

Preparing for Work- force Transfor- mation in Singapore: The Role of Technical and Vocational Educa- tion and Training

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Key Takeaways

- Transformations of industries, jobs and workplaces brought about by Industry 4.0 demand that workers continually upskill and reskill while accepting the reality of lifelong learning.
- Globally, Technical and Vocational Education and Training (TVET) has been instrumental in imparting a diverse set of skills to jobseekers and is increasingly important in digital transformation and the future of work.
- Adopting some of the features of long-established European TVET systems such as Germany's and Switzerland's, Singapore has started to actively invest in skill development to match its workforce to emerging industry needs.
- Since the establishment of a Lifelong Learning Council by Singapore's Workforce Development Agency in 2014, the country has witnessed a shift in national discourse towards more emphasis on Continuing Education and Training (CET) schemes and increased employer involvement.
- Under the SkillsFuture Singapore scheme, the Singaporean government now subsidises a wide range of courses with the aim of worker upskilling and reskilling, as well as supporting industry-specific digital workplace programmes to provide guidance on working within digitally enhanced environments.
- In light of the recent COVID-19-induced economic disruptions, the SGUnited Skills programme was launched in July 2020 to specifically target jobseekers via certifiable courses, monthly training allowances and career advisory support.
- In order to ensure standardised, high-quality skill acquisition across the various upskilling schemes, the Singapore government has introduced a national credentialing system, the Workforce Skills Qualification.
- Despite high standards and the continuous assessment of the evolving TVET scheme, more rigorous evaluations, including longitudinal designs, increased data sharing and transparency, are needed to understand the effectiveness of current measures fully.

1 Intro duction

Industry 4.0 innovations such as smart technology, artificial intelligence and automation, robotics, cloud computing, and the Internet of Things are influencing how work tasks are completed, and thus fundamentally changing the nature and design of jobs. Specifically, the growth of advanced technologies has changed the types of skills and competencies needed in the workforce and led to an increased emphasis on lifelong learning and training.¹ This paper follows the broad definition of skills as “the capacity to engage in productive economic activity”.² Skills in rising demand today include a mix of digital competencies such as data science, artificial intelligence, communication and problem-solving using digital tools. A growing emphasis on soft skills, such as communication, problem-solving, and creativity^{3,4} is also being witnessed. Individuals equipped with the right skills, competencies and mindsets are likely to take advantage of these changes for career progression while those who fail to catch up fear displacement.⁵ Efforts towards upskilling, reskilling and lifelong learning have never been more important for adapting to new job market requirements.

Whilst focusing on general education for developing core skills, governments and job seekers are also increasingly turning to Technical and Vocational Education and Training (TVET) to continually upgrade the skills of their workforce.⁶ TVET is an all-encompassing term⁷ covering “education, training and skills development relating to a wide range of occupational fields, production, services and livelihoods”⁸, and forms the focus of this paper. It can be acquired from and certified formally by an educational or training institution or from outside the formal system through private providers (non-formal) or informally through daily

Industry 4.0 innovations such as smart technology, artificial intelligence and automation, robotics, cloud computing, and the Internet of Things are influencing how work tasks are completed, and thus fundamentally changing

- 1 Chuang, Szufang, and Caroll M. Graham. 2018. “Embracing the sobering reality of technological influences on jobs, employment and human resource development: a systematic literature review.” *European Journal of Training and Development* 42: 400–416.
- 2 Iredale, Robyn R., Phillip Toner, Tim Turpin, and Manuel Fernández-Esquinas. 2014. “A Report on the APEC Region Labour Market: Evidence of Skills Shortages and General Trends in Employment and the Value of Better Labour Market Information Systems.” Singapore: Asia-Pacific Economic Cooperation.
- 3 Börner, Katy, Olga Scrivner, Mike Gallant, Shutian Ma, Xiaozhong Liu, Keith Chewning, Lingfei Wu, and James A. Evans. 2018. “Skill discrepancies between research, education, and jobs reveal the critical need to supply soft skills for the data economy.” *Proceedings of the National Academy of Sciences U. S. A* 115: 12630–12637.
- 4 Grundke, Robert, Luca Marcolin, The Linh Bao Nguyen, and Mariagrazia Squicciarini. 2018. “Which skills for the digital era? Returns to skills analysis.” *OECD Science, Technology and Industry Working Papers* 2018/09. OECD Publishing.
- 5 Brynjolfsson, Erik, and Andrew McAfee. 2014. *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton & Company.
- 6 Jagannathan, Shanti, Sungsup Ra, and Rupert Maclean. 2019. “Dominant recent trends impacting on jobs and labor markets-An Overview.” *International Journal of Training Research* 17: 1–11.
- 7 The term TVET is used interchangeably with VET in this paper. Formally the term TVET is seen more commonly in the Asia-Pacific context while the term VET is used in the European context.
- 8 UNESCO. 2015. “EFA Global Monitoring Report 2015: Education for All 2000–2015 –Achievements and Challenges.” (<https://unesdoc.unesco.org/ark:/48223/pf0000232205>).

life.⁹ TVET has also been leveraged to encourage lifelong learning through work-based learning and continuing training and professional development leading to qualifications.¹⁰ However, many existing TVET systems provide only short-term training and fall short of meeting the skill requirements triggered by the digital revolution.¹¹

Three models are generally seen in different countries' vocational education strategies:

- 1 market-driven, non-standardised development of vocational skills as seen in liberal-market economies such as Australia and the United Kingdom,
- 2 highly coordinated educational systems financed by governments and regulated labour market systems, such as in Singapore and
- 3 dual-corporatist approach that combines both models such as in Germany and Switzerland where learning occurs within educational institutes and the industry.¹²

This paper focuses on TVET systems in Singapore, a country that has been actively investing in skills development and TVET programmes to adapt to demographic shifts, mitigate a shrinking labour force and respond to increasing economic uncertainty as well as technological change. In the first part, Singapore's vocational education system will be benchmarked against long-established dual VET systems in Germany and Switzerland, known for their effective study-to-work transitions and low youth-unemployment rates in Europe.¹³ Shifting from students to young graduates and mature workers, the second part presents Singapore's upskilling and reskilling initiatives to tackle job disruption-related challenges, before concluding with an overall analysis and policy recommendations.

