rates and duration might be an additional benefit for those who are unable to commit to studying full-time. Upon completion of their apprenticeship programme and having attained primary qualifications, they would then be able to assist mentors, while slowly acquiring the confidence and skills to perform tasks of increasing complexity.

After working together and learning from their mentors for at least two years, apprentices would be offered opportunities to advance and become junior tradespeople. This could be achieved by attending courses and additional certification courses offered at IHLs, ITEs, or companies that provide training via SkillsFuture. Additionally, individuals who are interested in switching careers will be able to become junior tradespersons if they hold a relevant diploma or certification. With at least three years of relevant working experience and additional qualifications relevant to their fields (OECD, 2022), apprentices will then be eligible to undergo training before being certified as a junior tradesperson.

In this proposed model (Figure 13), vocational qualifications and work experience are equally important. Thus, for a junior tradesperson to become a tradesperson, constant upskilling is expected, as well as close shadowing of a more experienced tradesperson. Mid-career switch individuals with the relevant degree and certification can also partake in the master-level qualification (OECD, 2022). Individuals at this stage require a minimum of five years working experience to receive certification as a master tradesperson. At this stage, more career opportunities are open to them for example they could consider moving on to being an educator in teaching and training institutions like ITE.

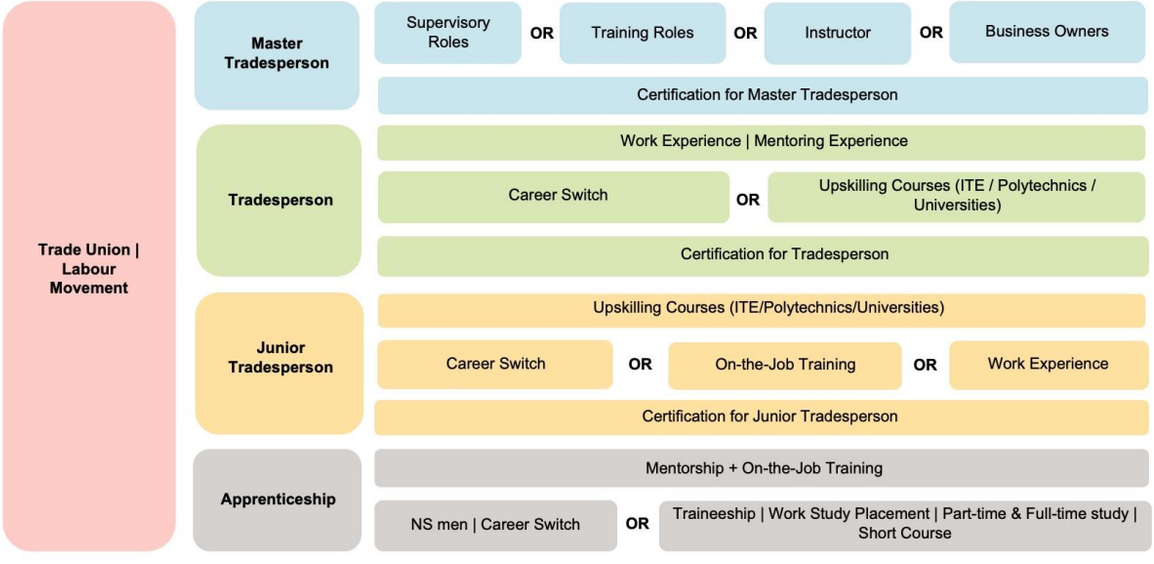

Figure 13. Proposed Career Progression Model

The CPM can actively involve the tripartite partners, first by identifying and matching interested candidates with prospective companies to kickstart their apprenticeship journey and in the process increase their chances of working in the skilled trades industry. Additionally, the Labour Movement can also assist in attracting full-time national servicemen whose military vocations allowed them to acquire the relevant vocational skills during their NS, or those who studied TVET courses in ITEs. Taking reference from the German country study, trade unions there collaborate with the government to ensure that the education, training, and qualification for tradespeople are standardised and contain useful components required based on the current market trend. Therefore, the Labour Movement together with tripartite partners in Singapore can position themselves to emulate the system in Germany. Companies too can influence the development of the training curriculum to fit their needs (ILO, 2017; OECD, 2022).

