ASEAN TEAM Project–Component 1:

Enhancing the Competitiveness of HR through Responsive TVET Curriculum
Supported by Involvement of Industries and Labour Market Information

Regional Report

Integrating the Case Studies of 10 AMS

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Foreword

EUI-HAE CECILIA CHUNG

Director-General, ASEAN & Southeast Asian Affairs Bureau
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Initiated by the ASEAN and with the support of 7 million USD from ASEAN-Korea Cooperation Fund (AKCF), the "ASEAN-ROK Technical and Vocational Education and Training for ASEAN Mobility (TEAM)" programme is one of the key deliverables of the ASEAN-Korea Commemorative Summit, held in Busan in November 2019.

Human resource development is one of ASEAN's priority as envisioned by the ASEAN Declaration on Human Resources Development for the Changing World of Work, adopted by ASEAN leaders in 2020. Furthermore, "People Mobility" is one of the 5 strategic areas of the Master Plan on ASEAN Connectivity (MPAC) 2025.

Against this backdrop, the TEAM Programme aims to strengthen technical and vocational education and training (TVET) system that enhances the competitiveness of the ASEAN region and promotes sustainable development in response to the rapidly changing industrial environment.

The TEAM Programme tackles three aspects of TVET system in the region. The first component establishes a labour market information system for ASEAN, the second component focuses on directly operating the TVET mobility program between ASEAN countries, and the third component analyzes the national qualification framework (NQF) of the CLMV countries (Cambodia, Lao PDR, Myanmar, Viet Nam).

This series of report is the result of Component 1 "The Study on Enhancing the Competitiveness of ASEAN Human Resources through Responsive TVET Curriculum Supported by Involvement of Industries and Labor Market Information" implemented by the Korea Vocational Competency Research Institute (KRIVET).

All the 10 ASEAN member countries (AMS) participated in this project, including the policy makers, national resource persons, regional experts, major sectoral bodies, and the ASEAN Secretariat. KRIVET was in charge of the overall operation of the project, closely cooperating with the ASEAN side and the Korean Ministry of Employment and Labor (MOEL). As a result to the joint-effort, a national report for 10 countries and one regional report were successfully produced.
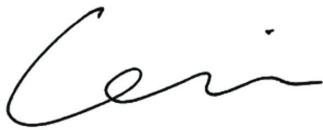
By analyzing AMS's current TVET governance, related policies, gaps in labor market demand and technology supply, and best practices, the reports suggests the direction of TVET policy at

the national and regional level under the rapid change of the economy and labour market condition.

In the midst of the global digital transformation according to the 4th industrial revolution and the continuing crisis of the COVID-19 pandemic, the establishment of a TVET system that can be used not only at the individual national level but also at the regional level will be the key to strengthening the future competitiveness of ASEAN's human resources. I hope this report can be used as a core basis for stakeholders to diagnose the current status of AMS and set the direction of future human resource training policies.

Lastly, I would like to take this opportunity to express my deepest gratitude to all the contributors to this project, especially the regional and national experts and KRIVET researchers for the hard work and great efforts to finalize the report. I would like to also convey my special appreciation to the Department of Labour and Employment of the Philippines, Ministry of Labour of Thailand, Ministry of Labour, Invalids and Social Affairs of Viet Nam that proposed the TEAM Programme, the ASEAN Secretariat, the ROK Mission to ASEAN, MOEL and the AKPMT who gave generous support for the successful implementation of the project.

Thank you.

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Foreword

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The Association of Southeast Asian Nations (ASEAN) has placed Human Resource Development (HRD) as a strategy to achieve a productive and competitive workforce that can cope with the challenges of regional integration. One of the accompanying critical areas in the development of the people is equipping them with the required competencies, which include technical and social skills that will make them job-ready locally and overseas.

The pressing need for human resource development was more emphasized due to the 4th Industrial Revolution's quickening pace, environmental changes, inevitable disruptions to education, ageing community and the COVID-19 pandemic. It could also radically change the global socio-economic state — from creation of new jobs to stagflation.

With the understanding that TVET curriculum responsiveness is significant to the demands of the labour market, the ASEAN and the Republic of Korea (ROK) collaborated to form this regional report titled, Enhancing the Competitiveness of HR through Responsive TVET Curriculum Supported by Involvement of Industries and Labor Market Information.

The effectivity of the technical and vocational education and training (TVET) system to adapt to the changing world of work is constantly supported by the collection and analysis of information on current and future demand and supply of skills from various perspectives and communication of results to diverse stakeholders related to education and training providers, students, trainees, employers, industrial bodies, and even government agencies.

Through this study, in-depth information and assessment of the existing level of responsiveness of TVET to labour trends, analysis of the extent of industry involvement and Labor Market Information (LMI) systems in TVET, the recurring issues and pitfalls, and the

strategies/mechanisms being implemented in ASEAN Member States (AMS) will be utilized to support the future labour mobility across the ASEAN region.

May this regional report help us as we continually improve our TVET systems and the overall workforce in the ASEAN Region.

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Foreword

EKKAPHAB PHANTHAVONG

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ASEAN recognises the importance of preparing its workforce to be competitive and resilient amidst globalisation, digitalisation of economies and aging populations. The ASEAN Declaration on Human Resources Development (HRD) for the Changing World of Work, in tandem with the Consolidated Strategy for the Fourth Industrial Revolution (4IR) for ASEAN, calls for actions to prepare our human resources to be future ready.

With the workforce as the engine of our economies, it is therefore imperative to invest in building well-functioning Technical and Vocational Education and Training (TVET) systems supported by robust labour market information systems and the business sector and industries. TVET plays a pivotal role in promoting higher employability of our graduates and their smooth transition into the labour markets.

Against this backdrop and with a forward-looking perspective, we are pleased with the development of the Regional Study on Enhancing the Competitiveness of Human Resources through Responsive TVET Curriculum Supported by Involvement of Industries and Labour Market Information as planned in the Work Plan 2021-2025 of the Senior Labour Officials Meeting Working Group on Progressive Labour Practices to Enhance the Competitiveness of ASEAN (SLOM-WG). The overall responsiveness of TVET systems in this region was analysed and built upon the findings and recommendations of the ten country reports of ASEAN Member States.

I would also like to express my appreciation to the Government of the Republic of Korea (ROK) for supporting the study as component 1 of the ASEAN-ROK TVET for ASEAN Mobility (TEAM) Programme through the ASEAN-ROK Cooperation Fund (AKCF). This study is a milestone in the cooperation with ROK which demonstrates our collective efforts to strengthening the strategic partnership.

I therefore wish to congratulate the Technical Education and Skills Development Authority of the Philippines, Ministry of Labour of Thailand, and Ministry of Labour, Invalids and Social Affairs of Viet Nam for their leadership as this project's country coordinators. I would also like to extend our appreciation to the Korea Research Institute for Vocational Education and Training (KRIVET) for their technical support in implementing this project.

I hope that the findings and recommendations in this study report will be useful input to ASEAN Member States in building a resilient and inclusive ASEAN Community that is built by high quality human resources.

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Deputy Secretary-General of ASEAN
for ASEAN Socio-Cultural Community

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Acronyms

Chapter II

AMS	ASEAN Member State
ASEAN	Association of South East Asian Nations
BDQF	Brunei Darussalam's Qualification Framework
BLK	Balai Latihan Kerja
	Vocational training providers
CET	Continuing Education and Training
C-VET	Continuing Vocational Education and Training
DNFE	Department of Non-Formal Education
DSD	Department of Skills Development
DTVET	Department of Technical Vocational Education and Training
DVET	Department of Vocational Education and Training
GCE A-Level	General Certificate of Education – Advanced Level
GCE N-Level	General Certificate of Education – Normal Level
GCE O-Level	General Certificate of Education – Ordinary Level
GER	Gross Enrolment Rate
GTC	Government Technological College
GTHS	Government Technical High School
GTI	Government Technical Institute
IAL	Institute of Adult Learning
IBTE	Institute of Brunei Technical Education
ISCED	International Standard Classification of Education
ITE	Institute of Technical Education
LGU	Local Government Unit
MLVT	Ministry of Labor and Vocational Training
MOE	Ministry of Education
MoES	Ministry of Education and Sports
MOEYS	Ministry of Education Youth and Sports
MOHE	Ministry of Higher Education
MoLSW	Ministry of Labor and Social Welfare
NER	Net Enrolment Rate
NGO	Non-Governmental Organization
NTec	National Technical Education Certificate

NQF	National Qualification Framework
OVEC	Office of Vocational Education Commission
PET	Pre-Employment Training
PDR	People's Democratic Republic
PTC	Provincial Training Center
SMK	Sekolah Menengah Kejuruan
SSG	SkillsFuture Singapore
TBE	Technical/Business Education
TESDA	Technical Education and Skills Development Authority
TPQI	Thai Professional Qualification Institute
TVED	Department of Technical and Vocational Education
TVET	Technical and Vocational Education and Training
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEVOC	International Centre for Technical and Vocational Education and Training
VTC	Vocational Training Center
WSG	Workforce Singapore
WSQ	Workforce Skills Qualifications

Chapter III

AQRF	ASEAN Qualification Reference Framework
ATC	ASEAN TVET Council
BNOSS	Brunei National Occupational Skills Standards
BPS	Badan Pusat Statistik (Statistics Indonesia)
CHED	Commission on Higher Education
CPF	Central Provident Fund
DepEd	The Department of Education
HRDF	Human Resource Development Fund
LFS	Labor Force Survey
LMI	Labor Market Information
LMIS	Labor Market Information System
MISC	Manpower Industry Steering Committee
MOLISA	Ministry of Labour – Invalids and Social Affairs
MTVET	National Technical and Vocational Education and Training Council
NSDC	National Skills Development Council
OVEC	Office of the Vocational Education Commission
T2MIS	TESDA Training Management Information System
TESDA	Technical Education and Skills Development Authority

ULI   Unique Learner ID

Chapter V

AAR	After Action Review
AF4	Analytical Framework IV
AQRF	ASEAN Qualification Reference Framework
ATO	Approved Training Provider
BNOSS	Brunei National Occupation Skills Standards
CBT	Competency-based training
CGTI	Cambodian Garment Training Institute
COPTPA	Code of Practice for TVET Programme Accreditation
CIAST	Center for Instructor and Advanced Skilled Training
CoMAKER	Collaborative, Methodical, Agile, Kinesthetic, Empowering, Real-time
CPD	Continuous Professional Development
CVT	Center for Vocational Training
DLMS	Digital Learning Management System
DMCI	D.M. Consunji, Inc.
EASE	E-contents, Activity, Support and Evaluation
GHOCS	Generates High Order Critical Skills
GMAC	Garment Manufacturers Association in Cambodia
GTIs	Government Technical Insititutes
HVCT	Ho Chi Minh Vocational College of Technology
IAL	Institute of Adult Learning
ICT	Information Communications Technology
IT	Information Technology
KRIVET	Korean Research Institute of Vocational Education and Training
MISC	Manpower Industry Steering Committee
MLVT	Ministry of Labour and Vocational Training
MOLISA	Ministry of Labour-Invalids and Social Affairs
MSMEs	Micro, small, and medium enterprises
NCS	Nation Competency Standards
NSSA	National Skills Standards Authority
OFF-JT	OFF the Job Training
OJT	On the Job Training
OVEC	Office of Vocational Education Commission
PSTC	Pakpasak Technical College
RPL	Recognition of Prior Learning
SACE	Singapore Association of Continuing Education
SCL	Student-Centered Learning
SIG	Special Interest Group
SKKNI	Indonesian National Work Competency Standards Standar Kompetensi Kerja Nasional Indonesia

SMKN	Sekolah Menengah Kejuruan Negeri
SSCs	Sector Skills Councils
STEP	Smart Training Education Platform
TBI	Talent Bridge Inc.
TESDA	Technical Education and Skills Development Authority
WSQ	Workforce Skills Qualifications

Executive Summary

Over the past decades, ASEAN has emerged from a region that has a potential for growth to one that attracts major investors in the world. Now, common and shared prosperity of the region has become key issues for the ASEAN community. Human resource development (HRD) is one of the strategic objectives of ASEAN towards achieving a productive and competitive workforce.

This regional report is an output of integrating and incorporating the 10 country reports for the 10 AMS. The 10 reports are based upon the analytical frameworks developed for the project to investigate the responsiveness of the TVET system to the labour markets of the AMS. The analytical tools are made of following four parts; first, National TVET system of the AMS (AF I): second, Analysis of Labour Market Information System (LMIS) and Labour Market Demands for 10 AMS (AF II): third, Responsiveness of TVET Curriculum to the Labour Markets (AF III): fourth, Identifying and sharing best practices of TVET in AMS. The frameworks have been implemented by NRPs and RCs for 10 AMS (AF IV).

Chapter I of the report provides an overview for the TEAM Component 1 project. It explains the analytical tools and methodology applied for the project and implications of the project for the ASEAN community.

Chapter II of report introduces the TVET system of the 10 AMS. Drawing on the findings from the 10 AMS on AF I, and also on the analysis of major statistics for AMS, the chapter compares and contrasts the features of the TVET system of 10 AMS.

Chapter III of the report addresses the issue of LMIS as a basis to check LM responsiveness of the TVET system. The results of the analysis of the LMIS for the 10 AMS are displayed as well as the strengths and weaknesses of the LMISs for supply and demands, and also the strengths and weaknesses of industry engagement in TVET among the 10 AMS. The results of the Delphi Survey, where data is collected from at least 5 informants for each AMS on the most promising sectors in the future, are also presented. Policy recommendations based upon the analysis are provided at the end of the chapter.

Chapter IV shows the results of the analyses of AF III, responsiveness of the TVET system to the labour market focusing upon the process of development and implementation of TVET curriculum. The focus is placed upon whether the LM demands are reflected into the TVET curriculum and the stakeholders are readily co-operating in the process. It discusses the major strengths and weaknesses of the 10 AMS based upon the analyses of the process of TVET curriculum development and implementation. At the end of the chapter, recommendations are made to improve the current TVET system in terms of its readiness to prepare and deliver the TVE curriculum based upon the demands of the LMs and also upon needs of the learners.

Chapter V integrates the results of analyzing the best practices of TVET programs among 10 AMS. Based upon the analyses, major features of the best practices of TVET programs for 10

AMS are presented. By many critics, best practices are often pointed out as a means to identify the working conditions for TVET under the given settings. If what works best under the given conditions can be identified, that will provide great implications for improving TVET programs for the TVET system. Therefore, analyses of best practices for 10 AMS are likely to shed light on improving the competitiveness of HR for the 10 AMS. Also, at the end of the chapter, based upon the results of the best practices, recommendations are provided for how to upgrade the TVET programs.

In Chapter VI of the report, policy recommendations are provided synthesizing the implications and suggestions discussed in chapter II through chapter V. In particular, how the ASEAN member states can co-operate together to enhance the HR competitiveness through co-operation in TVET at the regional level is suggested.

Chapter I. Introduction of the Project

1. Background of the project

1.1. Shared Prosperity of the ASEAN Region

Globalisation has made international exchanges of goods and services handier, thereby making everyday life more comfortable and convenient. At the same time, globalisation has also speeded up international competition among countries as well as inter-regional competition. Nowadays, all the modern states are working hard to stay competitive in the globalising markets.

The competitiveness of the human resources is known to be one of the major factors determining the national competitiveness. 4 out of 12 indicators of Global Competitiveness Index concern human resource development and adaptation of skills in the labour market (WEF). For each country to remain competitive in the face of increasing global competition, it is important for the country to secure high performing labour force. Furthermore, the competitiveness of the labour force is determined by the efficiency of the national human resource development (HRD) system. There can be numerous ways to check the competitiveness of the HRD system. In this project, we aim to approach this by looking at the responsiveness of the national TVET system to the labour markets.

Globalisation and challenges for human resource development

First, globalisation and global competition places a common challenge for the ASEAN region and ASEAN member states (AMS). For the ASEAN region to remain competitive, they need to improve the competitiveness of the workforce. Recently, there are other challenges that are likely to influence HRD of countries. Figure 1.1 below illustrates four such major challenges.
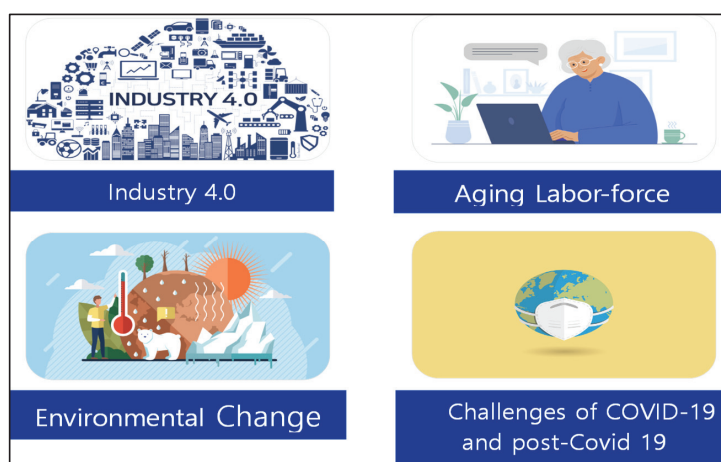
Figure 1.1 Major Challenges for TVET in ASEAN

Second, digitalization and industry 4.0 is affecting all the countries to prepare the labour force for the changing world of work. Second, ageing is a common issue for most of countries in the world, and also among the AMS. The ageing workforce places new challenges for the HRD. There is also an environmental issue and greening economy that is shared by all the countries globally. Greening is important for survival of every country as well as for sustainable development. Last, but not least, the Covid-19 situation and preparation for post pandemic era places a huge challenge for the AMS. The COVID-19 situation poses a challenge for TVET in the AMS, including training the labour-force during the COVID-19 era and in preparation for post-pandemic era.