9 UNESCO. 2010. "Guidelines for TVET policy review." (<https://unesdoc.unesco.org/ark:/48223/pf0000187487>).

10 UNESCO. 2015. "Proposal for the revision of the 2001 Revised Recommendation concerning Technical and Vocational Education." (<https://unesdoc.unesco.org/ark:/48223/pf0000234137>).

11 Kanwar, Asha, K. Balasubramanian, and Alexis Carr. 2019. "Changing the TVET paradigm: new models for lifelong learning." *International Journal of Training Research* 17:54–68.

12 Euler, Dieter, and Clemens Wieland. 2015. "The German VET system: Exportable blueprint or food for thought." Gütersloh: Bertelsmann.

13 Euler, Dieter, and Clemens Wieland. 2015. "The German VET system: Exportable blueprint or food for thought."

2 F U Preparing a Future-proof Workforce

The formal TVET system¹⁴ in Singapore covers lower and upper secondary school, post-secondary, non-tertiary education and tertiary education levels. The two-three year courses provided by polytechnics are aimed at imparting industry-relevant skills in specific fields such as engineering, biotechnology, ICT, early childhood education, business studies, accountancy and digital media. Technical diplomas ranging between 2.5–3 years provided by the Institute of Technical Education (ITE)¹⁵ are apprenticeship-based work programmes in the engineering, business and infocomm and media sectors, developed in partnership with employers.

Nearly 70% of all student enrolments are at the post-secondary level, shared between polytechnics and the Institute of Technical Education. In contrast, high enrolment rates in the VET system are seen at the upper secondary education level itself in Germany and Switzerland, where 48 and 64% of students in upper secondary education are enrolled in a vocational programme in Germany and Switzerland respectively.¹⁶ The key point in comparison here being that systematically embedding students in the workplace and very early in their learning journey are distinct hallmarks of the German and Swiss TVET programmes. Additionally, in contrast to Singapore's system, the German and Swiss TVETs combine industry-based vocational training and part-time vocational schooling designed in response to market needs¹⁷, bringing together enterprises, vocational schools

¹⁴ UNESCO. 2020. "TVET Country Profile- Singapore." (https://unevoc.unesco.org/pub/tvet_country_profile_-_singapore_revised_may_2020_final.pdf).

¹⁵ Ministry of Education. 2017. "National Strategies to improve Image and Reputation of TVET in Singapore." Country presentation. Singapore. 3rd High Officials Meeting on SEAMEO (Southeast Asian Ministers of Education Organization) TVET. 23–25 May 2017, Kuala Lumpur, Malaysia.

¹⁶ OECD. 2015. "Labour Force Statistics 2015." (https://www.oecd-ilibrary.org/employment/oecd-labour-force-statistics-2015_oecd_lfs-2015-en).

¹⁷ Hummelsheim, Stefan, and Michaela Baur. 2014. "The German dual system of initial vocational education and training and its potential for transfer to Asia." *Prospects* 44, 2: 279–296.

and labour unions in a legal framework.¹⁸ Over one-third of young VET graduates in Germany and Switzerland work in highly skilled occupations.¹⁹

As in Germany, young participants in the Swiss VET system are exposed to hands-on and applied training in theoretical concepts. These courses range from 1–3.5 years in Germany. In Switzerland these can range from two years for certificate level and 3–4 years for full apprenticeships. Apprenticeships are paid, and work placements result in nationally recognised qualifications that can be used to secure full-time jobs or to pursue higher education. A unique feature of the Swiss system is the high level of crossover between programmes, where students can transfer between general and vocational education without being confined to a set pathway regardless of their initial choices. This allows workers coming from vocational systems to pursue university degrees without being disadvantaged in their career development.²⁰ Such flexibility may indeed be desirable in a global workplace that is increasingly fluid in its skills demands. The crossover pathways between general and vocational education in Singapore are not as diverse as in Switzerland or Germany, especially for adult/continuing education. In Singapore, crossover opportunities are more apparent in the traditional education track leading from ITE or polytechnics to universities. For example, one in three polytechnic graduates advance to higher education in universities.²¹

To enhance economic growth and competitiveness, governments are known to “borrow” effective practices and models from other countries to adapt and implement in their own domestic context.²² Reforms in TVETs are no exception.²³ Over the recent decade, Asian TVET systems have begun to share many similarities with their more established European counterparts, including apprenticeship schemes and close industry partnerships to create highly skilled and productive workforces. Singapore is known to actively seek international examples and benchmarks that can be adapted and emulated for its local context. In its TVET development pathway, Singapore has borrowed insights from Germany’s dual vocational education system.²⁴ Currently, less than 50% of the student’s time is spent in workplace training in polytechnics in Singapore. While within ITE, on-the-job training accounts for 70% of curriculum time in work-study programmes.²⁵ Many programmes in Singapore today involve industry internships and new degree programmes, increasingly assuming a “dual” character of industry-specific learning

18 Barabasch, Antje, Sui Huang, and Robert Lawson. 2009. “Planned policy transfer: the impact of the German model on Chinese vocational education.” *Compare: A Journal of Comparative and International Education* 39, 1: 5–20.

19 OECD. 2020. “OECD Employment Outlook 2020.” (<http://www.oecd.org/employment-outlook/2020/>).

20 Hoffman, Nancy, and Robert Schwartz. 2015. “Gold Standard: The Swiss Vocational Education and Training System. *International Comparative Study of Vocational Education Systems.*” National Center on Education and the Economy.

21 Speech by Ong Ye Kung, Minister for Education, Singapore for the Handover of the SMVTI Vocational Training Institute, Yangon, Myanmar. February 19, 2020. (<https://www.moe.gov.sg/news/speeches/speech-by-ong-ye-kung--minister-for-education--for-the-handover-of-the-smvti-vocational-training-institute--yangon--myanmar>).

22 Phillips, David, and Kimberly Ochs. 2003. “Processes of policy borrowing in education: Some explanatory and analytical devices.” *Comparative education* 39, 4: 451–461.