Beyond the accumulation of vocational skills, recognition for relevant work experience and the attainment of knowledge pertinent to the skilled trades is a key feature of the proposed model. Thus, apart from using qualifications as the only assessment criteria, this paper proposes that employers equally consider the openness to mentoring and

leadership potential of skilled tradespeople in their performance assessment. In adopting this approach, it can help ensure a reliable pipeline of industry mentors. With an increasingly mature workforce, it would also be prudent to recognise work experience and leadership skills on an equal footing with formal qualifications. Therefore, in practice, highly experienced tradespersons who may lack certain educational qualifications are not disadvantaged but instead be given fair opportunities to progress in their careers. In fact, master tradespersons make good instructors for the next cohort of tradespersons and could extend their careers in vocational training institutions or even in IHLs.

The CPM model aims to ensure that there is a steady stream of newcomers, as well as provide an available pool of mentors in the industry to train and guide apprentices and tradespersons. By raising the skills and qualifications required at each stage of the CPM, the skilled trades may observe sustained wage growth and viability as an attractive career path, that is comparable with other vocations.

A survey was conducted to gather feedback on the above-proposed CPM. Respondents were asked about the likelihood of pursuing a career in skilled trades if the CPM was made available. More than half the respondents (53.6%) indicated that they were neutral about considering work in the skilled trades industry, even with the model as shown in Figure 14. This is not a surprising response since the model is hypothetical and has not been implemented. However, a positive takeaway in this instance is that there were no strong negative views regarding the model.

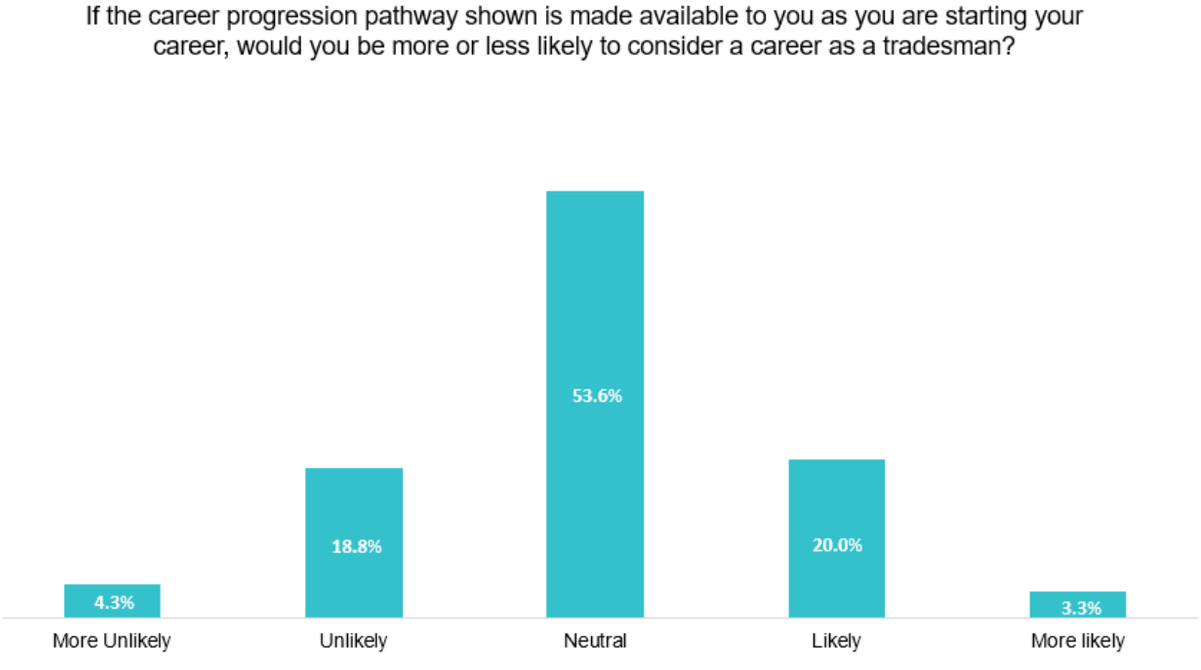

Figure 14. Likelihood of Considering a Career in Skilled Trades (n=1080)

A follow-up question was put forward to the respondents on why they would not consider a career in the skilled trades, even with the career progression pathway available, and 54% of the respondents attributed the reason to low pay, 40% indicated a misalignment of personal interests, and 39% did not want to do physical work, indicating the top three choices respondents made.