As browsed so far, these issues faced by all the countries pose great policy challenges for the states. The states need to come up with strategies to face these challenges more effectively. In particular, the HRD strategies will compose very important parts of those strategies.

Common challenges and for shared prosperity for the ASEAN region

As mentioned in the beginning, ASEAN as a region has gained attention of the world with its fast growing economy and its potential for continuous growth.[1] To continue to grow and achieve shared prosperity of the region, ASEAN needs to deal with the challenges.

First, there are growing expectations for continuous growth of the region and among individual AMS. The region needs to meet these expectations from the point of each member state. The global importance of the region is expected to continue with sustained pace of growth.

Second, the intra-regional labour mobility among AMS is increasing, which has implications on workforce development of the AMS. The TVET system and HRD system of the member states need to be looked at to further facilitate mobility of TVET students and teachers.

Also, recent challenges in the labour markets that are mentioned above, such issues as Industry 4.0, need to be addressed collectively with respect to HRD among AMS.

In order to deal with those challenges more effectively and to achieve the goal of continuous growth, the AMS need to secure skilled labour force. In order to upgrade the skills of the labour force, the AMS need to be equipped with a more robust HRD system. In other words, the AMS need to enhance their TVET system.

In this project, we purport to answer the following question, 'how can we improve the TVET system so that the system can equip every individual best prepared for the labour market?', in other words, 'how can we improve the national TVET system so that the TVET process can interact with the Labour Market to produce the best output?'

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1 8 of the 10 AMS has shown GDP growth rate ranging between 5~7 % during 2010~2019 period, which is much higher those of G7, and when compared to average GDP growth rate in the world, which maintained around 3 % in the same period.

We are going to check this possibility by looking at the following.

- national TVET System and recent national TVET policy trends

- checking how the labour market Information is produced (LMIS) and delivered to the TVET sector in the country (feedback of the LM information onto the TVET process)

- identifying how the TVET curriculums are being developed and how they are being managed.

The current project aims to answer the question of how we can upgrade the competitiveness of the human resources of the AMS by improving on the Labour Market Information System (LMIS), and also by establishing the TVET Curriculum responding to the labour market demands and also the demands of the learners. In other words, the project addresses the question of how we can improve the TVET system (sector) so that it can produce the skilled and proficient workforce and high quality labour that satisfy the skill demands in the labor markets in each AMS.

1.2. Component 1 Project & Its Main Objective

1.2.1. TVE for ASEAN Mobility (TEAM) project & Component 1

The TEAM Project has been proposed by ASEAN in order to address the challenges for ASEAN in terms of HRD.

The TEAM project is composed of following 3 components, and they are closely inter-related with one another to achieve the common objective of 'Promoting Mobility and Improving TVET System in the AMS' (Figure 1.2). To briefly introduce 3 components of the TEAM project, Component 1 is the current project analyzing TVET systems of 10 AMS and their responsiveness to the LM. Component 2 of the TEAM project deals with implementation of TVET mobility programs among 10 AMS; component 3 of the TEAM project concerns evaluation of the national qualification frameworks (NQF) and quality assurance system for the CLMV states.
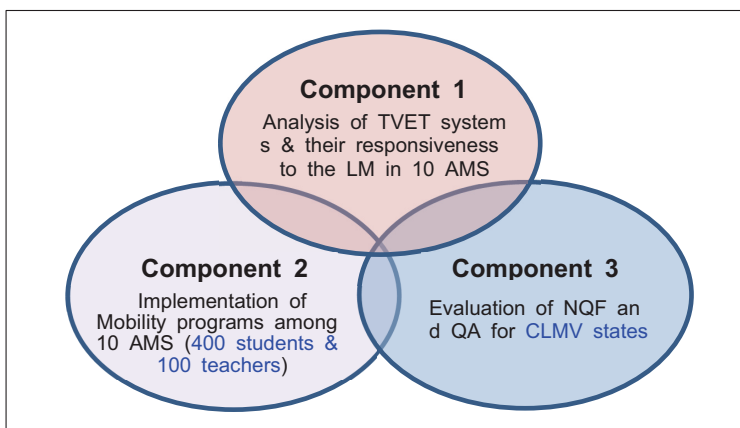
Figure 1.2 Organization of the ASEAN Team Project: Component 1~3

1.2.2. Objective of the Component 1 Project

The current project, titled 'Enhancing the Competitiveness of the Human Resources through Responsive TVET Curriculum Supported by Involvement of Industries and Labour Market Information (TEAM Component 1)' was launched based on this shared awareness among the ASEAN member states. It was proposed by ASEAN member states (the Philippines, Viet Nam, and Thailand), endorsed by ASEAN Senior Labour Officials Meeting (SLOM) Working Group on Progressive Labor Practices to Enhance the Competitiveness, and carried out by support of the national representatives of 10 AMS.

As its title suggests, the project aims to seek how to enhance the competitiveness of the human resources of the AMS by making the TVET curriculum more responsive to the labor market demands. The key variable here is the responsiveness of the TVET to the labour market demands and linkage between the TVET system and labour market demands.

In the project, the TVET responsiveness to the labour markets has been mainly operationalized as follows.

First, we checked the LMIS, since the LMIS is key to identifying the availability of data to measure the labour market demands.

Then, we investigated the process of TVET curriculum along with its development and implementation. The LMIS and labour market demands, and process of designing and implementing TVET curriculum are two major pillars of the project. We also looked at best practices of TVET programs in 10 AMS to be shared among 10 AMS.

Third, we looked at the national TVET system, which serves as backgrounds to understand the LMIS and making of TVET curriculum. Major features of the national TVET system such as the TVET governance, delivery system (TVET institutions), qualification frameworks, and policy contexts have been surveyed.

2. Analytical Frameworks for the Project

The analytical frameworks to measure the competitiveness of the TVET system in 10 AMS are composed of the following 4 parts; basic national TVET system of 10 AMS (Analytical Framework I), analysis of LMIS & labour market demands for 10 AMS (Analytical Framework II), TVET curriculum & its responsiveness to the labour markets (Analytical Framework III), and best practices in TVET among 10 AMS (Analytical Framework IV). (Table 1.1)

Table 1.1 Composition of AF I ~ AF IV for the project

Analytical Frameworks	Major Subjects & Tasks
1. Basic TVET Systems for 10 AMS.	• Socio-economic Context of TVET: Status of • TVET in the country • Recent Socio-economic development & recent TVET policy trends (IR 4.0, Post-Pandemic, Aging, Green Economy. Etc) • National Education System(Institutions, Formal vs. Non-formal vs. Informal) 　・National TVET System: 　・Main Features of the National TVET 　・TVET institutions, TVET Governance(MOE vs. MOL) 　・National Qualification Frameworks
II. Analysis of LMIS & Labour Market Demands for 10 AMS	• LMIS (method of data collection on skills demand and supply) • Employer engagement in the process (Sector Councils. etc.) • Most promising jobs for the future (a Delphi survey administered separately for this)
III. Responsiveness of TVET Curriculum to the Labour Markets.	• Analysis of Labour Market Demands for selected TVET programs(2) for the country • Designing TVET curriculum 　・Designing TVET curriculum/Stakeholder involvement in developing curriculum/ Linkage between TVET curriculum and NCS/NQF • Implementing TVET curriculum 　・Development of Teaching & Learning Materials/TVET teachers and trainers/Supply of TVET equipment & materials • Assessment, Certification and other measures to assure quality • Work-based training program(i.e. apprenticeships)
IV. (Identifying) Best Practices in TVET Programs	• Identifying 3 best practices of TVET programs in the country based on selection criteria(AF VI) • Description of main features of best practices for selected cases

Relationship among the Analytical Frameworks from I to IV is laid out in Figure 1.3 below.

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2 https://aseanorg-my.sharepoint.com/:f:/g/personal/carl_daquio_asean_org/EtbdEj49QSBJlxNHXFW5yoIB4yWS5FtXyRso_uwMd
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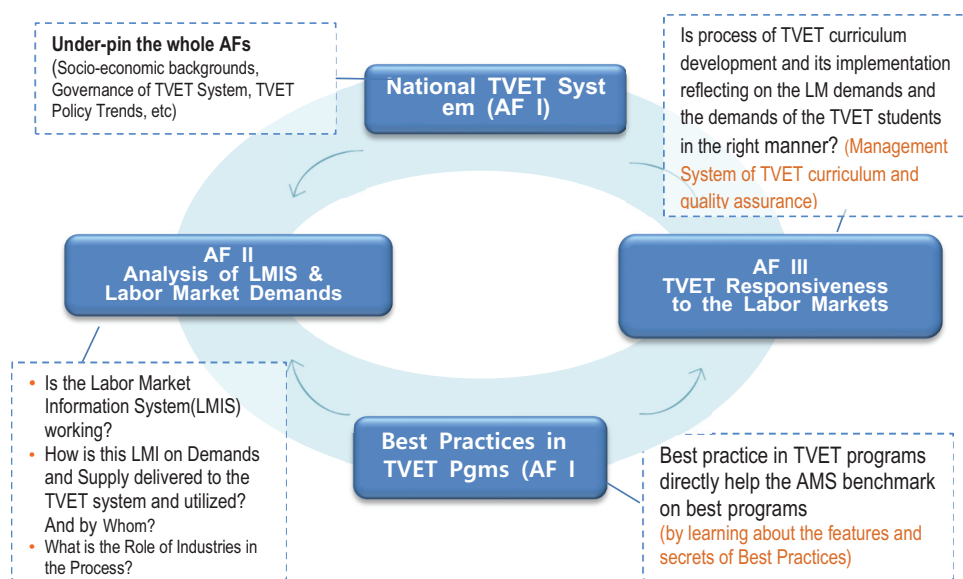
Figure 1.3 Linkage among Analytical Frameworks I~IV

First, AF I, information on the national TVET system underpins the features in AF II and AF III, which are 'analysis of LMIS and LM demands' and 'TVET curriculum responsiveness to the LM'. Therefore, AF I serves as key background based upon which to understand the findings from AF II and AF III for the country. For instance, industry involvement in TVET process from the AF II part is closely linked to the TVET governance and stakeholder involvement in the process of implementing NQF in the AF I part.

AF II checks if the labour market information is working and how the LMI on demand and supply is conveyed to the TVET system. AF III questions if the process of TVET curriculum development and its implementation is reflecting upon the LM demands and the demands of the consumers of TVET service (TVET students, employers etc.) in the right manner. Also, findings from AF II need to be understood in close linkage to the findings from AF III. For instance, to understand the process through which the information produced in the labour-market is conveyed to the process of TVET curriculum development, the findings from AF II should be interpreted in line with the findings from AF III.

Last, AF IV, best practices of TVET programs reveal successful TVET practices in 10 AMS. Often, best practices help explain why specific programs are working under the current TVET system in the country while others are not working as well. They also help countries with different TVET system decide if they can benchmark on the practices.

2.1. Analysis of Basic National TVET systems of 10 AMS: AF I

AF I serves as background based upon which to understand and analyze AF II through AF IV. AF I, which is about the national TVET system, covers topics such as national HRD system, TVET governance & TVET institutions, and NQFs. Main subjects of analytical framework I are composed of socio-economic context of TVET, recent socio-economic development including current TVET policy trends, national education system, and major features of national TVET system.

2.2. Analysis of Labor Market Information System (LMIS) & Labor Market Demands for 10 AMS: AF II

To check the LMIS and how the information on the demands and supply produced in the LMIS is being utilized in the TVET process, an analytical framework (AF II) has been developed. AF II includes questionnaires on the national LMI system, employer engagement in TVET. Also, to check the demands for industries in the LM, a Delphi survey on the most promising jobs in terms of industries and occupations in the country has been conducted.

2.3. Analysis of Responsiveness of TVET curriculum to the Labor Markets: AF III

Analytical Framework III mainly covers the process of TVET curriculum development and implementation of the TVET curriculum.

Analytical Framework III directly deals with the responsiveness of TVET curriculum to the labour markets. AF III mainly covers the process of TVET curriculum development and implementation of the TVET curriculum. The analytical framework collects detailed information on the process of designing TVET curriculum in the country along with stakeholder involvement in the process including the state, industries, and TVET institutions, and also on the process of implementing the TVET curriculum such as development of teaching & learning materials and measures of quality assurance of the TVET curriculum (i.e. certification and accreditation).

2.4. Identifying and Sharing Best Practices of TVET (programs) in10 AMS: AF IV

AF IV explores best practices of TVET programs for the country in the sector the country has selected according to the criteria given.

The cases collected from the AMS show what makes best practices, namely, what the main features of the practices are. They will also display key elements that make the best practices of TVET programs in TVET institutions.

3. Methodology

In this section, the procedures taken to proceed with the project are explained. Development of the analytical frameworks to operationalize the objective of the project, the process of implementing the project including the data collection, and the human resources mobilized to conduct the project is provided.

3.1 Development of analytical frameworks and Delphi Survey to check the competitiveness of the TVET system

First, the KRIVET research team has worked on developing analytical tools to measure and investigate the competitiveness of TVET system, which is described in the previous section. In the team, labour market economists and TVET experts are engaged in developing the frameworks to analyze the TVET responsiveness in the AMS. KRIVET experts have gone through reviews internally and externally to check the effectiveness of the frameworks developed, which includes feasibility checking for implementing this framework under the constraints of limited time and resources including COVID-19 pandemic.

Prior to entering data collection, the draft version of AF Part I through AF Part IV & the Delphi Survey were consulted with SLOM-WG for their inputs and received their ad-referendum endorsement.

Data collection based upon the analytical frameworks has been made through collaboration between the KRIVET research team and the ASEAN regional consultants (RCs) recruited for the project. For data collection, the RCs have directly worked with the national resource persons (NRPs) who were nominated by respective TVET ministries in the AMS and who took the work of collecting all the data and compiling the national version of draft report for the 4 analytical frameworks.

As part of the Analytical Framework II, a Delphi survey questionnaire was developed in order to identify the occupations and industries that are likely to be most promising in each of AMS. The survey was implemented to investigate labour market demands for occupations and industries. The national representatives of 10 AMS for this project (NRP) collected at least 5 responses from TVET and LM experts in the country. The result of the Delphi survey for 10 AMS is incorporated into Section 3 of the Chapter which is based on the Analytical Framework II.

3.2. Implementation of the Analytical Frameworks

The national representatives to collect data for the country were appointed by national SLOM-WG representatives. These representatives were NRPs for the 10 AMS.

Data collection based on the analytical frameworks was initially been planned to be made mainly through country visits. Through country visits, data collected through the NRPs in the

form of written reports would be verified on site and further information would be collected to draw the implications. During the country visits, the TVET practitioners were to be interviewed by the KRIVET research team, the Regional Consultants, and ASEAN regional experts in TVET.

However, due to outbreak of the COVID-19 and its persistence for the past two years, adjustments in the implementation of the AFs were necessary.

In place of the country visits that were to be made to supplement the missing information and verify the collected information, we exchanged questions and comments for each part of the AF reports numerous times to verify and supplement missing information.

Regular virtual conferences have been made where the NRPs met with the Regional Consultant to discuss and consult on the data collection process and outcomes.

To draw implications for the country, the NRPs have recruited TVET practitioners and TVET experts, policy makers who could comment on the implications. For each AMS, virtual conferences were arranged by the NRP to discuss and verify the implications of the study for the country.

3.3. Human Resources Network of the project

3.3.1. Partnership with local experts: National Resource Persons, and ASEAN regional consultants

Local experts played critical roles in the implementation of this project. To implement the national study of TVET competitiveness, national experts in TVET and the labour markets (NRPs) were recruited in coordination with SLOM-WG.

Participation of the country experts in the process of the implementation was critical in that it enabled more reliable and effective data collection and documentation on the country compared to the one based on experts outside the country. This also provided a chance for the national experts to provide feedback for results of data collection and implications drawn for their own country, so that the final output of the project can be checked from the perspective of the national experts.

The project also involved ASEAN regional consultants who have extensive knowledge and experience in TVET and the labour markets in the ASEAN region. Three regional consultants with one of them consisting of a group, each overviewing implementation of the project for 3-4 countries, worked with the NRPS of the countries assigned.

3.3.2. Partnerships with ASEAN and the Project Steering Committee (PSC) of the project.

The component 1 project was proposed by ASEAN and ASEAN Member States. Also, the ASEAN member states are expected to be the primary beneficiaries of the outputs of this project. The design to implement this project is based on the initial proposal of the project, submitted in 2018, which was carefully prepared for this report. This initial proposal indicated a need for strong partnership between ASEAN and the main actors involved in this project including those who are implementing this project.

Throughout the process of implementation of this project, a partnership was maintained between representatives of ASEAN & the member states and those are in charge of its implementation.

A committee titled the 'Project Steering Committee (PSC)' for the project was organized, which consisted of the representatives from the three proponents' countries -led by the Department of Labour and Employment of the Philippines, the Ministry of Labour (MOL) of Thailand, and the Ministry of Labour, Invalids and Social Affairs (MOLISA) of Viet Nam, representatives of Labour and Civil Service Division (LCSD) of ASEAN Secretariat, and the Regional Consultants working for the Project.

The PSC is engaged in monitoring the progress of the project and also monitoring the quality control of the outputs for the project. Monitoring progress of the project is made through the PSC meetings, where the PSC members convene to review the inception report for the project, and also to check the progress of the project. The 1st PSC meeting was held on April 29~30, 2021 to discuss the inception report and future work plan. The 2nd PSC meeting was substituted with numerous consultations made via on-line and e-mail exchanges regarding progress of the project.