23 López-Guereñu, Nuria. 2018. “Exploring vet policy making: the policy borrowing and learning nexus in relation to plurinational states – the Basque case.” *Journal of Education and Work* 31, 5–6: 503–518.

24 Tucker, Marc S. 2012. “The Phoenix: Vocational Education and Training in Singapore. *International Comparative Study of Leading Vocational Education Systems.*” Washington DC: National Center on Education and the Economy.

25 UNESCO. 2020. “TVET Country Profile-Singapore.”

and on-the-job training.²⁶ German and Swiss systems a greater emphasis on the workplace component. 50% of the VET programmes in Germany comprises of workplace training and 50% of the taught course content is job-specific. Students spend 1–2 days per week learning in school-based settings and 3–4 days undergoing company training. Similarly, in Switzerland nearly 60–80% of VET programmes comprise of workplace training. Students spend 3–4 days each week based at the company with 1–2 days at school. In classrooms, over 50% of content being taught is job-specific.

In Singapore, the availability of specific programmes in the TVET system and their size, in terms of permissible intake of students, is largely determined by labour force requirements rather than the demand for these programmes. Labour requirements in turn are decided by several agencies, such as the National Manpower Council, Ministry of Education, Ministry of Trade and Industry, the Public Service Commission, and the Economic Development Board. As a result, this creates segmentation among prospective learners in terms of competing for the “most-prized courses”.²⁷

Vocational education and skills development in Singapore, however, still struggle to be on par with general education as the focus on “meritocracy”, a hallmark of Singapore’s education system, remains exam-oriented.²⁸ Access to TVET, just like general education, depends to a large extent on prior academic performance and thereby runs the risk of becoming “hierarchical and stratified”²⁹. With too strong a focus on meritocracy, the TVET system would then be unable to achieve inclusiveness and openness to workers with varying academic abilities.

26 Ministry of Education. 2018. Opening Address by Minister for Education Ong Ye Kung, at the Singapore International Technical and Vocational Education and Training (TVET) Conference, 3 October 2018. (<https://www.moe.gov.sg/news/speeches/opening-address-by-minister-for-education-ong-ye-kung-at-the-singapore-international-technical-and-vocational-education-and-training-tvet-conference>).

27 Tucker, Marc S. 2012. “The Phoenix: Vocational Education and Training in Singapore. International Comparative Study of Leading Vocational Education Systems.”

28 Tan, Charlene. 2017. “Lifelong learning through the SkillsFuture movement in Singapore: challenges and prospects.” *International journal of lifelong education* 36, 3: 278–291.

29 Chong, Terence. 2014. “Vocational education in Singapore: meritocracy and hidden narratives.” *Discourse: Studies in the Cultural Politics of Education* 35, 5: 637–648.

3 Workplace Learning and Skilling Mature Workers

Undoubtedly, with rapid technological changes and the changing nature of work, TVET systems need to stay abreast of rapidly transforming industry and labour market demands, including the need to train and impart a combination of skills and qualifications needed to take up available job opportunities. TVET graduates in OECD countries have higher employment rates compared to general education graduates. However, this trend is not seen for older age groups.³⁰ The ITE in Singapore offers special support for working adults who want to go “back to school” to hone their basic literacy and technical skills through Basic Education for Skills Training, the Worker Improvement through Secondary Education programmes and a national credentialing system – Workforce Skills Qualification (WSQ)³¹ (discussed in sections ahead).

While TVET systems can help with smooth transitions from school to work, there are concerns for learners in this system with respect to staying competitive throughout the employment lifecycle, primarily owing to niche job-specific training and thus limited portfolios to make career switches. With rapid technological shifts, all occupations and industries may morph quickly, making prior training redundant. A study of dual education systems revealed that in Germany, those with vocational schooling suffered losses later in their career, thereby eclipsing advances made earlier. In Switzerland, however, the early gains of vocationally trained workers appear greater than the subsequent losses. The role of lifelong learning thus becomes crucial to retaining the advantage offered

³⁰ OECD. 2020. “Employment Outlook 2020.”

³¹ Tucker, Marc S. 2012. “The Phoenix: Vocational Education and Training in Singapore. International Comparative Study of Leading Vocational Education Systems.”

by TVET throughout the “lifecycle of employment” for each jobseeker joining the TVET system.³² Recent reviews of global digital skills frameworks found a lack of adult learners, as well as limited digital skills content in current TVET programmes³³, making it a problem on both the demand and supply sides. Ideally, though, and if well executed, TVET systems can help maintain the productivity of mature workers by keeping their skills current and helping them adapt to new technologies in the workplace.³⁴

As a small country with limited natural resources, Singapore has long invested in its workforce to drive the economy, with human capital being one of its most important resources³⁵. Demographic shifts and by implication a shrinking workforce³⁶ can impact lower and higher ends of the labour market, including securing labour for lower-skill jobs as well as retaining top talent for technology roles in high demand. The government’s focus has therefore been on strengthening and restructuring the business landscape to support innovation and workforce training, while also maintaining a workforce balance in terms of immigration and foreign workers.³⁷ The sub-sections ahead discuss policy efforts towards skilling mature workers and workplace learning in Singapore amidst disruptions such as those brought about by digital transformations, and more recently the COVID-19 pandemic, and their linkages with the country’s current TVET system.

3.1 Continuing Education and Training

Since 2008, the government has developed a comprehensive set of measures to support continuous education and training, including workplace learning. These measures fall under three key policy measures, namely the Continuing Education and Training (CET) Masterplan, the Smart Nation policy framework and SkillsFuture Singapore. Launched in 2008 and refreshed in 2014, the CET Masterplan aims to build deeper levels of expertise within the Singapore workforce through increased employer involvement and investment in skills development. Key aspects include meeting the manpower requirements for the growth of specific industries in Singapore, improved delivery of educational training and career guidance and development of a CET ecosystem with access to high-quality learning opportunities.³⁸

Developed in 2018, the Smart Nation framework aims to transform Singapore into a digital economy through enhanced collaboration and innovation, including a focus on strengthening digital capabilities (through training in data analytics and data science, for example) within the workforce and government agencies and society more broadly.³⁹ In 2014, the Singapore Workforce Development Agency established a Lifelong Learning Council to encourage more Singaporeans to view