In the preceding literature review, it was highlighted that the Labour Movement had an important role in supporting tradespersons for example in the German country case. Therefore, the survey also asked respondents to indicate their views on the role of trade unions, as well as the specific roles trade unions could play in the skilled trades industry (Figure 15). Respondents felt that trade unions play an important role in helping tradesmen in the industry (84%) and that trade unions should be actively advocating for fair and competitive wages (57%), ensuring workplace health and safety protections are in place and adhered to (40%), as well as providing subsidies for relevant training and matching of tradesmen to available jobs (30%) for tradespeople, roles most selected as important for trade unions to play, by participants. However, further analysis via the chi-square test of independence between each of the variables shows no significant relationship. Respondents were also asked to indicate any change in opinions if the CPM was implemented (Figure 16), and close to half of the respondents felt it would improve (49%).

Figure 15. Desired Role of Unions for Tradesmen in Singapore (n=1080)

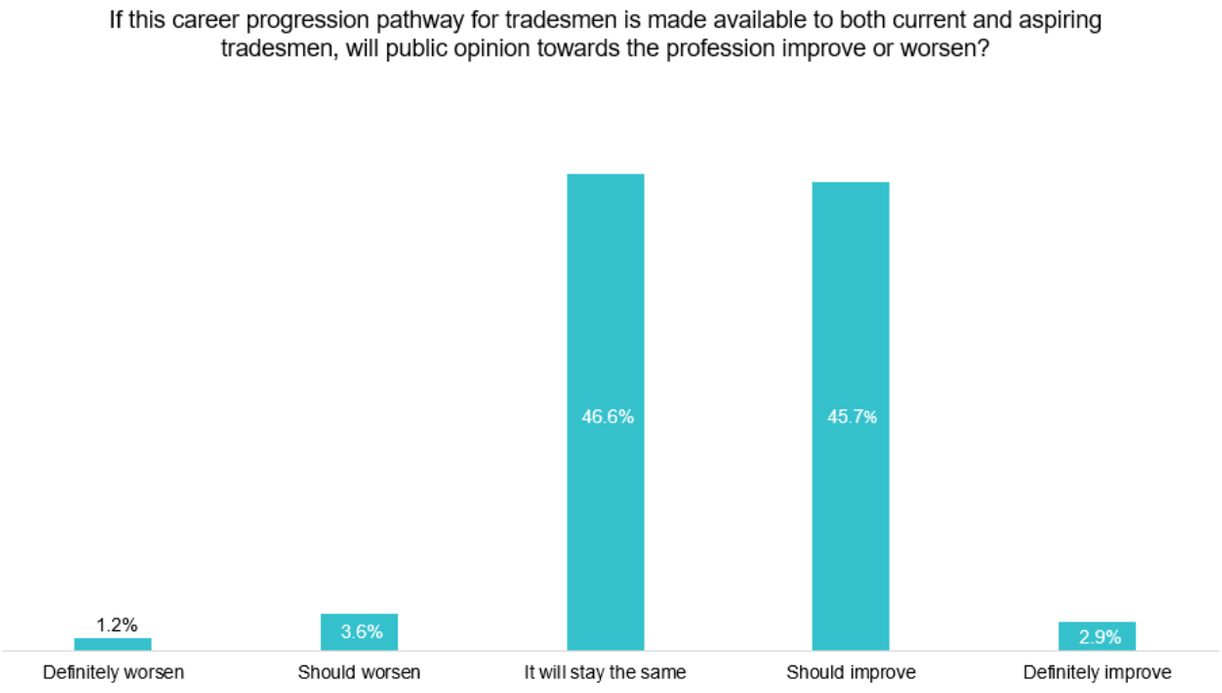

Figure 16. Change in Opinion After Implementing CPM (n=1080)

Results from this survey offer insights into the perspectives youths between the ages of 18 to 35 have of the skilled trades industry and suggestions offered to better implement the proposed CPM.

Additional Suggestions for Consideration for Tripartite Partners

(1) Partner With Social Media News Channels to Showcase Real-Life Stories of Skilled Trades People

To improve the image of trade work as well as ensure a steady stream of workers, social media news channels could be leveraged to showcase real-life stories of skilled tradespeople, following the precedent set by the plumbing industry (Hidaya, 2023). Through “a day in the life of a tradesperson” videos and write-ups, the advantages of skilled trades careers could be highlighted, and negative perceptions addressed. The partnerships with non-traditional media platforms like Our Grandfather Story, The Kopi Co, The Smart Local, and TikTok will effectively reach and inspire a young audience. This approach aims to shift perceptions and present skilled trades as valuable and rewarding career choices.