The PSC made co-ordination among key participants and key stakeholders for the project (ASEAN). The PSC members also made important decisions and provide recommendations on such matters as the timetable of the project and its methodology. The committee also reviews the final outputs and liaises with the key stakeholders in the process of reviewing the outputs for endorsement, and disseminates final outcomes among AMS.

ASEAN sectoral bodies also played important roles in the project. ASEAN SLOM-WG helped recruiting and appointing the NRP for the home country, who played critical role for the project. Other sectoral bodies provided support for the project whenever there is such a need. This process was coordinated by LCSD at ASEAN Secretariat. In addition, national SLOM representatives took the role of reviewing and endorsing the country report prepared by the NRP, the RC, and the KRIVET experts for the project.

Figure 1.4 below illustrates the organization of the network of human resources and the role of key participants in the project.

The Network of HRs for Component 1
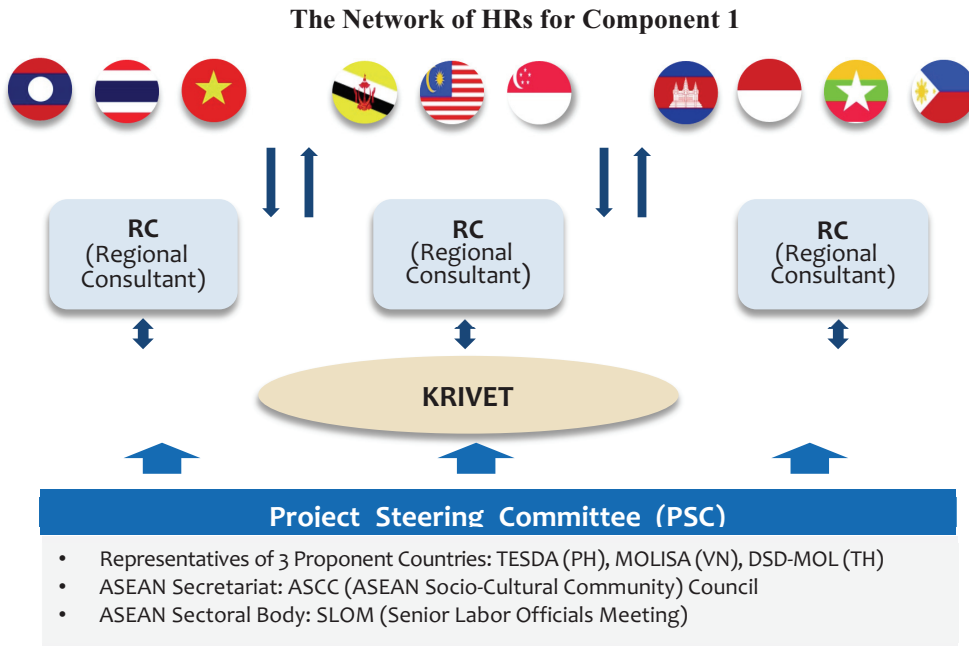
Figure 1.4 The Network of HRs for the project

3.4. Compilation of 10 Country reports and One Integrated Regional report

The works conducted for the project have been compiled into 10 country reports for 10 AMS and also into one comprehensive regional report. KRIVET researchers drafted the regional report drawing on the country studies, by comparing and analyzing the findings in the country reports. Regional consultants reviewed and commented on the regional report drafted by KRIVET researchers as well as NRPs of 10 AMS. The final version of the country reports and regional report are reviewed by key stakeholders in the AMS and submitted to SLOM-WG for endorsement prior to publication (Figure 1.5). In order to solicit wider perspective, the regional report was consulted for inputs among key relevant ASEAN bodies: SOM-ED, AQRFC, and ATC.
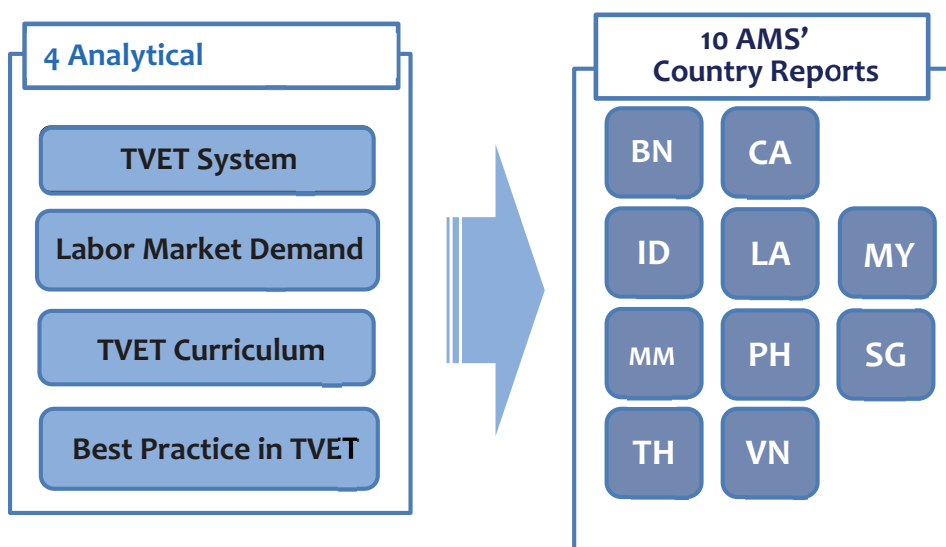
Figure 1.5 Compilation Process of the Country Report from Analytical Framework I~IV

The primary goal of conducting this project is to share the outputs among the key stakeholders of the AMS so that they can utilize the knowledge and experiences in the field of practice and policy making in TVET in their countries. This has been achieved by regional workshops that are held in the process of implementing the project.

Regional workshops were held to disseminate the findings from the project among key stakeholders in TVET in ASEAN AMS. Two regional workshops were held: 1st Regional Workshop on 10 November 2021 to discuss the interim findings of the project, and the 2nd Regional Workshop on 31 May 2022 to discuss the final outcomes and possible policy recommendations for each AMS. TVET experts and high officials in various areas of TVET were invited to share the outcomes and major findings from the project. Findings from case studies of 10 TVET systems and their responsiveness to the labour markets were shared so that the stakeholders engaged in the TVET sector could utilize them in establishing policies and plans for future. There were regional workshops; one for sharing the findings at the initial stage of the project, the other for sharing the final outputs from the project.

Interactions and networking made during the workshops contributed toward improving TVET and exchanging good practices in TVET. Feedbacks from the participants are reflected onto the final version of the country reports and the regional report (Figure 1.6).
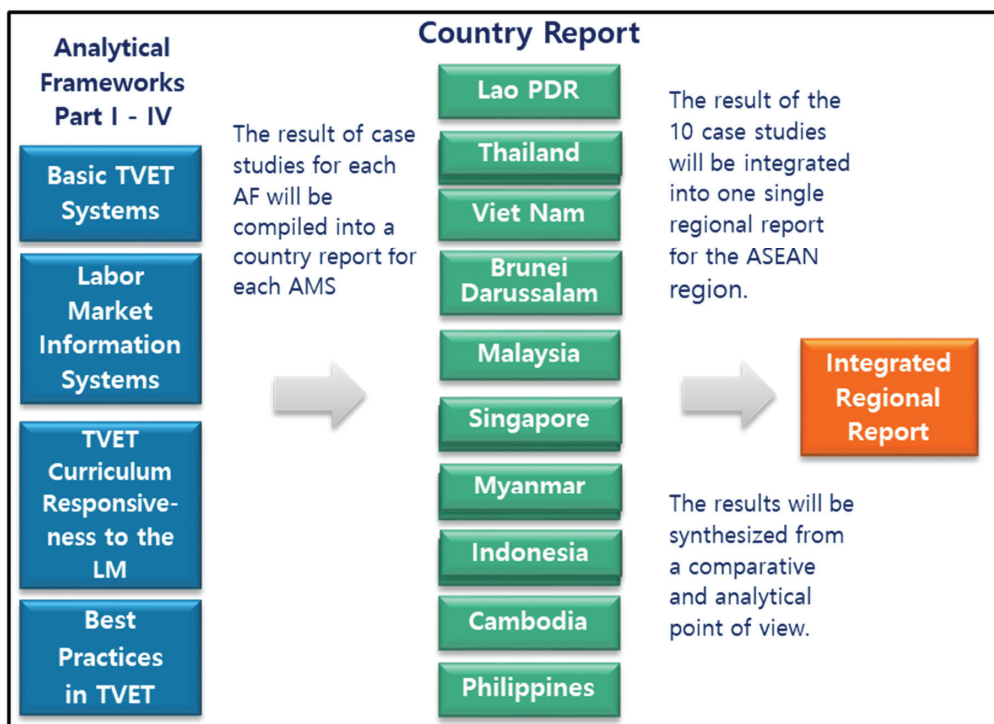
Figure 1.6 From 10 Country Report to Integrated Regional Report

Chapter II. TVET System of 10 AMS

In this chapter, we describe the TVET systems of 10 AMS in comparative perspectives. First, the socio-economic backgrounds which influence the making of the national TVET system were explored. Such socio-economic variables as economic growth and demographic characteristics of 10 AMS, status of labour utilization among the AMS, and industrial and occupational composition of the labour force of AMS were provided. These socio-economic characteristics were analyzed not only for the specific point of time, for instance, the most recent year where data is available, but also for the span of time which is likely to impact the perspective changes in the future. This is important to look at where the AMS are progressing to and how those changes will influence the TVET system of 10 AMS.

The 2nd section of this chapter describes the TVET systems of 10 AMS. First, the national educational systems of 10 AMS were compared. The national education system is important in that it forms the basis of the national HRD system, in close link to which the TVET system operates in each country. Then, national TVET systems of 10 AMS were described along with major characteristics of TVET system, such as TVET governance, major governing agencies of TVET, and major TVET institutions in each AMS. In particular, the national qualification systems and major recent TVET policies of 10 AMS were described in a comparative perspective.

The data described in this chapter was drawn from key statistics available from World Bank, UN, ILO, and ADB, and also from the case studies of 10 AMS whose data have been collected by the NRPs under consultation of the RCs involved in the project.

1. Socio-economic Backgrounds of TVET in 10 AMS

1.1. Introduction

ASEAN has strengths in its human capital, which is said to be the basis of the potential of economic and social growth. Therefore, it is of significance to have an overview of the overall socio-economic characteristics of the 10 AMS.

Table 2.1 below presents key socio-economic indicators of 10 ASEAN member states. Major statistics such as the gross domestic product (GDP), real GDP growth rate, size of population, life expectance, and human development index (HDI) are displayed for the 10 AMS. In Table 2.1, the AMS show high annual economic growth rates and high population growth rates compared to the G7 countries In Table 2.2, key socio-economic indicators for the G7 countries are provided. The indicators in Table 2.1 and Table 2.2 show the human resources of the ASEAN member states and the pace of economic growth and population growth of the AMS, which is higher than G7 countries.

Table 2.1 Key Socioeconomic Indicators of 10 AMS (2019)

Country	1. GDP (Million, Constant 2010 US$) a	2. Real GDP Growth Rate (%) (2019) b	4. Real GDP Growth Rate (%) '10-'19 Average c	5. Population (in Thou-sands) d	6.Population Growth Rate(%) e	7. Life ex-pectancy (year) f	9. Human Development Index (HDI) g
Brunei. Darussalam	14,006.98	3.87	0.47	433.30	1.01	75.86	0.838
Cambodia	20,920.95	7.05	7.03	16,486.54	1.46	69.82	0.594
Indonesia	1,204,479.85	5.02	5.41	270,625.57	1.10	71.72	0.718
Lao PDR	13,195.41	4.65	7.23	7,169.46	1.53	67.92	0.613
Malaysia	398,946.60	4.30	5.33	31,949.79	1.34	76.16	0.810
Myanmar	86,931.31	2.89	6.76	54,045.42	0.63	67.13	0.583
Philippines	360,858.88	6.04	6.40	108,116.62	1.37	71.23	0.718
Singapore	335,538.88	0.73	4.83	5,804.34	0.81	83.62	0.938
Thailand	452,674.62	2.35	3.62	69,625.58	0.28	77.15	0.777
Viet Nam	200,857.61	7.02	6.31	96,462.11	0.96	75.40	0.704

Sources: [a] World Bank (2022). *World Development Indicators* [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators. [b] World Bank (2022). *World Development Indicators* [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators. [c] Derived from World Bank (2022). *World Development Indicators* [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators. [d] United Nations (2022). *Demographic Statistics Database* [Data set]. Retrieved January 1, 2022, from http://data.un.org/Explorer.aspx. [e] Derived from United Nations (2022). *Demographic Statistics Database* [Data set]. Retrieved January 1, 2022, from http://data.un.org/Explorer.aspx. [f] World Bank (2022). *World Development Indicators* [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators. [g] United Nations (2022). *Demographic Statistics Database* [Data set]. Retrieved January 1, 2022, from http://data.un.org/Explorer.aspx.

Notes: GDP growth rates of Thailand & Singapore – The growth rate of Singapore for the 10~19 period Average is higher than Thailand due to the high economic performance of Singapore during 2010~2014 period. This can be confirmed from the trajectories of economic growth rates during 2010~2019 period by the World Bank data.

Table 2.2 Key Socioeconomic Indicators of G7 countries: GDP, GDP Growth, Pop., Life ex-pectancy, HDI

Country	1. GDP (Million, Constant 2010 US$) a	2. Real GDP Growth Rate (%) (2019)b	4. Real GDP Growth Rate (%) '10-'19 Average c	5. Population (in Thousands) d	6. Population Growth Rate(%) e	7. Life expectancy (Year) f	9. Human Development Index (HDI) g
U. S	18,349,108.24	2.16	2.30	329,064.92	0.60	78.79	0.926
U. K	2,913,556.87	1.37	1.83	67,530.16	0.58	81.20	0.932
Canada	1,953,233.25	1.86	2.22	37,411.04	0.91	82.05	0.929
France	2,974,818.95	1.51	1.38	65,129.73	0.21	82.58	0.901
Germany	3,948,227.90	0.56	1.92	83,517.05	0.47	80.94	0.947
Italy	2,152,283.49	0.29	0.25	60,550.09	-0.13	83.20	0.892
Japan	6,187,013.95	0.27	1.24	126,860.30	-0.13	84.36	0.919

Source: [a] World Bank (2022). *World Development Indicators* [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators. [b] World Bank (2022). *World Development Indicators*. [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators. [c] Derived from World Bank (2022). *World Development Indicators.* [Data set]. Retrieved Janaury 1, 2022, from https://databank.worldbank.org/source/world-development-indicators. [d] United Nations (2022). *Demographic Statistics Database* [Data set]. Retrieved January 1, 2022, from http://data.un.org/Explorer.aspx. [e] Derived from United Nations (2022). *Demographic Statistics Database* [Data set]. Retrieved January 1, 2022, from http://data.un.org/Explorer.aspx. [g] World Bank (2022). *World Development Indicators* [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators. [f] United Nations (2022). *Demographic Statistics Database* [Data set]. Retrieved January 1, 2022, from http://data.un.org/Explorer.aspx.

1.2. Economy and Demography in 10 AMS

1.2.1. Economy and Economic Growth of 10 AMS

1.2.1.1. GDP of 10 AMS (2019)

There is diversity among the AMS in terms of the size of the economy, which is best measured by the GDP displayed in Figure 2.1. Indonesia ranks as the 1st, in terms of GDP, with its large population, while Brunei Darussalam has the smallest in size of the economy, based upon 2019 current data.
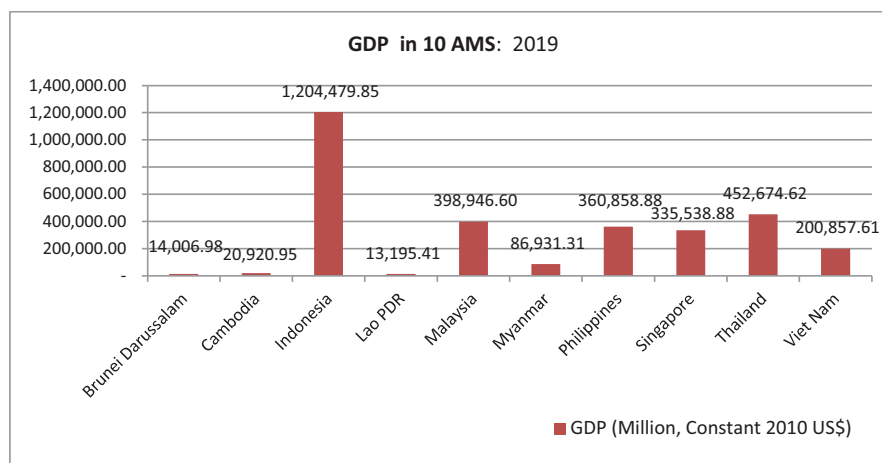
Source: World Bank (2022). World Development Indicators [Data set]. Retrieved January 1, 2022, from
https://databank.worldbank.org/source/world-development-indicators

Figure 2.1 Gross Domestic Product of 10 AMS: 2019

1.2.1.2. Pace of Economic Growth of 10 AMS

The pace of economic development is and has been more rapid among 10 ASEAN Member States. This can be easily observed when the annual economic growth rates of 10 AMS are compared among themselves, and to those of G7 countries. Figure 2.2 to Figure 2.4 below contrast the real GDP growth rates of 10 AMS in 2019, next to those of G7 countries. The real GDP growth rates of 10 AMS range between 6~7%, while the rates range between 1~2% for G7 countries.