- 32 Hanushek, Eric A. 2012. “Dual Education: Europe’s Secret Recipe?” CESifo Forum, ifo Institut – Leibniz-Institut für Wirtschaftsforschung an der Universität München 13, 3: 29–34.
- 33 Gekara, Victor, Darryn Snell, Alemayehu Molla, Stan Karanasios, and Amanda Thomas. 2019. “Skilling the Australian Workforce for the Digital Economy. Research Report.” National Centre for Vocational Education Research.
- 34 Marope, Priscilla Toka Mmantsetsa, Borhène Chakroun, and KP Holmes. 2015. *Unleashing the potential: Transforming technical and vocational education and training*. Paris: UNESCO Publishing.
- 35 Osman-Gani AM. 2004. “Human Capital Development in Singapore: An Analysis of National Policy Perspectives.” *Advances in Developing Human Resources* 6, 3: 276–287. (doi:10.1177/1523422304266074).
- 36 Ministry of Trade and Industry. 2014. “MIT Occasional Paper on Population and Economy.” (<https://www.mti.gov.sg/-/media/MTI/Resources/Feature-Articles/2012/MIT-Occasional-Paper-on-Population-and-Economy/MTI-Occasional-Paper-on-Population-and-Economy.pdf>).
- 37 Ministry of Trade and Industry. 2014. *MIT Occasional Paper on Population and Economy*.
- 38 Ministry of Manpower. 2020. “Refreshed Continuing Education and Training (CET) Masterplan.” (<https://www.mom.gov.sg/employment-practices/skills-training-and-development/refreshed-cet-masterplan>).
- 39 Smart Nation and Digital Government Office. 2021. “Transforming Singapore Through Technology.” (<https://www.smartnation.gov.sg/why-Smart-Nation/transforming-singapore>).

learning as a continuous journey over their lifetime. These policy shifts reflect how the national discourse is shifting towards ensuring that workers stay competent and employable, embracing lifelong learning. The Ministry of Education in Singapore has also significantly enhanced the delivery of CET via Institutes of Higher Learning (IHLs) with strong partnerships with employers and private training institutes. Unions and industry associations are also key players in building alternative vocational pathways through private sector training institutions providing subsidies for undertaking CET opportunities for potential learners. Currently there are 50 CET centres led by the private sector that offer training for workers (including rank-and-file workers, professionals, managers, executives and technicians) across industries such as aerospace, precision engineering, and process manufacturing, among others. Lifelong learning is largely emerging as a tripartite effort in Singapore, as seen in the role of Community Development Councils⁴⁰ and the National Trades Union Congress – a national confederation of trade unions (through its Employment and Employability Institute-e2i) – in connecting job-seeking individuals to relevant training courses offered by CET Centres.⁴¹

3.2 SkillsFuture Singapore

The above initiatives are complemented by SkillsFuture Singapore (SSG) – a “national movement to provide Singaporeans with the opportunities to develop their fullest potential throughout life, regardless of their starting points”.⁴² It comprises a range of skills-upgrading programmes that are targeted at Singaporeans across all stages of life, from students through to early and mid-career workers, as well as retirees, and fosters a culture of lifelong learning. As part of the programme, the government awarded all Singaporeans aged 25 and above an opening credit (lifetime validity) of S\$500 in January 2016 and gave a one-off top-up of S\$500 in October 2020 (valid for five years), with a pledge to providing periodic top-ups.⁴³ This scheme encourages individual ownership of skills development and lifelong learning, and the credit can be used to pay for courses subsidised or approved by SSG, including online courses, those offered by Ministry of Education-funded tertiary institutions and those conducted by selected public agencies⁴⁴. Since its inception, over half a million Singaporeans have used their SkillsFuture Credit. The courses garnering the highest participation rates have been in the areas of Information and Communications Technology, Food and Beverage, and Productivity and Innovation.⁴⁵ This credit supplements other funding avenues provided by SkillsFuture, such as fee subsidies on short-term courses on planning and prototyping blockchain, cyber security, design thinking, etc. (ranging from a few hours to weeks in training duration), conducted by private training providers as well as IHLs. SSG also works with industry partners to support industry-specific Digital Workplace programmes that include targeted training on working within digitally enhanced environments. In 2019, approximately 36,000 individuals participated in this training.

⁴⁰ CDCs were formed in 1997 to strengthen community bonds and foster social cohesion through an ABC mission – Assisting the Needy, Bonding the People and Connecting the Community – and to serve as a bridge between community units and the government of Singapore.

⁴¹ UNESCO. 2020. “TVET Country Profile- Singapore.”

⁴² Government of Singapore. 2020. “About SkillsFuture.” (<https://www.skillsfuture.sg/AboutSkillsFuture#section2>).

⁴³ In addition to the \$500 Credit, a one-off SkillsFuture Credit of \$500 will be provided to every Singapore citizen aged 40 to 60 (inclusive) as of 31 December 2020. This credit can be utilised from 1 October 2020 onwards, on about 200 career transition programmes offered by the Continuing Education and Training Centres, and will remain valid for five years to encourage individuals to learn, reskill, and explore new career opportunities.

⁴⁴ SkillsFuture Singapore. 2019. “Lifelong Learning Begins with Me.” (<https://www.skillsfuture.sg/-/media/A9B1DF3D25BE4AE5ACADB02CF07F4E03.ashx>).

⁴⁵ SkillsFuture Singapore. 2019. “Year In Review.” (<https://www.skillsfuture.sg/NewsAndUpdates/DetailPage/5ed87fff-39df-4dc3-b63b-6f2763d-b6aa9>).