(2) Acknowledge the Contributions of Tradesmen Through Awards and Recognitions

Secondly, the recognition of the valuable contributions of tradesmen is essential. The approach of honouring outstanding tradespeople through awards and recognition events is paramount. By partnering with societies and associations such as the Singapore Plumbing Society (SPS), the Singapore Electrical Trades Association (SETA), the Singapore Electrical Contractors & the Licensed Electrical Workers Association (SECA), and the Air-conditioning & Refrigeration Association (ARA), a system could be established to promote peer nominations and identify exceptional tradesmen who have displayed exceptional dedication and gone above and beyond their roles.

These annual or quarterly awards, complete with meaningful prizes, serve as a means to cultivate pride and foster a profound sense of accomplishment within the skilled trades profession. This initiative not only acknowledges individual excellence but also uplifts the entire community by setting benchmarks and encouraging continuous improvement. By collectively highlighting the exceptional work of tradespeople, these recognition events demonstrate that skilled trades are indispensable and deserving of respect. This collaborative effort contributes to the elevation of the profession, encouraging a new generation to consider skilled trades as a pathway to meaningful and fulfilling careers and reducing attrition rates.

(3) Identify and Match Interested Candidates With Relevant Experience and/or Background to Prospective Companies

In targeting the full-time national servicemen, tripartite partners can explore promoting work in the skilled trades industry for those that are already performing similar roles during their period of NS. This may encourage more to consider the skilled trades as a career. For example, interested national servicemen can be linked up with job or internship opportunities after NS. This can also be done before entering NS by identifying students who were in related courses in IHLs or ITEs and offering them an opportunity to complete a traineeship or internship at the company to learn the ropes and build upon their knowledge and experience, while also learning the ropes during NS.

(4) Develop a Skilled Trade Price Framework

One suggestion could involve the development of a skilled trade price framework, commencing with the three essential trades, to act as a catalyst for inspiring individuals to pursue careers as skilled tradespeople. Through collaborative efforts with SPS, SETA, SECA, and ARA, an intricate and consistent price guide will be established, harmonised with a Case Trust Mechanism. This innovative approach for household jobs is poised to heighten transparency in pricing, benefiting both tradesmen and consumers alike. By fostering a level playing field and instilling trust in the pricing process, this framework will not only empower consumers to make informed decisions but also encourage aspiring tradespeople to join the industry, drawn by the promise of fairness and reliability. Furthermore, for existing tradespeople, the price framework will serve as an incentive to upskill, thereby enhancing their wage potential and opening up improved work prospects.

(5) Create a Skilled Trades Scholarship for Youth

The creation of a skilled trades scholarship could significantly encourage young entrants to the skilled trades industry. A requirement for recipients to commit to serving a bond in their chosen trade for a specific period, such as two to four years or until they achieve the Junior Tradesperson level could be added as well. This approach not only provides financial assistance for education but also ensures that recipients gain valuable practical experience. Such a scholarship would not only address the financial barriers that often deter youths from pursuing skilled trades but also cultivate a skilled and dedicated workforce for the future.

(6) Create One-Stop Skilled Trades Portal for New Entrants to Practising Tradesperson

NTUC's survey findings highlight the significance of online information for 59% of young individuals interested in joining skilled trades. To cater to their needs, a one-stop Skilled Trades Portal could be established. This platform would serve as a comprehensive resource, catering to everyone from newcomers to experienced tradespeople. Drawing inspiration from the digital marketplace pioneered by the SPS, the Portal would feature a "trades marketplace." Verified tradespeople could list their services, enabling service seekers to directly connect with them. As the Portal evolves, it could transition to a pay-per-use model, facilitating job placement and matching services, and streamlining connections between trained individuals and available trade positions. Beyond the marketplace, the Portal would provide essential details about career progression pathways, expected salaries, useful links to relevant training institutions, and inspiring stories showcasing real-life tradespeople in Singapore. This holistic approach would empower aspiring tradespeople with a wealth of resources and connections, fostering a vibrant and skilled trade community.

Furthermore, with most of the working tradespeople being freelancers and in micro-SMEs, the government could keep track of registered tradesmen and classify them according to the different levels as indicated by the CPM to allow for a smoother transition for the existing tradesmen. The Labour Movement can also work with companies to encourage them to send tradespeople for courses and training to continuously upskill and increase the types of work they can carry out and, in the process, see an increase in their remuneration. Union Training Assistance Programme (UTAP) subsidies could also be provided to union members to help encourage higher participation rates.

Proposed Career Progression Model Pathway for Tradespeople

The following section demonstrates how the proposed CPM (refer to Figure 1) will help tradesperson in three sectors.