When the pace of economic growth is analyzed among 10 AMS from 2010 to 2019, it can be observed that the ASEAN Member states have continued to maintain high economic growth during the last decade. Such a high economic growth resulted in the economic emergence of the ASEAN region and ASEAN Member States. In the following, the pace of economic growth during the period 2010-2019 is shown through the 'the average annual real GDP growth rate during the period and the time series data of the annual real GDP growth rate during the period.
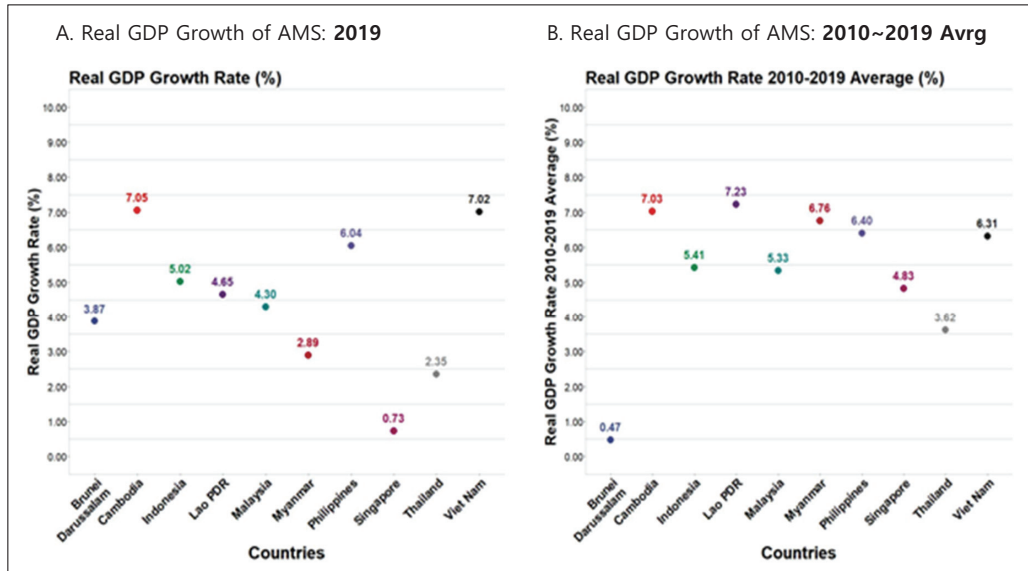
A. Real GDP Growth of AMS: **2019**   B. Real GDP Growth of AMS: **2010~2019 Avrg**

Source: Derived from World Bank (2022). *World Development Indicators* [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators

Figure 2.2 Annual Growth Rate of GDP of 10 AMS: 2019 & 2010~2019 Average
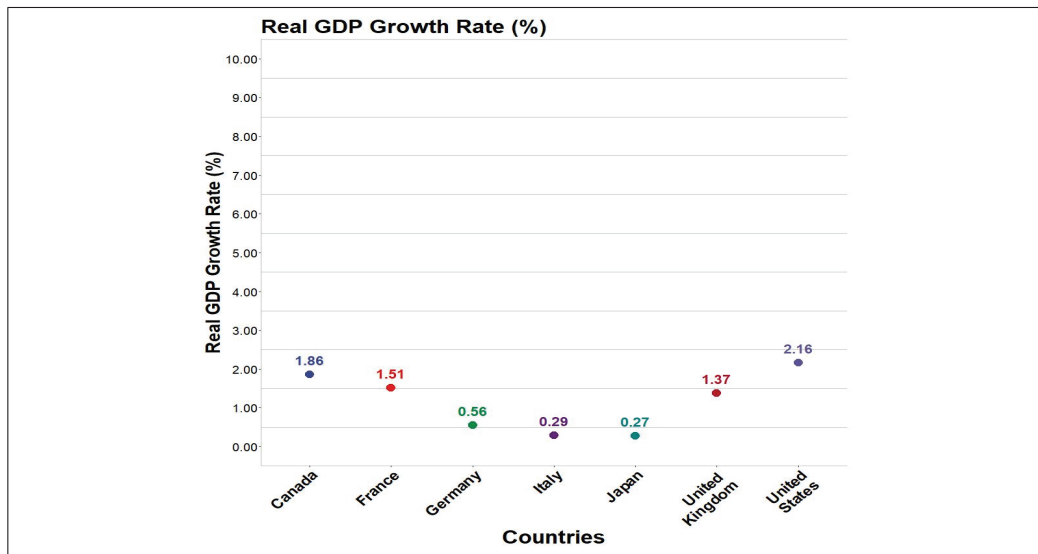
Source: World Bank (2022). World Development Indicators [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators

Figure 2.3 Annual Growth Rate of GDP (2019): G7 countries
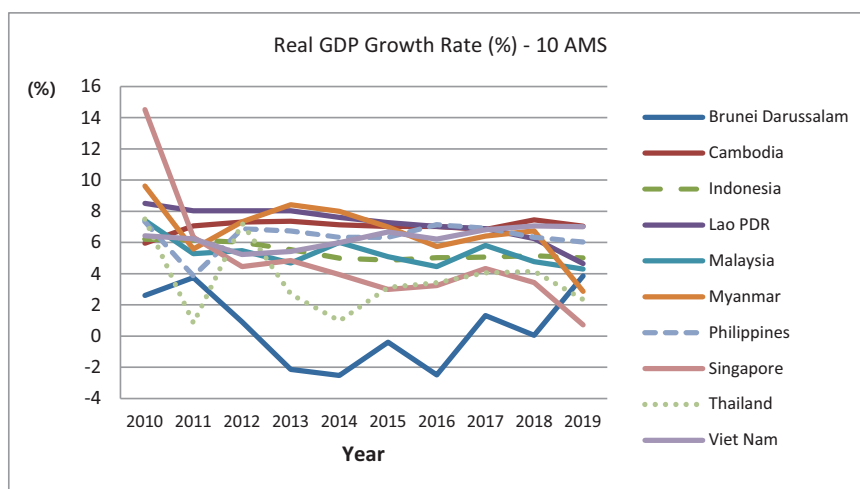
Source: Derived from World Bank (2022). World Development Indicators [Data set]. Retrieved January 1, 2022, from
https://databank.worldbank.org/source/world-development-indicators

Figure 2.4 Annual Real GDP growth of 10 AMS: Time Series over 2010~2019

1.2.2. Population and population changes in 10 AMS

1.2.2.1. Population of 10 AMS

There is diversity among the AMS in terms of the size of the population. Indonesia has the largest population among the AMS. Brunei Darussalam, Singapore and Lao PDR have a moderate size of population compared to other AMS. The Philippines and Viet Nam have a large population accounting to almost 100 million people.
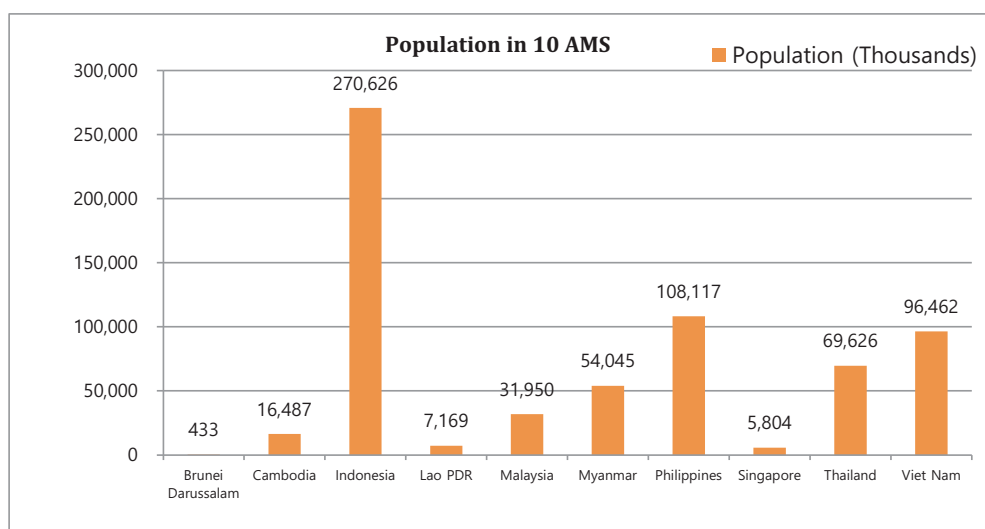
Source: United Nations (2022). Demographic Statistics Database [Data set]. Retrieved January 1, 2022, from
http://data.un.org/Explorer.aspx

Figure 2.5 Population of 10 AMS: 2019

1.2.2.2. Current Population Structure and Changes in Population Structure

Population is the major source of human capital development. Also, its structure and changes in the population structure influence characteristics of human capital and utilization of human capital.

i. Population and the Pace of population growth in 10 AMS

As shown in the population of 10 AMS in Figure 2.5, the Member States show diversity in the size of population.

We also analyzed the pace of population growth in 10 AMS for 2019, and for the decade of 2010 to 2019, which are shown in figure 2.6 & figure 2.7.

In 2019, the annual population growth rate exceeded 1.0% for six out of 10 AMS. Myanmar recorded 0.63, with Singapore 0.81 and Thailand 0.28.

When the population growth rates of AMS are compared to those of G7 countries, where 6 out of 7 countries show the growth rate lower than or equal to 0.60%, the population is growing much faster in 10 AMS. The same result is observed with the annual growth rates over the period of 2010 to 2019. During the last decade, the AMS have shown more rapid population growth, compared to those of G7 countries (cf. figure 2.7).

Another observation which can be made with respect to the population growth in the 10 AMS is that the growth rates are higher than other countries such as G7 but the growth rate continues to decrease during the 10 years in most of 10 AMS.

In the long run, the decreasing growth rate has influence on the population structure in the countries as we are going to look at in the following.
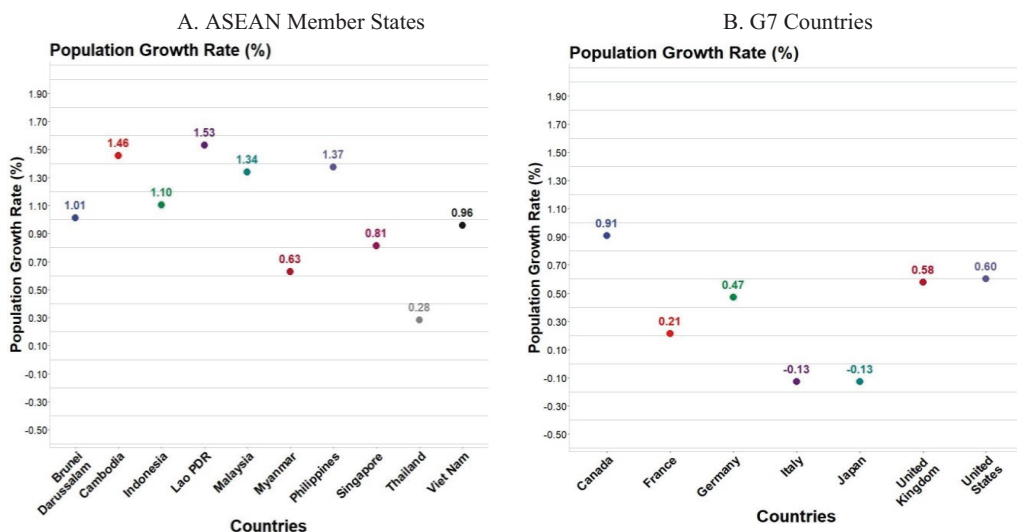
A. ASEAN Member States   B. G7 Countries

Source: Derived from United Nations (2022). Demographic Statistics Database [Data set]. Retrieved January 1, 2022, from http://data.un.org/Explorer.aspx

Figure 2.6 Annual Population Growth Rate (2019): 10 AMS and G7 countries
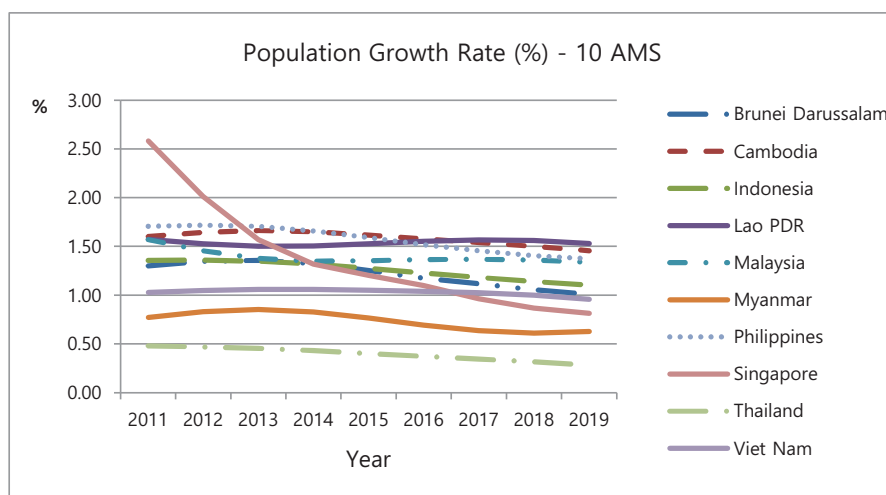
Source: Derived from United Nations (2022). Demographic Statistics Database [Data set]. Retrieved January 1, 2022, from http://data.un.org/Explorer.aspx

Figure 2.7 Annual Population Growth of 10 AMS: Time Series during 2011-2019

ii. Current Demographic Structure in 10 AMS: Major Characteristics

The current demographic structure of the 10 AMS has the following characteristics.

First, the proportion of the young, who are aged 14 and under, is relatively high.

Second, the percentage of the old, who are aged 65 & over, is relatively low.

Third, as a result, the AMS have now relatively young labour force, with the proportion of those aged under 35 relatively high, and the proportion of those aged between 35 and 64 relatively low in the labour force.

Relatively young labour force works beneficial to utilization of the labour, because younger labour force has higher trainability and it can positively affect the quality of labour.

However, it can also be predicted that ever decreasing rates of population growth in the AMS can bring changes to the population structure and aging of population in the AMS.

Table 2.3 Current Population Distribution of Key Age Groups among 10 AMS (2019)

(in %)

Country	0-4	0-14	15-24 (Youth)	25-34	55-64	65+	0-34	35-64
Brunei Darussalam	7.54	22.62	*16.03*	17.00	8.69	5.21	55.64	39.15
Cambodia	10.80	31.10	*18.34*	17.24	6.44	4.72	66.68	28.60
Indonesia	8.85	26.22	*16.91*	15.09	8.39	6.05	58.21	35.74
Lao PDR	11.08	32.30	*19.52*	17.28	5.68	4.16	69.11	26.73
Malaysia	8.20	23.69	*17.49*	18.22	8.20	6.92	59.40	33.68
Myanmar	8.35	25.91	*18.12*	15.71	8.23	6.01	59.75	34.24
Philippines	9.97	30.48	*18.92*	16.04	6.84	5.31	65.44	29.24
Singapore	4.31	12.33	*11.93*	14.94	15.73	12.39	39.20	48.41

Country	0-4	0-14	15-24 (Youth)	25-34	55-64	65+	0-34	35-64
Thailand	5.24	16.82	*13.39*	13.26	13.22	12.41	43.47	44.12
Viet Nam	8.18	23.21	*14.12*	17.71	9.63	7.55	55.05	37.40
United States	5.96	18.55	*13.28*	14.11	12.80	16.21	45.94	37.85
U.K.	5.85	17.70	*11.56*	13.61	12.23	18.51	42.87	38.62
Canada	5.29	15.85	*11.80*	14.16	14.11	17.65	41.80	40.55
France	5.63	17.80	*11.62*	11.81	12.58	20.39	41.23	38.38
Germany	4.77	13.80	*10.42*	12.35	14.82	21.56	36.57	41.87
Italy	3.94	13.17	*9.62*	10.85	13.90	23.01	33.64	43.35
Japan	3.87	12.57	*9.29*	10.40	12.15	28.00	32.26	39.74

Source: United Nations (2022). *Demographic Statistics Database* [Data set]. Retrieved January 1, 2022, from
http://data.un.org/Explorer.aspx

iii. Expected changes in population structure in 10 AMS

As suggested above, the decreasing rate of population growth has effects on the current population structure.

While the size of population continues to increase in the countries, the diminishing pace of population growth itself will bring shift in the demographic structure.

It will decrease the proportion of those in the younger age group, while increasing the proportion of those aged over 65. In other words, if the current trends of decrease in the growth rate persist, it will eventually bring the ageing of population, and also ageing of the labour force.

iv. Impacts of changes in demographic structure for HRD among AMS

This changing demographic structure in the AMS places challenges for HRD policies for the AMS.

First, the needs arise for smarter utilization of labour. With ageing labour force, young and productive labour becomes limited and, therefore, HRD policies need to be established that can maximize the utilization of the labour. Efficient HRD system increases utilization of labour in ageing population and limited labour force available.

Second, strategies are needed to set up to deal with the aging labour force. For instance, more precise predictions need to be made with respect to the pace of ageing, so that it can be predicted how the population structure will change during the designated period. Accordingly, plans need to be made as to how to utilize the labour force with changing demographic structure.

These predictions have to do with the projections on the supply in the labour markets. These predictions will also have impacts on both the training of the youth before they enter the labour markets and also retraining of the employed, who are in the labour markets.

1.3. Labor-force Utilization in 10 AMS

1.3.1. Labor Force Participation Rate (LFPR)

Labour force participation rate (LFPR) is a very important indicator measuring the status of labour force utilization in the country. In the below, we provide the LFPRs for the labour-force in 2019 among the AMS, that is, for those aged 15 to 64. Then we analyze the gender gap in LFPR between males and females among the AMS, which is the source of lower labour-force utilization in most of the AMS. Then, we also provide the LFPR for the elderly aged 65 and over, and the youth aged 0 to 14. These analyses will shed a light on the major issues of labour force utilization among the AMS.

i. LFPR for those aged 15 to 64

As shown in the figure 2.8 below, labour force participation rates of those aged between 15 and 64 in 2019 have variations among the AMS. They range from 43% to 84%.