Alongside the SkillsFuture credit, SSG also has many work-study programmes offered as diplomas and degrees. In 2018 a series of “bootcamps” were launched as a pilot to equip fresh graduates and mid-career individuals with on-the-job learning, mind-sets and technical skills related to specific job roles in participating companies.⁴⁶ These have evolved into programmes that yield work-study certificates in areas such as Digital Marketing, Engineering 4.0 and Customer Service.⁴⁷ SSG also provides competitive SkillsFuture Study Awards of \$5,000 to support early-to-mid-career Singaporeans deepening their skills in sectors or areas that are identified as having growth potential.⁴⁸ Polytechnic and ITE graduates can also apply for SkillsFuture Earn and Learn Programmes (ELPs) that include both workplace-based learning and institution-based teaching for on-the-job skills development and a smoother transition into employment.⁴⁹ These ELPs include specialist diplomas in applied artificial intelligence, and healthy ageing and community care for the elderly. To date, approximately 4,500 individuals and 1,100 companies have benefited from the work-study programmes since the first programme was launched in 2015.⁵⁰ Enrolment in these Work-Study programmes is steadily increasing, with 2,200 Singaporeans embarking on a Work-Study programme in 2019, an increase from 1,700 participants in 2018.⁵¹

Four SkillsFuture work-study programmes are to be introduced by the Institutes of Higher Learning over the next two years, creating over 140 job roles for Singaporean fresh graduates.⁵² A partnership approach between the government, education institutes and participating companies is the cornerstone of work-study programmes. Firms of all sizes have harnessed SkillsFuture funding to provide new career opportunities, in-depth training and targeted support for new graduates as well as mid-career workers seeking to change occupations or industries due to increasing technological disruption and economic changes. A recent effort, for example, accessible under SkillsFuture, has been initiated by the Oversea-Chinese Banking Corporation (OCBC) to provide a set of 13 modules on data analytics conducted by experts from polytechnics and the industry.⁵³

46 Kurohi, Rei. 2018. “SkillsFuture pilots work-learn bootcamp to support fresh grads, mid-career professionals.” *The Straits Times*, 28 July. (<https://www.straitstimes.com/singapore/education/skillsfuture-pilots-work-learn-bootcamp-to-support-fresh-grads-mid-career>).

47 Singapore SkillsFuture. 2021. “SkillsFuture Work-study Certificate.” (<https://www.skillsfuture.gov.sg/wscert>).

48 Singapore Workforce Development Agency. 2016. “SkillsFuture Study Awards offered to about 349 Singaporeans for skills mastery.” Media release, 9 July. (https://www.nas.gov.sg/archivesonline/data/pdfdoc/20160709003/ForMedia_FINAL_Media%20Release_%20SkillsFuture%20Study%20Awards_20160709_WDA.pdf).

49 UNESCO. 2020. “TVET Country Profile- Singapore.”

50 Singapore SkillsFuture. 2019. “More Work-Study Opportunities for Singaporeans.” Press Release, 12 July. (https://www.ssg-wsg.gov.sg/news-and-announcements/12_Jul_2019.html).

51 SkillsFuture Singapore. 2019. “Year In Review.” (<https://www.skillsfuture.gov.sg/NewsAndUpdates/DetailPage/5ed87fff-39df-4dc3-b63b-6f2763db6aa9>).

52 Co, Cindy. 2020. “Four new SkillsFuture Work-Study programmes launched, with more than 140 places over the next 2 years.” Channel News Asia, 12 August. (<https://www.channelnewsasia.com/news/singapore/four-new-skillsfuture-work-study-programmes-launched-13013424>).

53 Ang, Jerene. 2020. “OCBC’s data analytics training programme for employees receives IBF accreditation.” Human Resources Online, 24 August. (<https://www.humanresourcesonline.net/ocbc-s-data-analytics-training-programme-for-employees-receives-ibf-accreditation>).

3.3 SG United Skills Programme

In light of the recent economic disruptions due to COVID-19, which led to an almost doubling of retrenchments in the second quarter of 2020⁵⁴, the government doubled down on efforts to work with employers to create and sustain job opportunities for the Singaporean workforce by working collaboratively with industry. American International Assurance (AIA) Singapore, for example, recently announced up to 500 new career opportunities along with training and financial support for fresh graduates and those making mid-career transitions, for example, from a non-technical role to a technical role or shifting the sector of work.⁵⁵ These efforts, combined with the existing suite of SkillsFuture initiatives, reflect the considerable investment in and concerted policy shift of the Singapore government towards retraining and retaining workers through upskilling.

A major training and job support scheme to assist Singaporeans affected by the COVID-19 is the SGUnited Skills (SGUS) programme that was launched by SkillsFuture Singapore in July 2020. Nearly 7,200 trainees had enrolled under this programme (as of December 31, 2020).⁵⁶ The sectors that received high enrolments were ICT and media, professional services, manufacturing and healthcare.⁵⁷ SGUS is a full-time training programme ranging from 6 to 12 months, targeting over 20,000 jobseekers. The SGUS consists of certifiable courses delivered by various CET Centres in Singapore, which include universities, polytechnics and ITE, and provides a monthly training allowance of S\$1,200 and career advisory support. The training is modular in format, allowing trainees the flexibility to exit if they find jobs during the training. Apart from courses provided by CET Centres, the SGUnited Mid-Career Pathways Programme involves courses provided by companies in key sectors aimed at jobseekers between the ages of 40 and 60, with a monthly training allowance of S\$1,500. The course fees are subsidised and, similar to SGUS, are aimed at increasing the employability of the jobseekers. These programmes complement existing efforts such as the Professional Conversion Programme that help mid-career PMETs move into new occupations and sectors that have good prospects and opportunities for progression through industry-recognised skills-conversion training.⁵⁸

54 Manpower Research & Statistics Department. 2020. "Labour Market Survey." (<https://stats.mom.gov.sg/Pages/Retrenchment-Summary-Table.aspx>).

55 "AIA Singapore creates up to 500 new career opportunities for fresh graduates and mid-career switchers impacted by COVID-19." AIA, 21 September 2020. (<https://www.aia.com.sg/en/about-aia/media-centre/press-releases/2020/aia-singapore-creates-up-to-500-new-career-opportunities.html>).

56 "540,000 people, 14,000 businesses benefited from SkillsFuture initiatives last year." Channel News Asia, 9 February 2021. (<https://www.channelnewsasia.com/news/singapore/540000-individuals-14000-businesses-skillsfuture-training-14145518>).

57 Singapore SkillsFuture. 2020. "SG UnitedSkills." (<https://www.skillsfuture.sg/sgunitedskills>).


58 Workforce Singapore. 2020. "Programmes and Initiatives." (<https://www.wsg.gov.sg/programmes-and-initiatives/professional-conversion-programmes-individuals.html>).