Air-Conditioner Technician

Currently, air-conditioner technicians require skills and knowledge on the proper and safe installation of supports, equipment and techniques, all of which are offered by the BCA academy. The enrolment requirement for this course requires applicants to have a minimum of two years of air-conditioning installation experience (BCA Academy, 2020). Additionally, for trade workers who would like to upskill themselves, ITEs offer some short courses to learn more about working as an air-conditioning technician (ITE, 2021). Therefore, the proposed CPM will need to be integrated within this pathway, apprentices will be new workers who joined the industry without little to no working experience as an air-conditioner technician. After shadowing the experienced technicians for at least two

years, they will be eligible to take the BCA qualification to become a licensed air-conditioner technician, from which, they would be considered a junior tradesperson.

To progress to become a tradesperson, they will need to undergo further upskilling courses such as those offered by ITEs to improve themselves. However, solely upskilling should not be relied on, as such, junior tradespeople will need to have worked for at least three years. Thereafter, tradespeople will be able to handle larger projects and scope of work, as well as manage a larger group of workers to build their leadership and communication skills as well. Tradespeople that show considerable promise can then be allowed to mentor apprentices, and finally move up to become a master tradesperson.

Electrician

At present, electricians have three different levels of licensing, with the work that they do progressing as they move up the levels (ELISE, 2023). With the introduction of the CPM within this existing pathway, apprentices can be classified as electricians who possess an ITE certificate with relevant electrical work components, and at least two years of working experience. Apprentices should be mentored by an experienced tradesperson to learn more about the trade itself. Subsequently, an electrical technician will be a junior tradesperson where workers will require either a diploma in electrical power engineering and at least two years of working experience, or to be a licensed electrician with a minimum of five years of working experience. Junior tradespeople are expected to undergo upskilling courses offered at ITEs or IHLs before continuing to attain the highest level of qualification as an electrical engineer, or a tradesperson. With a minimum of two years of work experience, they can be a registered professional engineer in electrical engineering, under the Professional Engineering Act (ELISE, 2023). After fulfilling these requirements, electrical engineers will be able to expand their scope of work and responsibilities and begin to mentor apprentices, and finally, they can become master tradespeople after a period of mentoring and upskilling.

Plumber

Plumbers working in Singapore handle different types of work depending on whether they are licensed or not. In the proposed CPM model, as apprentice plumber (unlicensed) will need to shadow experienced plumbers in their works and projects to gain a better understanding of the work done.

An unlicensed plumber can do potable and used water works, therefore making the apprenticeship journey important to ensure that the unlicensed plumbers are not doing slipshod work. For two years, apprentices will only be allowed to work under the supervision of licensed plumbers. Following which, to be a licensed plumber, a junior tradesperson must hold relevant certificates issued by either the BCA academy, ITEs or IHLs. Once licensed, they can then build up their working experience by working with other tradespeople or master tradespeople to allow them to experience the work that they

will be conducting in the future first-hand. After attaining a minimum of two years of experience working with other licensed plumbers, junior tradespeople can then apply to become licensed plumber, a tradesperson. While PUB (2023) states that as part of the requirement for a licensed plumber, applicants will need to attend a mentorship programme with SPS, this mentoring can be considered in moving it forward for apprentices instead to ensure that the work that they undertake is of a certain standard by shadowing an experienced plumber.

As a tradesperson, licensed plumbers can take up upskilling courses offered by ITEs or IHLs to improve their skills and knowledge in the field, and complete larger scaled works alongside other plumbers. Tradespeople who show promise in mentoring apprentices and managing other plumbers can then be promoted to become master tradespeople.

Conclusion

The skilled trades in Singapore have faced long-standing difficulties in recruiting a core of younger, local tradespersons due to stagnating wages and the negative perception that it is a dead-end with no career prospects. To address this concern, a CPM for the three identified essential trades was proposed: licensed electricians, plumbers, and air-conditioner technicians.

The proposed model presents an apprenticeship pathway that supports career progression through continuous skill upgrading at different points in the apprenticeship journey. The overarching strategy is to minimise attrition levels, recruit and incentivise new apprentices to remain committed in the skilled trades.

From this review, we find that a successful CPM should offer training and recognition at each stage of the career of a tradesperson. The model should be supported with a strong mentorship arrangement to manage attrition, as well as develop a core group of future leaders in the trades. To this end, the CPM also seeks to recognise both work experience and qualifications through defined stages in a tradesperson’s career. A successful CPM must also meet the needs of various stakeholders while not placing the employee at a disadvantage.

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