Overall, the LFPRs of those aged 15-64 among AMS are lower compared to those among G7 countries such as the United Kingdom, Germany, and Japan. This is mainly caused by following two factors; first, the larger gender gap in LFPR among the AMS, second, the higher LFPR of the elderly among the AMS. These factors will be further documented later.
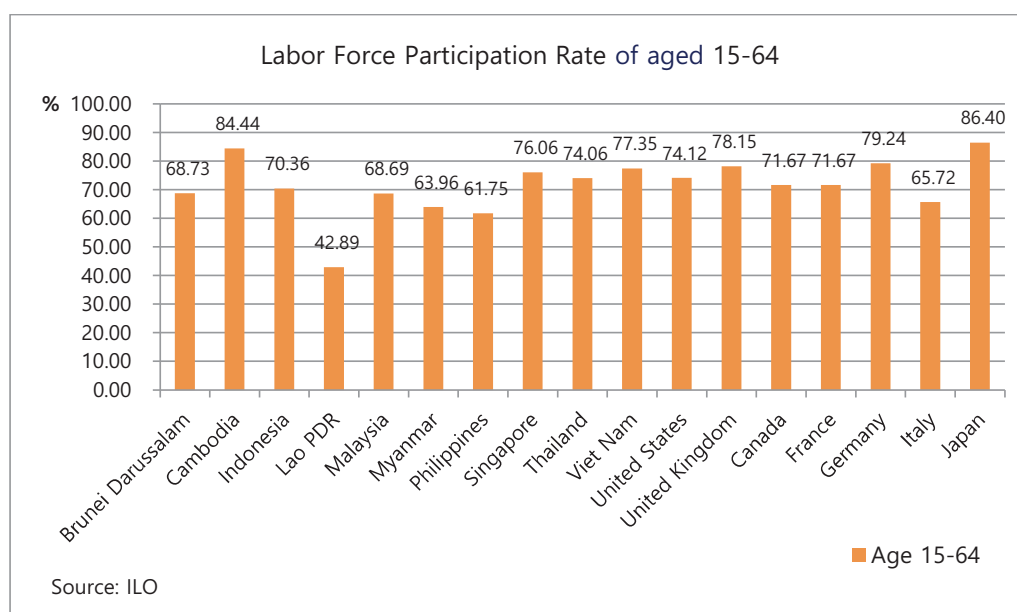
Source: International Labour Organization (2022). Labour Force Participation Rate [Data set]. Retrieved January 1, 2022, from https://ilostat.ilo.org/data

Figure 2.8 the LFPR of the workforce aged 15 to 64 among AMS and G7 countries (2019)
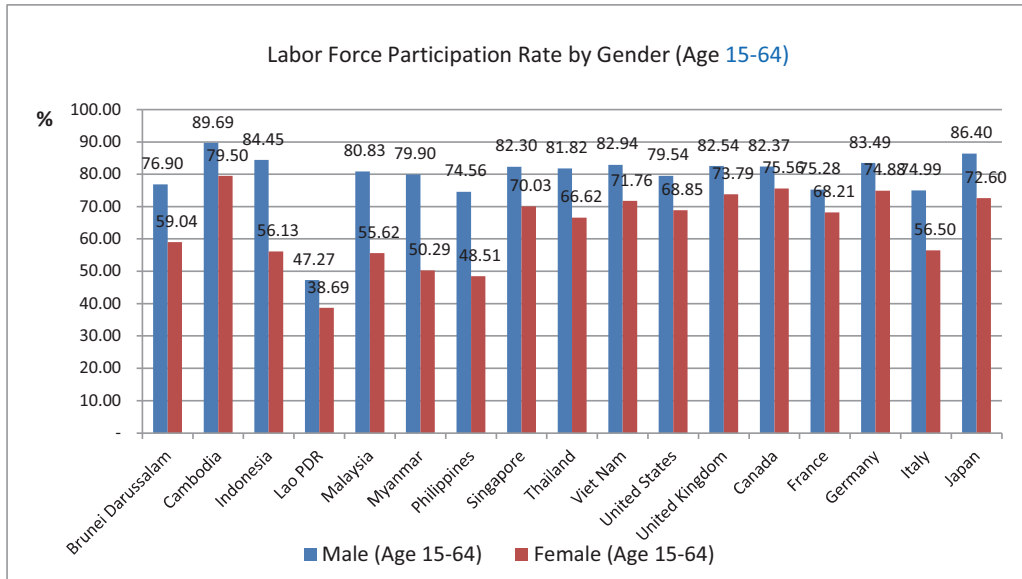
Labor Force Participation Rate by Gender (Age 15-64)

Source: International Labour Organization (2022). Labour Force Participation Rate [Data set]. Retrieved January 1, 2022, from https://ilostat.ilo.org/data

Figure 2.9 Labor Force Participation Rate by Gender among AMS & G7 countries (2019)

ii. Gender Gap in the LFPR among those aged 15 to 64 in AMS

When the LFPRs for males and for females are compared among AMS, a considerable gender gap is found.

The LFPRs for males exceed 80% in most of the AMS. This shows that the LFPR for males among AMS are as high as those in G7 countries. However, the LFPRs for females in AMS range from 40% to 60%, which is quite low compared to the LFPR for females in G7 countries, which range from 60% to 75%.

This analysis shows that the gender gap in LFPR among AMS is the main source of lower labour force utilization among AMS. When only the LFPRs for males are compared, AMS have labour force utilization as high as countries of high labour force utilization in the world.

iii. LFPR of those aged 65 and over (the elderly)

The LFPRs for aged 65 and over are high among AMS. This means that they work until later in life in AMS, probably because they have to work to support themselves.

Due to high LFPRs for the old among AMS, the gap between the LFPRs among AMS and those in G7 countries is reduced when the LFPRs are compared for the age group of those who are 15 years and over. (LFPR for aged 65)

vi. LFPR of the youth (aged 15 to 24)

The LFPRs for the youth, aged between 15 and 24, among AMS are relatively low, compared to G7 countries such as U.S, U.K, and Germany, They are lower than 50% in most AMS. This shows that there is room for improving labour force utilization of the youth in AMS.
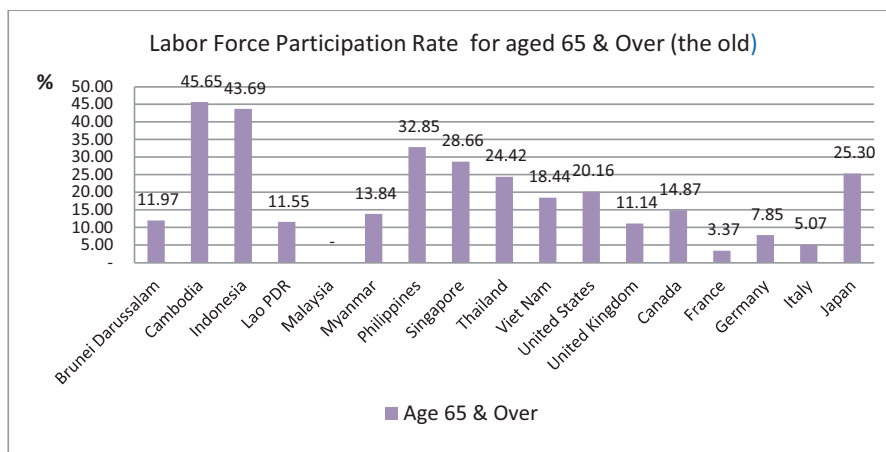
Labor Force Participation Rate for aged 65 & Over (the old)

Source: International Labour Organization (2022). *Labour Force Participation Rate* [Data set]. Retrieved January 1, 2022, from https://ilostat.ilo.org/data

Figure 2.10 LFPR for the old, aged 65 & over, 2019
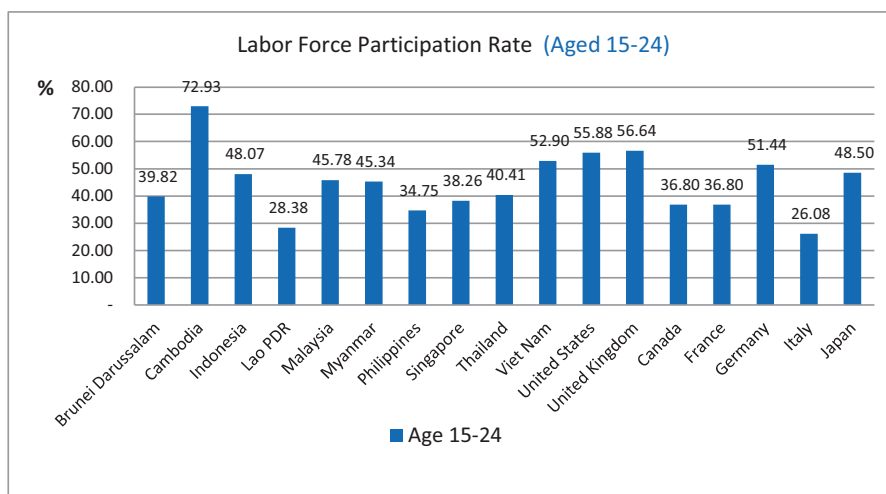
Labor Force Participation Rate (Aged 15-24)

Source: International Labour Organization (2022). Labour Force Participation Rate [Data set]. Retrieved January 1, 2022, from https://ilostat.ilo.org/data

Figure 2.11 LFPR for the youth aged 15~24: 2019

1.3.2. Rate of Unemployment

As shown in figure 2.12 which shows the rate of unemployment in 2019 in the AMS, in general, the rate of unemployment is relatively low for the adult aged 25 and over among AMS. The rates are higher among G7 countries.

This is partly due to the fact that it is hard to measure the rate of unemployment exactly in some of the countries.[3] This is why the employment to population ratio, which is measured by the number of those actually employed over the number of people in the respective age group, is preferred as an indicator of labour force participation.

In contrast, the rate of unemployment for the Youth is not low among AMS, when compared to those of G7 countries. In some of the AMS, the youth unemployment is as high as in G7 countries.

This raises an issue of under-utilization of the youth labour in these countries. Considering the relatively young population in many AMS, it is quite important to address the issue of maximizing the utilization of the youth in the labour markets who are in transition to the labour market. Setting up policy initiatives to train the youth properly, with TVET reforms, to prepare them for the world of work, should be very important part in policies targeting the youth.
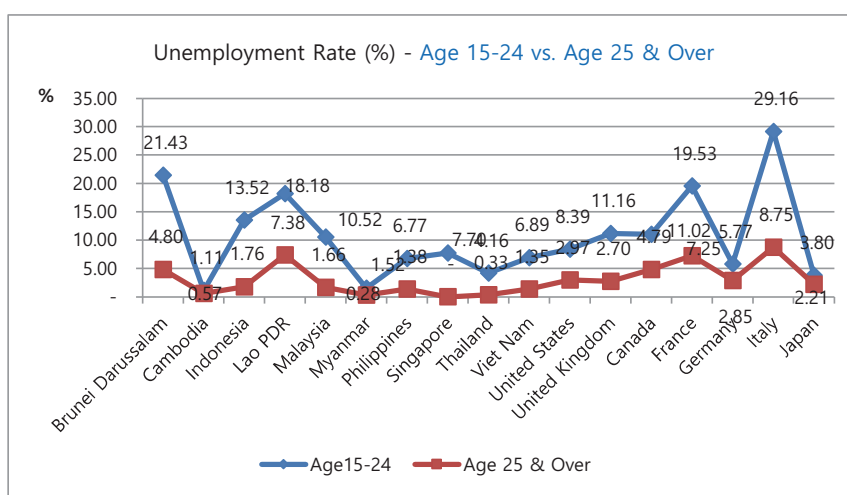
Source: International Labour Organization (2022). Labour Force Participation Rate [Data set]. Retrieved January 1, 2022, from https://ilostat.ilo.org/data

Figure 2.12 Rate of Unemployment of 10 AMS of the youth (15-24) & adults (25 and over), 2019

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3 'Unemployed' measures the intension of the individual: 'willing to work, but can not find a job'. However, often it is hard to determine whether the job-less individual wanted to work or not. Therefore the non-employment rate is often preferred as a clearer measure.

1.3.3. Implications of the Analysis for Establishing Strategies for HRD in AMS

From analysis made so far, a few significant implications can be made for the direction of HRD policies among AMS.

First, there are needs for higher female labour force utilization. We have shown that the gender gap in LFPRs is the major source of low utilization of labour force among AMS. Therefore, increasing participation of the female labour-force in the labour markets and increasing female employment would be critical in setting up HRD initiatives.

Second, there are needs to improve vocational education and training for old-age workers. Rapid pace of ageing, while population growth slows down, calls for training and re-training of old-workers. Older workers have special needs at the workplace and they need to be trained properly to adjust to the workplace, while jobs that are suitable for older workers need to be identified. In particular, TVET programs to get them ready in the labour-market and additional kinds of national support will be needed.

Third, utilization of the youth labour needs to be improved. It was observed that the youth unemployment is high in some AMS. Considering the young labour force of most AMS, quality TVET programs needs to be developed and provided in order to enhance the HR competitiveness of AMS.

1.4. Industrial & Occupational Structures of 10 AMS

Industrial and occupational structures play an important role as indicators of skills demands and skills supply in the labour markets. They reflect demands for jobs in industries and occupations, and also demands for skills in the labour market. Therefore, here we have analyzed the industrial composition of the labour force, occupational composition of the labour force, and also the changes in industrial composition over the years. Changes in the industrial structure can be considered to reflect the changes in demands for industries and changes in demands for the skills in the labour market.

1.4.1. Industrial Structure

Here, the current industrial structure of the 10 AMS is described. First, industrial composition of the gross domestic products (GDP) of the AMS is presented. Then, the distribution of the employed over the industry groups is analyzed.

1.4.1.1. Composition of GDP by Industries in 10 AMS (2019)

The following show major characteristics of the composition of GDP by the 3 broad industry groups among the AMS based upon the 2019 statistics.

i. Agriculture/Forest/Fishing Sector

The GDP share in Agriculture/Forest/Fishing appears to be high in CLMV states. The share accounts for 14 to 21% of the total GDP among CLMV states.

ii. Industry Sector

The secondary sector includes construction. In most of AMS, the share ranges between 30% and 37%, while Brunei Darussalam with the highest (62.5%), and Singapore with the lowest share (24. 2%) among AMS.

iii. Service Sector

The share of service in GDP ranges between 40% and 50 % in most AMS, with Singapore the highest (70%), and with the Philippines and Thailand high share reaching 60%.

1.4.1.2. Composition of the employed across major Industry groups

In the following, major characteristics of the distribution of the employed over the 3 broad industry groups in the AMS are described. The analysis is based on the 2019 statistics.

i. Agriculture/Forest/Fishing Sector

The share of employed in Agriculture/Forest/Fishing is high in CLMV states. The share ranges from 30% to 60% in CLMV states. The share is also high in Thailand and Indonesia. Meanwhile, the Share is very low in Brunei Darussalam, Singapore, and the share is relatively low in Malaysia.

ii. The Industry Sector

The figures for the secondary sector include those in construction. The share of the employed in the *industry sector* ranges between 13% to 28 to among AMS.

iii. The Service Sector

The share of those working in the service sector shows wide range reaching from 25.6% to 84.4%. The share is highest in Brunei Darussalam and Singapore, where they mark 77% and 84%, respectively. The share is relatively high in Malaysia, Philippines and Indonesia with the share ranging between 50% and 60%.