59 Workforce Singapore. 2020. "Singapore Workforce Skills Qualifications (WSQ)." (<https://www.ssg.gov.sg/wsqs.html>).

60 Ramos, Catherine, and Saravanan Gopinathan. 2016. "Vocational training and continuing education for employability in Singapore and Philippines." The HEAD Foundation Working Papers Series 1/2016.

3.4 Workforce Skills Qualification

The Singapore government introduced a national credentialing system, the Workforce Skills Qualification (WSQ), in 2005^{59,60} to ensure standardised, high-quality skill acquisition across its various upskilling schemes. Based on national standards developed by the Singapore Workforce Development Agency (WDA) and various industry partners, WSQ ensures workers acquire skills needed by employers at the workplace as well as recognised CET qualifications. With clear progression pathways, workers can also use WSQ to upgrade their skills and advance their careers. The



quality of WSQ is assured by WDA, from the development of competency standards, accreditation of training providers to the award of its qualifications.⁶¹ The Singapore government offers subsidies for self-sponsored individuals, ranging from 50 to 95% to offset course fees, with the percentage varying according to the accreditation of the training centres and courses, age and citizenship of trainees and target level of courses.⁶² For employer-sponsored training, subsidies vary based on the size of the company (higher subsidies for small and medium enterprises (SMEs)) and whether the training is being provided internally or externally.⁶³ The WSQ is currently managed by SkillsFuture Singapore under the Ministry of Education and focuses on adult learners.⁶⁴

Based on recommendations by the Committee on the Future Economy in 2017, the Singapore government has invested more than \$4.5 billion in an Industry Transformation Programme.⁶⁵ Industry Transformation Maps (ITMs) have been developed by the government in partnership with both small and large firms, industry representatives and unions to drive industry transformation in key economic sectors for Singapore. The WSQ system aligns with the ITMs developed for 23 economic sectors under 6 clusters:

- 1 Manufacturing (Precision Engineering, Electronics, Marine and Offshore and Aerospace, and Energy and Chemicals),
- 2 Built Environment (Construction, Real Estate, Environmental Services and Security),
- 3 Trade and Connectivity (Air Transport, Sea Transport, Land Transport, Logistics and Wholesale Trade),
- 4 Essential Domestic Services (Healthcare and Education),
- 5 Modern Services (Professional Services, ICT & Media, and Financial Services, and
- 6 Lifestyle (Food Services, Food Manufacturing, Retail and Hotels).⁶⁶



61 Amiron, Evarina. 2014. "Enhancing the Quality and Relevance of Technical and Vocational Education and Training (TVET) for Current and Future Industry Needs-Phase 1." Singapore: APEC Secretariat, Economic Committee.

62 Professional, Managerial, Executive (PME) level or non-PME.

63 Ramos, Catherine, and Saravanan Gopinathan. 2016. "Vocational training and continuing education for employability in Singapore and Philippines."

64 Workforce Singapore. 2020. "Singapore Workforce Skills Qualifications (WSQ)."

65 Ministry of Trade. 2021. "ITM Overview." (<https://www.mti.gov.sg/ITMs/Overview>).

66 Ministry of Trade. 2021. "Economic Clusters." (<https://www.mti.gov.sg/FutureEconomy/Economic-Clusters>).

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A key pillar of each ITM is a corresponding Skills Framework, which has been co-created by employers, industry associations, education institutions and unions, and provides information on sector-specific career pathways covering different occupations and job roles.⁶⁷ Skills Frameworks for 34 sectors are in place to date and SSG continually updates the Skills Frameworks to reflect the changing market needs, with eight new Skills Frameworks rolled out in 2019.⁶⁸

Skills and competencies as part of the Skills Framework identified for each job role fall under

- 1 Technical Skills and Competencies, aligned with industry trends and job roles, and
- 2 Critical Core Skills such as thinking critically (with competencies in Creative Thinking, Decision Making, Problem Solving, Sense Making and Transdisciplinary Thinking), interacting with others (with competencies in Building Inclusivity, Collaboration, Communication, Customer Orientation, Developing People and Influence) and staying relevant (with competencies in Adaptability, Digital Fluency, Global Perspective, Learning Agility, Self Management).⁶⁹

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Clear TVET qualifications such as WSQ can help standardise skills assessments and facilitate movement of skilled labour within and across countries.⁷⁰

67 SkillsFuture Singapore. 2020. "SkillsFuture." (<https://www.skillsfuture.sg/>).

68 SkillsFuture Singapore. 2019. "Year In Review." The skills frameworks have been introduced for the following sectors: accountancy, air transport, aerospace, biopharmaceuticals manufacturing, built environment, design, early childhood care and education, electronics, energy and chemicals, energy and power, engineering services, environmental services, financial services, food manufacturing, food services, healthcare, hotel services, human resource, infocomm, intellectual property, landscape, logistics, marine and offshore, media, precision engineering, public transport, retail, sea transport, security, social service, tourism, training and adult education, wholesale trade, workplace safety and health.

69 SkillsFuture Singapore. 2020. "Critical Core Skills." (<https://www.skillsfuture.sg/skills-framework/criticalcoreskills>).

70 Marope, Priscilla Toka Mmantsetsa, Borhène Chakroun, and KP Holmes. 2015. "Unleashing the potential: Transforming technical and vocational education and training." Paris: UNESCO Publishing.

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4 Evaluating Singapore's Approach to Lifelong Learning

W An assessment of the efficacy of the above programmes, given their relative nascence compared to Singapore's longstanding general education programmes, mandates close monitoring and evaluation. Programme-specific studies have been undertaken to assess the impact of training on wage and employment outcomes. A study to estimate the returns to investment in Singapore's WSQ training revealed that unemployed trainees who completed their full training from 2011 to 2016 had greater success in seeking employment and attaining higher wages than in their previous jobs (0.8% higher on average in the year after training), compared to those who had not attended training.⁷¹ The same study also examined the wage data of the initial batches of graduates from the SkillsFuture Earn and Learn Programme (ELP) and established that ELP graduates enjoyed a sustained wage premium of about 10% above that of polytechnic diploma graduates.⁷²

71 Teo, M. and Jia Ying, W. 2018. "Returns to Singapore Workforce Skills Qualifications (WSQ) training. Does Training Raise Wages and Employability?" Economic Survey of Singapore 2018. (https://www.mti.gov.sg/-/media/MTI/Resources/Economic-Survey-of-Singapore/2018/Economic-Survey-of-Singapore-2018/FA_AES2018.pdf).

72 Seow, Johanna. 2019. "WSQ training helped boost real wages and likelihood of employment: MTI economists." The Straits Times, 15 February. (<https://www.straitstimes.com/business/wsq-training-helped-raise-real-wages-and-likelihood-of-employment-mti-economists>).

Nevertheless, key learning points can be derived from assessments of TVET programmes elsewhere. Apart from student enrolment and expenditure in TVET, these programmes' effectiveness can also be assessed by the quality of interactions between various actors in the education and employment components of the system. A key differentiating factor between a strong and weak VET system is the distribution of the decision power of these actors over the various phases of curriculum design and implementation. These decisions revolve around three phases broadly:

- 1 curriculum design, including standardisation of qualifications, evaluation, and participation of companies,
- 2 curriculum application, including place of learning for students (school versus firm), regulation of student rights, cost sharing, and exam format, and
- 3 curriculum updating, including decisions around timing of curriculum updates, procuring information on graduates and changes in demand for VET.

An Education-Employment Linkage Index⁷³ (EEL) was developed by Renold et al. to capture the power sharing between education and employment actors over these three phases based on a survey of VET experts⁷⁴ from governments, industry and research institutes in 18 countries. Switzerland and Germany, which have dual VET systems, were found to have the highest EEL while Asian countries, including Singapore, scored the lowest. Singapore's case reveals that while employers might be consulted or serve on oversight boards, much of the coordination and decision power lies with the government. The ITE programmes were found to be largely classroom-based, with workplace learning happening after classroom learning ends, unlike the Swiss and German approaches, where on-the-job training constitutes a greater share of instructional time. Other aspects in which Singapore scored below average as compared to other countries are employer engagement in all three phases, particularly around curriculum design, the development, delivering and grading of exams and curriculum reviews and updates. These findings suggest that in these critical aspects, more active employer engagement and consultation when developing curriculums and programmes can be incorporated to refine their industry relevance.

Yet another issue relates to public perceptions of TVETs. In many Asian countries, TVET pathways are often seen as inferior to higher education even though TVET graduates can have high earning capacity, particularly in industries that are set to grow in the new digital economy.^{75, 76} The creation of ITE and the continual investment in its development have been geared towards changing attitudes and mindsets that stubbornly regard VET as being secondary to general education⁷⁷ and demonstrating the value of vocational education in a knowledge-based economy. The salaries of those graduating from ITE have risen over the years and employment

73 The education-employment linkage index addresses linkage throughout the Curriculum Value Chain at all observable processes where education-system and employment-system actors might come into contact. A survey was developed to measure the index, and sent to VET experts from the education, employment, and research sectors in the twenty countries identified as top youth labour markets or PISA performers. Experts taking the survey were the highest-ranking individual in their field that focused exclusively on VET issues.

74 24 experts were consulted in Singapore, 57 in Switzerland and 1 expert in Germany.

75 Grainger, Paul, and Romina Bandura. 2019. "Rethinking Pathways to Employment: Technical and Vocational Training for The Digital Age." *The Future of Work and Education for the Digital Age*, TheThink20, Japan.

76 Hummelsheim, Stefan, and Michaela Baur. 2014. "The German dual system of initial vocational education and training and its potential for transfer to Asia." *Prospects* 44, 2: 279–296.

77 Varaprasad, Natarajan. 2016. *50 years of technical education in Singapore: How to build a world class TVET system*. World Scientific.

rates six months post-graduation are nearly 90%, making vocational learning a viable alternative to general education⁷⁸, albeit significantly less prestigious. To moderate such perceptions, the state has sought to elevate the quality of the TVET experience to enhance its appeal.^{79, 80} A ten-year graduate employment survey tracking 3,500 graduates from ITE (2007–2017) reveals that 44% of ITE graduates went on to obtain qualifications higher than an ITE certificate, while about 25% reported a polytechnic full-time diploma as their highest qualification and 19 % reported diplomas not offered by polytechnics. ITE graduates were found to be earning S\$500 more on average in comparison to their peers who joined the workforce right after secondary school.⁸¹

As the TVET ecosystem expands and becomes more comprehensive, an issue to consider and avert is the problem of credentialism – where workers begin to accumulate vocational training certificates in a bid to enhance their employability and competitiveness in a crowded job market, while the standard for credentials keeps increasing.⁸² In other words, credentialism refers to the undesirable situation where skills certifications may be irrelevant or extraneous to industry needs and therefore do not translate into tangible benefits for workers, or where the credentials required for jobs become more inflated over time. Singapore’s famed meritocratic approach to governance may also contribute to a culture of credentialism, thereby hollowing out the intention of making the VET pathway a viable alternative for career advancement.

78 World Skills UK. 2019. “Singapore: Building a future economy with TVET at its heart.” (https://www.worldskillsuk.org/wp-content/uploads/2020/10/rsa_wsuk_singapore-case-study-07-11-19.pdf).

79 Speech by Ong Ye Kung, Minister for Education, Singapore for the Handover of the SMVTI Vocational Training Institute, Yangon, Myanmar. February 19, 2020. (<https://www.moe.gov.sg/news/speeches/speech-by-ong-ye-kung--minister-for-education--for-the-handover-of-the-smvti-vocational-training-institute--yangon--myanmar>).

80 Ministry of Education, Singapore. 2018. Opening Address by Minister for Education Ong Ye Kung, at the Singapore International Technical and Vocational Education and Training (TVET) Conference, 3 October 2018. (<https://www.moe.gov.sg/news/speeches/opening-address-by-minister-for-education-ong-ye-kung--at-the-singapore-international-technical-and-vocational-education-and-training-tvet-conference>).