Table 2.4 Distribution of Gross Domestic Product(GDP) across Major Industry Groups in 10 AMS, 2019

(In %)

Country	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
GDP (in Const. Million US. dollars)	14,007	20,921	1,204,457	13,297	398,947	89,353	361,124	338,646	452,964	200,858
Agricul/Forest/fishing	0.99	20.71	12.71	15.17	7.26	22.18	8.82	0.03	8.14	13.96
Industry (including const)	62.52	34.23	38.95	31.41	37.40	35.90	30.33	24.21	33.60	34.49
Services	38.18	38.85	44.22	42.34	54.21	41.92	60.85	70.67	58.26	41.64

Source: World Bank (2022). World Development Indicators [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators

Table 2.5 Distribution of the Employed across Major Industry Groups in 10 AMS, 2019

(In %)

Country	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
Agriculture	1.95	34.53	28.50	61.44	10.28	48.85	22.86	0.03	31.43	37.22
Industry	20.76	27.91	22.36	12.94	27.01	16.94	19.12	15.55	22.84	27.44
Services	77.28	37.56	49.14	25.62	62.72	34.21	58.03	84.41	45.73	35.34
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: World Bank (2022). World Development Indicators [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators

Table 2.6 Distribution of the Employed across 22 Broad Structure Industries in 10 AMS, 2019

(In %)

BS industries (ISIC '04)	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
A. Agricul/forest/fishing	4.87	38.28	33.35	31.33	10.23	48.91	22.87	0.71	31.46	29.56
B. Mining & quarrying	4.09	0.12	0.86	0.48	0.60	0.58	0.42	-	0.13	0.22
C. Manufacturing	4.18	16.66	13.71	7.94	17.79	10.54	8.53	12.85	16.28	21.83
D. Electricity, gas, steam and air condition	0.44	0.34	0.18	0.58	0.47	0.11	0.22	-	0.32	0.38
E. Water supply.	0.51	0.21	0.24	0.33	0.59	0.10	0.15	-	0.25	0.32
F. Construction	8.55	8.14	6.76	4.72	8.47	5.58	9.79	12.07	5.83	9.01
G. Wholesale & retail trade	15.97	13.43	18.63	18.72	17.21	18.22	19.92	12.87	16.60	14.38
H. Transport and storage	2.88	4.14	3.92	2.23	4.43	5.45	8.09	6.95	3.46	3.89
I. Accomm. and food service	9.65	3.85	4.38	2.31	10.28	1.77	4.52	7.03	7.58	5.48
J. Information & comm.	2.18	0.19	0.49	0.46	1.42	0.28	1.00	3.95	0.52	0.72
K. Financial and insurance	1.79	0.81	1.47	0.60	2.22	0.71	1.37	5.31	1.37	1.00
L. Real estate	0.50	-	0.25	0.02	0.61	0.09	0.55	2.21	0.54	0.62
M. Profess/scient/tech serv.	1.48	0.61	0.36	0.22	2.56	0.25	0.72	6.71	1.01	0.64
N. Admin. & support serv.	4.80	4.47	0.89	0.60	5.35	1.03	3.91	6.73	1.60	0.71
O. Public adm. & defense	19.00	3.25	3.42	8.90	4.89	0.63	6.56	6.76	4.28	2.98
P. Education Service	8.59	1.97	4.88	4.83	6.38	2.39	3.02	-	3.08	4.00
Q. Human health & soc. work	3.36	0.45	1.23	1.27	3.50	0.33	1.26	4.48	1.52	1.23
R. Arts, entert. & recreation	1.34	1.01	0.42	0.53	0.52	0.09	0.96	1.51	0.90	0.55
S. Other service activities –	1.16	1.61	2.24	1.39	1.77	2.87	6.15	9.85	2.48	2.01
T. Act. of hslds as employer;	4.33	-	2.33	0.05	0.69	0.07	-	-	0.58	0.46
U. Eextraterritorial orgs.	0.36	0.46	0.00	0.03	-	-	0.00	-	0.21	0.01
Not elsewhere classified	-	-	-	12.45	-	-	-	-	-	-
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: International Labour Organization (2022). Labour Force Participation Rate [Data set]. Retrieved January 1, 2022, from https://ilostat.ilo.org/data

Note: For Singapore, the data for Agriculture (A) is acquired as a result of adding the data for agriculture (A), mining and quarrying(B), gas & electricity(D), and water supply(C). Additionally the data for education service (P) is summed to the data for public administration & defense(O). *Based on 2019 Data except Cambodia & Lao PDR(2017), and Indonesia (2015)

1.4.1.3. Distribution of the Employed over 22 BS Industries (2019)

The table 2.6 shows the distribution of the employed over 22 ISCI Broad Structure industrial categories. For each industrial category group, the countries that show relatively high share in the industrial category is as follows.

Table 2.7 Countries with high share of the employed in the sector (22 Broad Structure industries), 2019

Industry Sector (ISCI)	Country
A. Agriculture, fishing, and mining	Myanmar, Cambodia, Lao PDR, Thailand, Viet Nam
B. Mining & Quarrying	Brunei Darussalam
C. Manufacturing	Viet Nam, Malaysia, Thailand, Cambodia
F. Construction	Singapore, Philippines, Viet Nam
G. Wholesale & retail trade	Philippines, Lao PDR, Indonesia, Myanmar
H. Transportation & Storage	Philippines, Singapore
I. Accommodation & Food	Malaysia, Brunei Darussalam
J. Information & communication	Singapore, Brunei Darussalam, Malaysia
K. Financial and Insurance Services	Singapore, Malaysia
L. Real Estate	Singapore
M. Professional, Scientific and Technical Services	Singapore, Malaysia
N. Administrative Supportive Services	Singapore, Malaysia
O. Public Administration and defense	Brunei Darussalam, Lao PDR, Philippines, Singapore
P. Educational Services	Brunei Darussalam, Malaysia
Q. Human health & social work activities	Malaysia, Brunei Darussalam, Singapore
S. Other Service Activities	Philippines, Singapore

1.4.2. Occupational Distributions in 10 AMS (2019) (Refer to Table 2.8)

Occupational distribution among the ASEAN member states has the following characteristics.

First, there is considerable variation in the share of the professionals and semi-professional (technicians and associate professionals) among the states. In Brunei Darussalam, Malaysia, and Singapore, the share of the professionals and semi-professionals (technicians and associate professionals) is greater than 10%. The proportion of clerical support workers is also greater among these countries. It can be said that Brunei Darussalam, Malaysia, and Singapore have a high proportion of white collar workers compared to the rest of the AMS.

Meanwhile, the share of the service and sales workers are relatively high in most of the AMS. The share is particularly high in Indonesia, Malaysia, and Thailand.

If we look at the skilled blue collar jobs such as skilled agricultural workers and crafts & trades workers, the share of skilled agricultural workers is particularly high in Cambodia, Lao PDR, Myanmar, and Thailand, while the share of craft and trades workers are particularly high in Cambodia and Viet Nam.

The share of plant and machine operators is high in Malaysia and Viet Nam, while the proportion of elementary occupations is high in Viet Nam, Philippines, and Myanmar.

The share of the service and sales workers is high across 10 AMS. It runs from 10. 8 % to 25.0 % among 10 AMS. Also, the share of elementary occupations is high, exceeding 10% in most of the 10 AMS and approaching almost 30 % in the highest country.

Analysis of the occupational composition among the 10 AMS reveals where the state is located in terms of skill distribution of the workers employed. Among with changing industrial structure and labour market demands in the state, this current occupational composition is about to be altered reflecting upon the changes in the skill demands. For instance, the growing service sector will demand more workers in the white collar jobs. Meanwhile, the share of service and sales workers and that of elementary occupations stay stable across the 10 AMS, indicating that supporting jobs are in stable demands regardless of the status of the economic development of the country. Also, the share of the skilled agricultural workers is quite high in several AMS. This shows there is need to focus on the skill development of agricultural workers in countries where the agriculture explains considerable part of GDP.

Table 2.8 Distribution of the Employed by Occupation, 2019

(In %)

Major Occupations (ISCO)*	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
1. Managers	7.70	0.77	2.56	**10.78**	4.61	0.74	**11.41**	**16.36**	3.66	1.06
2. Professionals	**17.49**	3.38	5.95	7.87	**12.50**	2.70	5.59	**21.05**	5.63	8.77
3. Technician & ass. Professionals	**13.43**	1.39	3.11	2.63	**10.44**	1.44	4.15	**20.98**	4.49	3.67
4. Clerical supportive Workers	**10.09**	4.74	4.76	1.91	**8.44**	2.06	6.08	**10.63**	4.51	2.13
5. Service and sales W.	18.24	17.85	**25.04**	10.77	**22.63**	19.57	18.40	11.55	**20.13**	18.83
6. Skilled agricultural	0.71	**31.80**	22.13	**39.64**	6.19	**35.57**	11.77	-	28.80	7.24
7. Craft and trades W.	11.03	**23.24**	11.33	11.27	10.46	13.18	7.93	3.04	11.28	**15.17**
8. Plant/mach. operators	3.53	4.03	6.84	4.40	**12.38**	5.95	7.72	6.79	9.90	**12.77**
9. Elementary occs	15.79	11.91	17.84	7.70	12.36	**18.75**	**26.75**	6.70	11.40	**30.12**
0. Armed forces occ.	2.00	0.89	0.43	3.04	-	0.04	0.21	-	-	0.24
Not elsewhere classified	-	-	-	0.00	-	-	-	2.91	0.18	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Year	2019	2017	2019	2017	2019	2019	2019	2019	2019	2019

Source: International Labour Organization (2022). Labour Force Participation Rate [Data set]. Retrieved January 1, 2022, from https://ilostat.ilo.org/data

Notes: figures for the major occupational categories in the table are calculated from the ISCO digit 2 level statistics.

Table 2.9 GDP Growth of 22 BS Industries in 10 AMS: 2010–2019 Compound Annual Growth Rate (CAGR)

	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Viet Nam	Singapore	Thailand
GDP by industrial origin [a]	0.24	7.14	5.33	6.93	4.81	6.30	6.29	6.30	3.80	3.20
A. Agricult./forestry/Fishing	0.73	1.44	3.95	2.66	0.95	0.05	1.95	2.85	2.26	1.28
B. Mining and quarrying	-1.63	20.16	1.29	0.75	-0.36	2.18	2.68	0.32		0.22
C. Manufacturing	1.25	8.63	4.65	5.44	4.79	9.81	5.55	10.96	2.90	1.41
D. Electricity, gas, steam, & air-conditioning	1.30	8.15	4.88	14.77	4.28	8.75	5.95	10.63	1.37	3.23
E. Water supply; sewerage, waste mana, remed. Activities	27.03*		4.91	5.68	6.77	…	4.44	7.98		5.17
F. Construction	4.18	17.29	6.54	15.84	4.58	8.86	9.59	7.05	2.55	2.84
G. Wholesale and retail trade;	3.02	6.74	5.06	9.70	7.08	7.76	6.24	8.80	3.29	3.92
H. Transportation and storage	2.61	7.63	7.32	17.27	6.28	8.75	8.73	6.75	2.94	4.79
I. Accommodation and food service activities	3.38	6.44	5.82	-3.31	8.31	…	8.05	6.76	3.68	9.57
J. Information & comm.	1.51		9.71	9.21	7.85	…	5.95	8.38	5.87	7.21
K. Financial & insurance act.	3.20	10.03	7.06	11.56	4.42	25.60	9.22	7.31	7.04	7.62
L. Real estate activities	2.41	9.34	5.35	5.13	4.79	…	6.64	3.33	4.18	3.74
M. Professional, scientific, and technical activities	…		8.53	7.93	9.29	…	9.60	6.97		3.36
N. Administrative & support service activ.	0.95			…	7.45	…		7.22		3.64
O. Public administration and defense; compul. Soc. Sec.	1.14	4.53	3.88	3.46	4.41	4.90	6.92	6.60		1.61
P. Education Service.	1.22		6.03	4.93	6.15	…	4.85	7.32		1.70
Q. Human health and soc.l work activities	3.42		7.51	3.78	5.72	…	6.02	7.33		4.29
R. Arts, entertain.,& recreation	…			…	…	…	5.95	7.33		11.67
S. Other service activities	-6.17	5.71	8.18	3.47	4.93	12.96	6.82	6.19	3.04	5.07
T. Activities of hslds as employers;	…			…	…	…		6.90	4.21	-0.53
U. Activities of extraterritorial organizations/bodies	2.05*			…	…	…				

Source: Derived from Asian Development Bank (2021). Key Indicators Database (KIDB) [Data set]. Retrieved January 1, 2022, from https://kidb.adb.org/
[a] Derived from World Bank (2022). World Development Indicators [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators

1.4.3. Changes in Industrial Distribution

1.4.3.1. GDP Growth: CAGR of 22 BS industries: 2010-2019 (Refer to Table 2.9)

Countries which show high GDP growth rates among AMS during the last decade for each of 22 BS industries are as follows. The industry sectors showing relatively high CAGR in the AMS indicate that there is growing demands for the sectors in the labour markets.

Table 2.10 Countries with high CAGR during 2010~2019 by Industry (BS Industries)

Industry Sector (ISIC)	Country
B. Mining & Quarrying	Cambodia
C. Manufacturing	Cambodia, Myanmar, Viet Nam
D. Electricity, Gas, Air Conditioning	Lao PDR, Viet Nam, Myanmar, Cambodia
G. Wholesale & Retail	Cambodia, Lao PDR, Malaysia, Myanmar
H. Transportation & Storage	Lao PDR, Myanmar, Malaysia, Indonesia Thailand
I. Accommodation & Food	Malaysia, Philippines, Thailand
J. Information & Communication	Indonesia, Malaysia, Viet Nam, Singapore
M. Professional/Technical Service	Malaysia, Philippines
O. Public Administration/Defense	Malaysia, Indonesia, Philippines
R. Arts, Entertainment	Thailand

1.4.3.2. Employment Growth by industry (across major industry groups) (Refer to Table 2.11)

In the following, major features in the percentage decrease or percentage increase in the share of employment by industry sector during the period 2011~2020 is analyzed for 10 AMS. Overall, employment in the agriculture, forestry & fishing is on the decease, while employment in manufacturing and the service sector in on the increase. HR policies in the AMS need to take these transitions in employment in each sector into account.

i. Agriculture/Forestry/Fishing

The share in Agriculture/Forestry/Fishing decreased in Cambodia (23%P ↓), Viet Nam (11%P ↓), Lao PDR, Philippines, & Indonesia (10%P ↓)

ii. Industry sector (including construction)

The share of employment in the industry sector increased in Cambodia (12%P ↑), Viet Nam (6% P ↑), and Lao PDR, (5%P ↑) The share decreased in Singapore (6.3%P ↓)

iii. Employment Changes in the Service sector

The share of employment in the service sector increased in Cambodia (11%P ↑), Indonesia, Philippines (7% P ↑), and Singapore (6%P ↑)

Table 2.11 Growth of Employment by Industry: 2011-2020

11-1. Percentage Increase in the Share of Employment by Industry during last decade: C2-C1 (2011-2020)

	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	ASEAN Total
Agriculture/forestry/fishing	1.26	-22.78	-10.63	-10.02	-3.02	-4.29	-10.06	-0.08	-6.82	-11.49	-9.96
Industry (incl. const.)	1.24	11.87	3.71	4.62	-0.61	0.42	3.40	-6.31	2.20	5.76	3.53
Services	-2.51	10.91	6.92	5.40	3.63	3.87	6.67	6.38	4.62	5.73	6.44

Source: Derived from World Bank (2022). World Development Indicators [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators

11-2. Rate of Growth of the Share of Employment of Major Industries during last decade: C2-C1 (2011-2020)

	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	ASEAN Total
Agriculture, forestry/fishing	219.45	-30.51	-12.67	5.24	-0.64	-6.56	-17.62	-67.44	-18.52	-15.36	-14.06
Industry (incl. construction)	20.22	100.68	43.76	90.38	25.71	4.23	44.29	-15.08	9.73	40.19	35.07
Services	9.48	62.55	39.56	55.10	36.45	14.61	34.04	29.14	10.30	32.20	32.19
Total GDP	13.04	15.33	19.90	22.41	28.55	1.64	18.64	19.38	-0.84	10.76	14.04

Source: Derived from World Bank (2022). World Development Indicators [Data set]. Retrieved January 1, 2022, from https://databank.worldbank.org/source/world-development-indicators

2. TVET System in 10 AMS

2.1. National Education System in 10 AMS

i. Free and compulsory education

All ASEAN countries have a legal provision for free and compulsory education for at least some levels of basic education, mostly for primary education. The average duration of free and compulsory education for the ASEAN countries is 7.3 years. It should be noted that the duration for primary education in Lao PDR, Myanmar, and Viet Nam is 5 years while it is 6 years in the other 7 countries. In some countries, upper secondary education is provided free of charge, even though it is not compulsory (e.g. Malaysia, Thailand). On the other hand, although lower secondary education is compulsory in Viet Nam, only primary education is free (UNESCO Bangkok, 2014: 8).
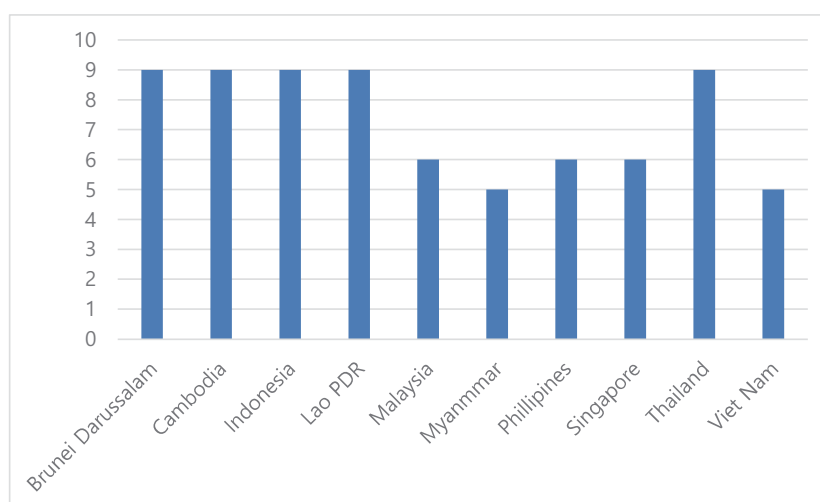
Source: Updated from UNESCO Bangkok (2014). Education Systems in ASEAN+6 Countries: A Comparative Analysis of Selected Educational Issues. P.8.

Figure 2.13 Years of free and compulsory education in AMS

ii. Structure of national education system

In the majority of countries, formal education officially starts at the age of 6, while in Myanmar, children start formal education at the age of 5 and in Indonesia and Thailand, at age 7. Many of the ASEAN countries have 12 years of formal education divided into primary, lower secondary and upper secondary levels while some have 11 years of education (UNESCO Bangkok, 2014: 11).

Table 2.12 Starting age and duration of primary and secondary education

Structure	Total Years	Countries
6+3+3	12	Cambodia (Yr 6-11 + Yr 12-14 + Yr 15-17) Indonesia (Yr 7-12 + Yr 13-15 + Yr 16-18) Thailand (Yr 7-12 + Yr 13-15 + Yr 16-18)
6+4+2	12	Philippines (Yr 6-11 + Yr 12-15 + Yr 16-17)[4] Singapore (Yr 6-11 + Yr 12-15 + Yr 16-17)[5]
5+4+3	12	Lao PDR (Yr 6-10 + Yr 11-14 + Yr 15-17) Viet Nam (Yr 6-10 + Yr 11-14 + Yr 15-17)
6+3+2	11	Malaysia (Yr 6-11 + Yr 12-14 + Yr 15-16)
6+5	11	Brunei Darussalam (Yr 6-11 + Yr 12-16)
5+4+2 (3)[6]	11 (12)	Myanmar (Yr 5-9 + Yr 13 + Yr 14-15 (16))

Source: Compiled from TVET Country Profiles

The detailed structure of education varies among countries but most countries have 5 or 6 years of primary education, followed by 3 or 4 years of lower secondary, and 2 or 3 years of upper secondary education. 6+3+3 is the most common education structure in the region, followed by 6+4+2 and 5+4+3 system. In recent years, several countries have introduced structural reform to their education systems requiring significant investment and preparation. Lao PDR is one of such examples. Lao PDR introduced 5+4+3 school system in 2009/2010 by adding one year to the lower secondary level (UNESCO Bangkok, 2014: 12).

In most AMS, vocational education starts at ISCED level 2 or 3 (lower or upper secondary education). In Brunei Darussalam, Malaysia, Singapore, and Viet Nam, basic/elementary vocational education is provided at the lower secondary level for 3 to 4 years. On the other hand, in other 6 countries, the division of academic and vocational education track starts at the level of upper secondary education.

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4 Philippines had introduced K-12 reforms in 2016

5 Singapore's education structure is commonly described as 6+4+2. Other pathways consist of 6 years of primary education, 4 or 5 years of lower secondary education, and 1, 2, or 3 years of upper secondary education.

6 In Myanmar, the existing 5 + 4 + 2 system is under transition to the new 5 + 4 + 3 system. The new system was first introduced in 2016, and the system is being replaced phase by phase.

Table 2.13 Structure of national education system linked with ISCED[7]

ISCED	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
8	Doctoral degree (3)	Doctoral degree (3) *Doctoral degree of TBE (3)*	Doctoral degree (3-5) *Specialist 2 (3-5)*	Doctoral degree (3-5) Post graduate diploma of specialist level 2 (3)	Doctoral degree	Doctoral degree	Doctoral degree (3)	Doctoral degree	Doctoral degree	Doctoral degree (4)
7	Master's degree (1.5)	Master's degree (2) *Master's degree of TBE (2)*	Master's degree (2-5) *Specialist 1 (3-5)*	Master's degree (2) Graduate diploma (1) Graduate diploma of specialist level 1 (2-3)	Master's degree	Master's degree	Master's degree	Master's degree	Master's degree	Master's degree (2)
6	Bachelor's degree (5)	Bachelor's degree (5) *Bachelor of TBE (2)*	Bachelor's degree (4-6) *Diploma 1-4 (4)*	Bachelor regular program (4) Bachelor continuing program (1.5)	Bachelor's degree (academic) *Bachelor's degree (TVET)*	Bachelor's degree *High-level engineering courses (6)*	Bachelor's degree	Bachelor's degree	Academic tertiary undergraduate (4) *Vocational tertiary undergraduate (2+2)*	Bachelor's degree (4-6)
5	*Advanced National Diploma (2.5) Higher National Diploma (2.5)*	*Higher Diploma of technical/business education (TBE) (2)*		Associate degree (1.5-2) *Advanced diploma (1-3)*	*Polytechnics (5)*	Advanced diploma (Academic / Vocational)	*Diploma 5*	*Polytechnics (2-3) ITE college (2-3) Apprenticeship*	Associate degree Technical diploma	*Technical college (3)*

7 Further checking is needed. The distinction between ISCED 4 and ISCED 5 is not clear in some of the countries.

ISCED	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
4	*Higher National Technical Education Certificate (2)*	-	-	-	Form 6 (2) Matriculation college (2) Community college (4) *Vocational college (2)*	Post-secondary education (2) *Engineering courses (GTI) (3)*	*National Certificate 3-4*	Junior college / Pre-university (GCE A level) (2)	-	*Vocational college (2-3)*
3	General Upper Secondary (GCE O & A Levels) (4) *National Technical Education Certificate (NTec) (2)*	Upper secondary (3) *Upper secondary vocational (3)*	Upper general education (2) Islamic education (2) *Vocational education (2) Islamic vocational education (3)*	Upper secondary (3) *Diploma (1-3)*	Upper secondary (2) *Technical school (2) Vocational college (2)*	Upper secondary (3) *Secondary vocational education (GTHS) (2)*	Senior high school (2) *Senior vocational high school (2) National Certificate 1-2*	Express course S1-4 (4) (GCE O level) Normal academic course (4) (GCE N level) *Normal technical course (4) (GCE N level) Customized and practice-based curriculum (ITE skills certificate)*	Upper secondary (3) *Upper secondary technical and vocational (3)*	Upper secondary (3) *Vocational / Professional secondary (3-4)*
2	Lower secondary (3) *Lower Secondary pre-vocational (3) Lower secondary special education / Industrial Skills Qualification (3)*	Lower secondary (3) *Trade schools*	Lower secondary (3)	Lower secondary (4)	Lower secondary (3) *Basic vocational education (3)*	Lower secondary (4)	Junior high school (4)		Lower secondary (3)	Lower secondary (4) *Elementary TVET (1) Certificate 1-3*
1	Primary (6)	Primary (6)	Primary (6)	Primary (5)	Primary (6)	Primary (5)	Primary (6)	Primary (6)	Primary (6)	Primary (5)

Source: Compiled from TVET Country profiles

Note: 1) TVET in *Italic style*, 2) Numbers in blank ( ) mean years of education, 3) The first division of vocational education in each country is colored in red, 4) The end of vocational track in each country is colored in blue.

iii. Formal and non-formal education

In most countries, education pathways include formal and non-formal education channels. Formal education refers to the teaching and learning organized at schools on a regular and systematic basis and the program content is developed based on the national curriculum standards. This education pathway has a clear level of education, starting from early childhood education, primary education, secondary education, to higher education.

Non-formal education refers to any organized, systematic educational activity carried outside the framework of the formal education system that provides selected types of learning to a segment of the population. Non-formal education is provided for those who need educational services that function as a substitute, supplement, and/or complement to formal education in order to support lifelong learning.

In ASEAN countries, technical vocational education and training is provided in both formal and non-formal education channels. In general, formal TVET (referred to as vocational education) is under the responsibility of the Ministry of Education covering from lower or upper secondary education (ISCED 2-3) to tertiary education (ISCED 5-8). The formal TVET is usually linked with national qualification framework (NQF), and currently many AMS try to recognize the result of non-formal TVET in this framework.

On the other hand, non-formal TVET (referred to as vocational training) is under the administration of the Ministry of Labour covering from elementary, intermediate, and even college levels. It is not only implemented by the affiliated organizations of the Ministry of Labour, but other organizations under various related government ministries and agencies, non-government organizations (NGOs), and development partners depending on training targets. In some countries, one ministry such as the Ministry of Education or the Ministry of Labour, manages and coordinates both formal and non-formal TVET system (e.g. Cambodia, Malaysia, the Philippines, and Viet Nam).

Table 2.14 Distinction between Formal and non-formal education / TVET in AMS

AMS	Formal	Non-formal
Brunei Darussalam	• Formal TVET is administered by the Ministry of Education (MOE) • Formal TVET includes: - Pre-vocational Courses and Industrial Skills Qualifications (ISCED 2) - National Technical Education Certificate courses (ISCED 3) - Higher National Technical Education Certificate courses (ISCED 4) - Higher National Diploma and Advanced Diploma Programs (ISCED 5)	• Intermediate skills training for a shorter duration by several Government ministries and agencies • Recognized as value-added programs that do not necessarily meet the requirements of BDQF levels • Non-formal TVET includes: - Youth Development Centre courses (Ministry of Culture, Youth and Sports) - Life skills and community services courses (Continuing Education and Training (CET) Institute) - Institute of Brunei Technical Education (IBTE) courses - Intermediate skills training and education (Youth Development Centre, Arts and Handicraft Centre)
Cambodia	• The management of formal TVET was transferred from the Ministry of Education Youth and Sports (MOEYS) to the Ministry of Labour and Vocational Training (MLVT) in 2005	

AMS	Formal	Non-formal
	• The management of non-formal TVET was transferred from the Ministry of Social Welfare to the MLVT in 2005	
	• The formal TVET system is supervised by the Directorate General of TVET (DGTVET) under the Ministry of Labour and Vocational Training (MLVT) • The MLVT is responsible for leading TVET sector to create skills and developing/managing national occupational standards - The MLVT and line ministries provide formal TVET programs from level 1-level 8 (Vocational Certificate, C1, C2, C3, High Diploma, Bachelor /Engineering of technology, Master of technology, and Ph.D (based on Cambodia Qualifications Framework-CQF)	• TVET institutions including National Polytechnic, Reginal Polytechnic, Institutes, College, and Provincial Training Centers (PTCs) are the major providers of both formal and non-formal TVET • Short-term (1-4 months) provide many flexible course (Center Based, Community Based,, and Enterprise Based) and focus on many skills based on the local labour market need like: agriculture, construction, electricity, electronic, manufacturing, auto, mechanic, motor repairs tourism, and basic food processing. etc.
Indonesia	• Formal education consists of five levels: early childhood education, basic education, lower secondary education, upper secondary education, and higher education • Formal TVET under the MOE is delivered in vocational high school (SMK) and Polytechnic	• Non-formal education includes equivalent programs such as package A (primary), package B (lower secondary), and package C (upper secondary) • Public non-formal vocational training providers (BLK), under the district governments, provide programs for out-of-school youths • Non-formal TVET includes: - Institutional training - Non-institutional training - Apprenticeship program - Demand-based training
Lao PDR	• The formal TVET system is supervised by the Department of Technical and Vocational Education (TVED) under the Ministry of Education and Sports (MoES) • The MoES is responsible for organizing TVET to create skills and developing/ managing national occupational standards • The MoES provides formal TVET programs for C1-C3 to diploma and advance diploma (based on Lao Qualifications Framework)	• Non-formal TVET is under the responsibility of Department of Non-Formal Education (DNFE) of MoES and Ministry of Labour and Social Welfare (MoLSW) • MoLSW is responsible for organizing national skills standards development and skills testing certification • MoLSW provides vocational training on Skills Standards L1-L5
Malaysia	• Department of Skills Development (DSD) within the Ministry of Human Resources (MOHR) establishes and coordinates a national TVET system with 10 other ministries	
	• Formal TVET is under the Ministry of Education (MOE) and Ministry of Higher Education (MOHE) • Formal TVET includes: - Basic Vocational Education (ISCED 2) - Technical and vocational programs (ISCED 3) - TVET education at certificate and diploma levels (ISCED 4) - TVET education at the tertiary education level (ISCED 5-8) - TVET education following other qualification systems is offered at various levels	• Non-formal TVET provided by the Ministry of Human Resources, Ministry of Works, and Ministry of Rural Development • Vocational training for veterans is provided by the Department of Veterans Affairs under the Ministry of Defense • Industrial Skills training programs is provided by the Ministry of Youth and Sports • TVET for the agricultural sector is provided by the Ministry of Agriculture and Agro-Based Industry

AMS	Formal	Non-formal
Myanmar	• Formal TVET is administered by the Ministry of Education (MOE) Department of TVET (DTVET) • Formal TVET includes: - Upper secondary TVET provided by 35 Government Technical High Schools (GTHSs) - Post-secondary TVET (Diploma level) provided by 22 Government Technical Institutes (GTIs) and 3 Government Technological Colleges (GTCs) - Tertiary TVET (High-level engineering courses)	• The MOE DTVET also provides competency-based short course training (3 months – 1 year) • The Ministry of Agriculture, Livestock and Irrigation, Ministry of Industry, Ministry of Labour, Immigration and Population, Ministry of Social Welfare, and Ministry of Border Affairs also offer non-formal TVET training for the different target group of youths and workers • Non-formal TVET programs are also provided by private training institutes and through public private partnerships
Philippines	• Technical Education and Skills Development Authority (TESDA) is in charge of overall management of formal and non-formal TVET	
	• Formal TVET system includes: - Technical-Vocational Livelihood programs at the upper secondary education level (ISCED 3) - TVET programs at the post-secondary non-tertiary level (ISCED 4) - TVET programs at the tertiary sector (ISCED 5-8)	• The TESDA, local government units (LGUs) and NGOs offer non-formal TVET programs • Non-formal TVET includes: - Centre / Institution-based programs - Community-based training programs - Enterprise-based programs
Singapore	• The Ministry of Education (MOE) controls, administers, implements, and formulates policies for the entire education system in the country, starting from Primary level to university education • Pre-Employment Training (PET) (Age generally below 25) covers ISCED Level 0 (early childhood education) to ISCED 8 (Doctoral degree)	• The SkillsFuture Singapore (SSG) under the MOE provides Singaporeans with opportunities to develop to their fullest potential through lifelong learning and skills mastery • The Workforce Singapore (WSG) in the Ministry of Manpower focuses on helping Singaporeans take on quality jobs and careers • Continuing Education Training (CET) (i.e. after completing school) is delivered by 5 career centers, 40 CET centers, and Institute of Adult Learning (IAL) aligning with a Workforce Skills Qualifications (WSQ) framework
Thailand	• The formal TVET is under the administration and supervision of the Office of Vocational Education Commission (OVEC) in the Ministry of Education (MOE) • Formal TVET programs at the upper secondary education level are provided in vocational colleges and institutes and last three years	• The non-formal TVET is under the Department of Skills Development (DSD) in the Ministry of Labour • Non-formal vocational programs involve: - (1) short training programs - (2) group vocational courses - (3) vocational certificate programs equivalent to lower secondary school - (4) non-formal occupational certificate programs
Viet Nam	• The Ministry of Labour, Invalids and Social Affairs (MOLISA) Department of Vocational Education and Training (DVET) is responsible for formal and non-formal TVET	
	• Formal TVET includes: - Elementary training is offered at the lower secondary education level (ISCED 2) - Secondary VET training is offered at the upper secondary level (ISCED 3) - College training (practicing bachelor training) is offered at the post-secondary non-tertiary level (ISCED 4)	• Non-formal TVET (C-VET) programs are provided as in-service, correspondence, or guided self-study training at the elementary, intermediate, and college levels • C-VET programs are offered in TVET institutions or other organizations such as the Women Union, Farmer Union, Youth Union, associations, and companies

Source: Compiled from ASEAN TEAM Project Component 1 Country Reports and TVET Country Profiles

iv. Key educational statistics

Literacy Rate

In the AMS, considering the latest data available, the average literacy rate of population over age 15 is 91.3%. The highest country is the Philippines (98.2% in 2015) followed by Singapore (97.3% in 2018), and the lowest country is Myanmar (75.6% in 2016) followed by Cambodia (80.5% in 2015). Gender difference of literacy rate is biggest in Cambodia (11.5% in 2015) and smallest in the Philippines (-0.1% in 2015) (The World Bank DataBank, 2021).

On the other hand, the average literacy rate of population age 15-24 is 96.1%. Singapore (99.9% in 2018) shows the highest rate followed by Brunei Darussalam and Indonesia (both 99.8% in 2018), and Myanmar (84.8% in 2016) represents the lowest rate followed by Lao PDR (92.5% in 2015). It is noteworthy that youth literacy rate of females is bigger than that of males in Lao PDR, Myanmar, and Viet Nam (The World Bank DataBank, 2021). (For more details, refer to Table A2.1 in the appendix)

Table 2.15 Adult literacy rate - Population 15+ years, Population 15-24 years[8]

Countries	Recent Year Data Available	Literacy Rate (15+ Yr)	Gender Difference (Male-Female)	Literacy Rate (15-24 Yr)	Gender Difference (Male-Female)
Brunei Darussalam	2018	97.2	1.8	99.7	0.2
Cambodia	2015	80.5	**11.5**	92.2	0.7
Indonesia	2018	95.7	3.3	99.7	0.0
Lao PDR	2015	84.7	10.6	92.5	**-3.9**
Malaysia	2018	94.9	2.6	96.9	0.3
Myanmar	2016	**75.6**	8.2	**84.8**	**-0.7**
Philippines	2015	**98.2**	**-0.1**	99.1	0.4
Singapore	2018	97.3	2.9	**99.9**	0.0
Thailand	2018	93.8	2.8	98.1	**0.9**
Viet Nam	2018	95.0	2.9	98.4	-0.1
Average	-	91.3	4.6	96.1	-0.2

Source: The World Bank DataBank - Education Statistics, https://databank.worldbank.org/source/education-statistics
(extracted on August 27, 2021)

Educational attainment

To look at the definition, 'Average years of schooling' is defined as average number of years of education received by people ages 25 and older, converted from education attainment levels using official durations of each level. 'Expected years of schooling' means number of years of schooling that a child of school entrance age can expect to receive if prevailing patterns of age-specific enrollment rates persist throughout the child's life (UNDP Human Development Data Center, 2021).

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8 Comparison of the literacy rates among the AMS based upon the data in the table may have a limited validity, since the AMS such as Myanmar(2016), Cambodia, Lao PDR, Philippines (2015) have base year other than 2018. These limitations should be considered in interpreting the descriptions provided.

In ASEAN countries, the mean of the average years of schooling is 8.0 years, while the mean of the expected years of schooling is 13.2 years. The average years of schooling is biggest in Singapore (11.6 years) covering almost the whole period of primary HRD secondary education, and smallest in Cambodia and Myanmar (both 5 years) covering only primary education (UNDP Human Development Data Center, 2021).

If the prevailing patterns of enrolment rates remain, the expected years of schooling are biggest in Singapore (16.4 years), which means that the whole population receive tertiary education up to ISCED Level 5. On the other hand, Myanmar shows the lowest expected years of schooling (10.7 years), however, it is almost 6 years more than the current average years of schooling (UNDP Human Development Data Center, 2021).