81 Ang, Jolene. 2020. “5% of ITE grads go on to get degrees from local public unis.” *The Straits Times*, 21 January 21, 2020. (<https://www.straitstimes.com/singapore/education/5-of-ite-grads-go-on-to-get-degrees-from-local-public-unis>).

82 Brown, Phillip, Hugh Lauder, and David Ashton. 2010. *The global auction: The broken promises of education, jobs, and incomes*. Oxford: Oxford University Press.

5 Conclusion

Mature economies, such as Singapore's, are at a critical inflexion point where the confluence of slower economic growth, more intensive digitalisation and ageing populations have ignited challenging issues for managing the workforce. Principally, rising technologisation can present opportunities for automation and resource optimisation but is also raising concerns around workplace disruptions, skill-based polarisation as well as increasing job loss and unemployment. Despite student enrolments in Singapore TVET programmes rising, challenges still remain for smooth school-to-work transitions for students taking the vocational track, compared to those in the German and Swiss systems.

Countries with successful TVET systems boast strong industry partnerships in setting TVET priorities at the policy level, determining current and future priority skill areas, developing national skill standards, financing TVETs, and providing TVET pre-employment as well as on-the-job training and successful placement of TVET graduates.⁸³ Despite their commonalities, the dual-model VET systems differ in their support for workforce transformation in terms of areas of focus for skill development, roles of different stakeholders within the government-industry networks, regulations around course development and qualifications, among others.⁸⁴ To fully optimise opportunities for policy borrowing between Asian and European TVET systems given workforce transformations under Industry 4.0, further research is needed, such as identifying target indicators in relation to skills development in the context of digital transformation and rapidly changing labour market trends within the regional and national contexts.

In Singapore, substantial investments in skills development and training are bound to raise questions around the measurement of their efficacy in improving productivity and employment opportunities. In response to a parliamentary question, then Minister for Education Ong Ye Kung responded that Singapore had been evaluating the outcomes of training through several measures, including collecting feedback from employers and individuals on course quality and training outcomes.⁸⁵ More rigorous evaluations, including longitudinal designs, and increased data sharing and transparency are needed to understand the effectiveness of current measures fully.

Overall, our policy review of TVET in Singapore and insights from the German and Swiss systems have shown that there are some adaptations that can and should be introduced to refine Singapore's TVET model

⁸³ Ra, S., B. Chin, and A. Liu. 2015. "Challenges and opportunities for skills development in Asia: changing supply, demand, and mismatches." Philippines: Asian Development Bank.

⁸⁴ Lassnigg, Lorenz. 2017. "Apprenticeship Policies coping with the crisis: A comparison of Austria with Germany and Switzerland." In *Vocational Education and Training in Times of Economic Crisis*. (https://link.springer.com/chapter/10.1007/978-3-319-47856-2_7).

⁸⁵ "Increasing Number of SkillsFuture Awards for Singaporeans Aged 40 and Above In View of Economic Slowdown." Hansard Parliamentary debates 94, 4 November 2019. (<https://sprs.parl.gov.sg/search/sprs3topic?reportid=written-answer-na-5294>).

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to support reskilling and upskilling as part of workforce transformation under Industry 4.0. These include:

1 *Developing stronger education-employment linkages:* The variations in TVET-systems across countries are to some extent an outcome of variations in the power held by various actors within the education and employment systems within the respective TVET system. Taking the lead from the German and Swiss systems, Singapore can consider increasing the current levels of employer engagement in TVET, along with improving the share of workplace training⁸⁶, especially in terms of collaboration between industries and training institutions for developing training syllabi, particularly with modules relevant to digital transformations in industries and workplaces.

2 *Developing multiple transition pathways for TVET learners:* As workplaces transform under Industry 4.0, there must also be provision of additional pathways for learners of varied profiles to enter the TVET system and plan fluid transitions between education and employment at various career stages. This will require rethinking of the eligibility criteria for TVET programmes, acknowledgement of previous skills and work experience, timely career guidance and outreach on available learning and career pathways for prospective learners to optimise TVET opportunities.⁸⁷ Singapore is making inroads in considering work experience and CET credentials, including taking into account the qualifications of working adults undertaking part-time programmes and not relying only on academic results. “Work experience-based pathways” as criteria for admissions into selected ITE and polytechnic diplomas are underway, to encourage working adults to return to school to uptake new skills.⁸⁸ Importantly too, the rigour and relevance of TVET programmes must be closely managed and maintained to ensure that the credentials they offer are industry-relevant, well-recognised and can translate into an effective match between jobs and prospective hires. Recruitment advertisements and job portals must also be scrutinised to detect any emerging trends in credentialism.

3 *Supporting research on individual adaptability of learners:* Apart from the quality of the TVET system itself in terms of its format and content, individual adaptability to changing job market conditions and education, training and skills development needs to play an important role. As digitalisation progresses, training programmes should

consider the technological skills for different groups of learners of different ages and abilities⁸⁹, along with relevant soft skills such as communication, cross-cultural literacy and collaboration. In light of the mediatised landscape, variations in learners’ media-use habits, digital literacy levels and attitudes towards learning new technologies can also influence the effective leveraging of online learning platforms. Such factors thus need closer investigation.

⁸⁶ Renold, Urusula, Thomas Bolli, Katherine Caves, Jutta Bürgi, Maria E Egg, Johanna Kemper, and Ladina Rageth. 2018. “Comparing International Vocational Education and Training Programs: The KOF Education-Employment Linkage Index.”

⁸⁷ Harris, Roger and Ramos, Catherine R. 2012. “The one less travelled: adult learners moving from the academic sector to the vocational sector in Singapore and Australia.” *Journal of Vocational Education & Training* 64, 4: 387–402.

⁸⁸ Speech by Mr Ong Ye Kung, Minister for Education, at the 2nd Singapore Institute of Technology Applied Learning Conference. 30 January 2020 (<https://www.moe.gov.sg/news/speeches/speech-by-mr-ong-ye-kung--minister-for-education--at-the-2nd-singapore-institute-of-technology-applied-learning-conference>).

⁸⁹ Lim, Sun Sun. 2016. “Young people and communication technologies: Emerging challenges in generational analysis.” *Communication across the life span: 5–20*.

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