Table 2.16 Average and expected years of schooling

Countries	Average Years of Schooling					Expected Years of Schooling				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Brunei Darussalam	9.0	9.1	9.1	9.1	9.1	14.5	14.6	14.5	14.4	14.3
Cambodia	4.7	4.7	4.8	4.8	**5.0**	11.2	11.3	11.3	11.3	11.5
Indonesia	7.9	7.9	8.0	8.0	8.2	12.9	13.3	13.4	13.5	13.6
Lao PDR	5.1	5.2	5.2	5.2	5.3	11.1	11.2	11.2	11.0	11.0
Malaysia	10.2	10.2	10.2	10.2	10.4	13.5	13.7	13.9	13.7	13.7
Myanmar	4.9	4.9	5.0	5.0	**5.0**	9.9	10.0	10.3	10.5	**10.7**
Philippines	9.3	9.3	9.4	9.4	9.4	12.8	12.7	12.7	12.7	13.1
Singapore	11.6	11.6	11.4	11.6	**11.6**	16.1	16.3	16.3	16.3	**16.4**
Thailand	7.6	7.6	7.7	7.8	7.9	13.9	14.3	14.7	15.0	15.0
Viet Nam	8.0	8.1	8.2	8.2	8.3	12.7	12.7	12.7	12.7	12.7
ASEAN	7.8	7.9	7.9	7.9	8.0	12.9	13.0	13.1	13.1	13.2

Source: UNDP Human Development Data Center http://www.hdr.undp.org/en/data# (extracted on August 27, 2021)

2.2. National TVET System in 10 AMS

2.2.1. Major Features of TVET System of AMS in comparison

i. TVET participation in 10 AMS

Participation in TVET indicates the degree of focus of the national HRD system in TVET. The figure below shows variations in the degree of participation in TVET at the ISCED 3 level, among AMS.

Countries showing relatively high degree of participation are Indonesia (43.9%), Philippines (37.5%). Malaysia, Thailand, and Brunei Darussalam show participation rate ranging from 17% to 23%. Cambodia, Lao PDR, and Myanmar still has low participation in TVET at ISCED 3 level.

Share of TVET Students in VET Programs: ISCED 3 (%)

Figure shows a bar chart with the following values:
- Brunei Darussalam: 17.3
- Cambodia: 1.9
- Indonesia: 43.9
- Lao PDR: 2.2
- Malaysia: 22.7
- Myanmar: 0.7
- Philippines: 37.5
- Singapore: (no data)
- Thailand: 23.0
- Viet Nam: (no data)

Legend: ■ Share of ISCED Students in VET Programs (%)
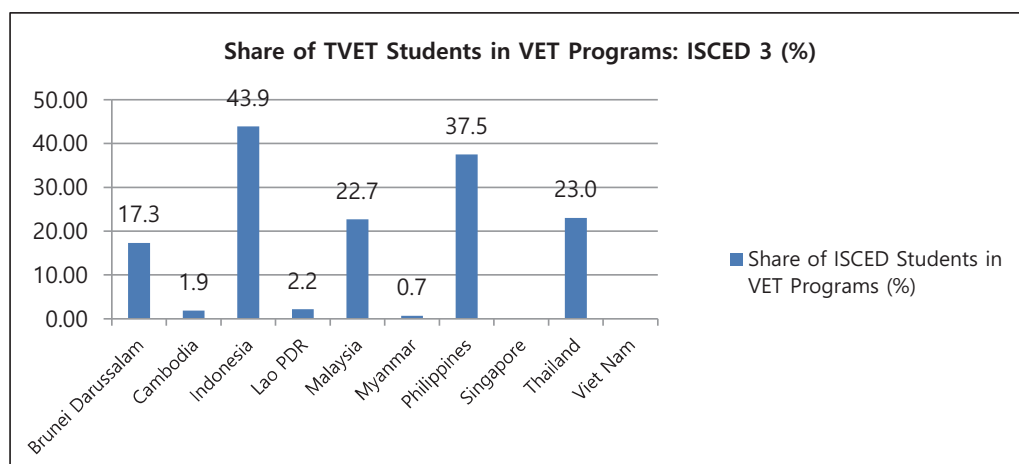
Source: Derived from UNESCO-UIS https://tcg.uis.unesco.org/data-resources/repository-education-indicators/ (extracted on August 27, 2021)

Note: Data is not available for Singapore & Viet Nam.

Figure 2.14 Share of TVET Student Enrolments at ISCED 3 (high schools)

ii. TVET governance system in 10 AMS: Key features

Table 2.17 presents key characteristics of the TVET system of the 10 AMS such as TVET governance, the major governing agency, TVET institutions, and NQF. Distinction between vocational education and vocational training as well as distinction between formal and non-formal training in the national TVET system are displayed. TVET institutions of the country also reflect the TVET governance system in that the TVET institutions are administered by key governmental agencies participating in the TVET governance.

In the Philippines, the major governing agency for TVET is TEDSA. TEDSA is responsible for governing both vocational education & vocational training. Also, most TVET institutions in the Philippines are under the administration of TESDA. Meanwhile, the ministries governing human resource developments in the Philippines are the Ministry of Education, the Commission on Higher Education, and TESDA, which concern basic education, higher education, and vocational education & training respectively.

In Brunei Darussalam, the Ministry of Culture, Youth & Sports (MOCYS), Ministry of Education, and the Prime Minister's Office (PMO) are major governing agencies for TVET. The 3 institutions also run their own TVET institutions. The Ministry of Education is responsible for formal TVET and has TVET institutions such as technical high schools under the governance. MOCYS provides skill development for the youth, while PMO also provides traditional training where there is need.

In Lao PDR, the TVET Department in MOES (Ministry of Education and Sports) is responsible for vocational education. DTVET in MOES also has public TVET institutions under its governance. DSDE(Department of Skill Development & Employment) of MOLSW run their

own training centers. MOES and MOLSW are major governing ministries of TVET in Lao PDR.

In Myanmar, the Department of TVET (DTVET) in the Ministry of Education is the national leading governing agency in TVET. However, other ministries are also involved in TVET and have their own TVET institutions under the Ministries. The Ministry of Labour in Myanmar runs training centers.

In Thailand, the Office of Vocational Education Committee (OVEC) is the main governing agency for formal TVET. Department of Skill Development, Department of Labour (DSD DOL) is responsible for developing national skill standards and cooperates with OVEC so that the standards developed are well reflected into the TVET curriculum. OVEC has public TVET institutions under its governance, while DSD has their training centers.

In Cambodia, the Ministry of Labour and Vocational Training (MLVT) is the major governing agency for TVET, and Most TVET institutions are under the administration of DGTVET MLVT. MLVT also has polytechnic colleges and regional and provincial training centers under the governance.

In Malaysia, the Department of Skill Development (DSD), the Ministry of Human Resources (MOHR) is the major governing agency for TVET. DSD MOHR takes the leading role in coordinating among the 10 ministries involved in TVET including the Ministry of Education. This coordination is made possible, above all, through the Malaysian Qualification Framework (MQF) which is administered by MOHR. TVET institutions in Malaysia are governed by following three ministries; the Ministry of Education which administers vocational & technical high schools, the Ministry of Higher Education which administers polytechnic universities, junior colleges, and universities participating in TVET, and the Ministry of Human Resources which has vocational training centers under the governance.

In Viet Nam, Directorate for TVET (DVET) in MOLISA is the main governing agency for TVET and it governs such important areas of TVET as curriculum development, teacher training, and national qualification systems. In Viet Nam, DVET MOLISA now covers areas that used to be governed by Ministry of Education and Training (MOET) and MOLISA.

In Indonesia, formal TVET (vocational education) is mainly governed by the Ministry of Education, while non-formal TVET is governed by the Ministry of Labour. Main TVET institutions under the Ministry of Education are vocational high schools (SMKs) and poly-techs. Vocational training centers (BLK) are under the Ministry of Labour. Indonesia has a very high percentage of TVET participation even at the high school level. This shows both the state and the individuals have high demand for TVET and TVET programs. Considering the size of the population and high demand for TVET, upgrading the quality of TVET and TVET provision can considerably contribute to raising the national productivity.

2.2.2. National Qualification Frameworks in 10 AMS

National qualification frameworks reflect the overall span of TVET programs in a country.

While there may be a variation in a way of accrediting and recognizing the outcome of learning in TVET among countries, nationally accredited TVET qualifications have to do with the levels of TVET programs that are recognized nationally, therefore they can be mapped along the international standard classification systems such as ISCED (in full).

In that sense, it is meaningful to look at the national qualifications frameworks and national TVET sector qualifications of 10 AMS in one place. Table 2.18 below shows the result of mapping the national TVET qualifications along the ISCED levels. The table is based upon description of the national educational system and NQF system submitted by the National Resource Person for each country.

In the table, the national TVET qualifications are mapped to national qualification framework levels, and the NQF levels to ISCED levels. The table shows that the TVET qualifications in most countries range between ISCED 3 to ISCED 6 levels. In countries such as the CLMV states, vocational certificates exist at ISCED 1 and 2 levels. Countries such as Cambodia, Indonesia, and Viet Nam do not have TVET qualifications equivalent to ISCED level 4, which is the category of 'post-secondary, and non-tertiary'.

Overall, most countries have national TVET qualifications, which are equivalent to ISCED level 3 to 5, which are high school to junior college levels.

As this comparison suggests, most of the national TVET qualifications are placed around ISCED level 3 and ISCED 5 in 10 AMS. It may not be easy to map some TVET qualifications which relate to non-formal training or lifelong-learning in the countries into ISCED levels. In particular, some TVET qualifications that are categorized along with ISCED 1 or ISCED 2, may fall into the category of non-formal education and lifelong learning in a few countries. This might be a case in countries such as Myanmar and Lao PDR. These possibilities are taken into account, when comparing TVET programs submitted as part of the country reports for the analytical frameworks in this project. With these possibilities and alternative interpretations of the result of mapping considered, we can compare TVET programs of 10 AMS based upon the NQFs of 10 AMS and additional information provided in the country report.

At least, this over-simplified heuristic comparison of the national qualification systems of 10 AMS along with the common tool of categorization ISCED provides a ground to compare the TVET programs of 10 AMS. This comparison may further give a room to exchange of actual TVET students and TVET teachers, based upon a TVET program that can provide qualifications that are both comparable and accepted in both the host and guest countries.

2.2.3. Analysis of Recent TVET Policy Trends in 10 AMS

TVET policies are important tools to plan and implement strategies that are needed for AMS.

In particular, AMS are faced with significant challenges with respect to HRD that need to be addressed at the national and/or regional level.

Among the challenges, issues such as the COVID-19, environmental changes, industry 4.0 and ageing place challenges that should be collectively dealt with by 10 AMS.

The table below shows a selection of policies adopted in the AMS to deal with important national and regional TVET issues. The policies listed are examples of key TVET policy initiatives that are under implementation in the AMS (Table 2.19). These policies address major challenges facing the Member States.

With respect to major subject areas of TVET policies, countries working on the policies are as follows.

Myanmar, Viet Nam, Lao PDR, Cambodia, Indonesia, Thailand, and the Philippines are the countries that have established TVET reform policies addressing the new needs for TVET. Indonesia, Malaysia, Philippines, and Thailand have been implementing policies targeting industry 4.0. Countries such as Viet Nam, Brunei Darussalam have updated policies targeting marginalized workers & continuous education and training (CET), which are policy areas closely related to CET. Indonesia has set up TVET policies to deal with environmental changes. Philippines is working on TVET policies to deal with migration.

Covid-19 is a common issue that should be dealt with in setting up TVET policies responding to the changes in TVET environment. Indonesia, Myanmar, and Philippines have policies directly dealing with TVET strategies to face Covid-19 & new normal.

The Philippines has also established policies related to green economy, while working on workforce development for the care economy.

These policies to deal with main national issues and new challenges in TVET are important in that they have effects on the national TVET system and its performance. The objective of setting up new TVET policies and updating existing TVET strategies lies in that the these polices support to improve the functioning of the TVET system, while supplementing missing or insufficient aspects of the current system.

This also means that the current TVET system needs updating and improvement on the continual basis in order to better respond to the changing environment for TVET. In addition, the TVET policies provided in the each country report will help the AMS to learn from another in setting up new TVET policies and customizing the TVET according to the their own national policy environment.

3. Discussions on the TVET System of 10 AMS

In this chapter, the TVET systems of 10 AMS are reviewed. Socio-economic characteristics of the 10 AMS and characteristics of the TVET system are discussed.

Common major issues identified from the review of the socio-economic characteristics and TVET systems of 10 AMS in the chapter are as follows.

First, the ASEAN member states are diverse in terms of the size of the economy and the size of the population. But, they share common characteristics such as high economic growth rates and high population growth rates. Also, they have abundant human resources and relatively young labour-force, which is considered favorable for economic growth. The AMS also share such issues as under-utilization of the women, elderly, and the youth in the labour-markets. Therefore, the TVET policies of the AMS need to be targeted toward these demographic groups. By better utilizing the labour of female workers, the elderly, and the youth, the AMS can be better-off.

Next, from the analysis, it was found that the industrial and occupational structure of the labour force in the AMS is in rapid change. Changes in the industrial structure indicate that there are changes in the demands for the labour-force in the labour markets. Therefore, analyzing the changes in the industrial and occupational structure accordingly and applying those changes into planning TVET programs is a very important step to improve HR competitiveness of the AMS. In order to adjust the TVET system in line with the changes in the demands in the LM, reforms in the TVET system are needed such as innovative TVET policies.

This chapter also reviewed the TVET governance of the 10 AMS. From the analysis, it was found that the ministry related to education (MOE) and the ministry related to labour (MOL) have different positions in each AMS in terms of its function in TVET. In AMS such as Brunei Darussalam and Thailand, ministry of education takes a major role in TVET, while in AMS such as Cambodia and Viet Nam, ministry of labour plays a major role in TVET. Also, there are cases where a third independent government agency, not ministry of education, nor ministry of labour, play a major role in TVET. TESDA in the Philippines is such a case. The role of ministry of education and that of ministry of labour in TVET has to do with the historical backgrounds of either governmental ministry and also with the status of TVET in the country. What's more important is the capacity of the major governing party to work with the remaining ministries involved in TVET. The closer the major governing party works in linkage to other HRD related ministries, the better the TVET system can function.

TVET institutions play an important role in TVET delivery system. In the AMS, TVET institutions are administered under the governance of the ministries related to TVET. The quality of TVET institutions has great impacts on the quality of TVET programs being delivered. Also, financial support for TVET institutions is important to improve the quality of TVET delivered. In most AMS, strong TVET institutions are supported by the state, which indicates the importance of financing TVET from the government.

Then, the national qualification frameworks of 10 AMS are reviewed. National qualifications systems are important because they play a critical role in bringing together the general education, TVET, and the higher education of the country. In a country where the NQF is well established and functions well, TVET system is found to be strong. This is so because when the TVET qualifications are well-recognized and well-linked to the qualifications for general education and higher education TVET can be well-accepted as an alternative pathway of achieving qualifications. Therefore, a well-functioning national qualification system can be seen as a result of the state to establish such a linkage among the key qualifications.

Finally, recent TVET policies of 10 AMS are reviewed. The recent TVET policies that are adopted and are to be adopted among the AMS indicate that the state is keen to adjust to changing environment of TVET. Such issues as technological changes, climate changes, and preparation for the post COVID 19 era constitute an important setting to be considered to establish the TVET policies. The fact that most of the AMS have recently adopted TVET policies to deal with these issues more effectively shows that TVET is an important part of the state policy among the AMS and the AMS are greatly interested in the effectiveness of TVET. Therefore, these TVET policies are very important indicators of focus of the state in TVET among the AMS.

Table 2.17 The TVET System of 10 AMS

	Brunei Darussalam	Cambodia	Indonesia	Lao PDR
I. Major governing agency of TVET (incl. governance in TVET institutions)	1. Major agencies involved in TVET goverance in BD: MOCYS, MOE & PMO 2. MOE is sole regulating body for formal TVET with assistance of BDNAC & PES(private education sector) 3. MOCYS is responsible for youth skill development through PPB(youth development center)	1. DGTVET (compised of 6 divisions) of Ministry of Labour & Vocational Training(MLVT) is the major gov. agency of TVET 2. Formal TVET is provided through polytechs and technical institutes (16 polytechs, 5 RTCs, 17 PTCs are under DGTVET)	1. Formal TVET governed by Ministry of Education; non formal TVET by Ministry of Labour 2. TVET Institutions: SMK and Polytechs under MOE, BLK and training centers and CVE under MOL	1. TEVT Department MOES(Ministry of Education) responsible for formal TVET (run 25 public TVET institutions) & CVE. 2. DSDE (Department of Skill Development & Employment) MoLSW for non-formal TVET (run training centers)
II. TVET co-ordinating & Regulatory Body		National Training Board (NTB) chaired by MLVT and co-ordinating line-ministries/ industries & TVET institutions		National Training Council: overarching among MOES, MoLSQ, & reps of Industries, TVET insts.
III. NQF	BDQF is developed by MOE in 2014	technical & vocational certificates as well as higher educational degrees are administered under CQF	INQF: KKNI * The NQF enables linkages between formal, non-formal and informal TVET	MOES develop occupational standards; MoLSW develop skill standards

	Malaysia	Myanmar	Philippines	Singapore
I. Major governing agency of TVET (incl. governance in TVET institutions)	1. DSD, Ministry of Human Resources (MOHR) is major gov. agency for TVET: DSD MOHR coordinates among Ministries. 2. TVET institutions administered by MOE (tech. vocational HSs), MOHE (polytechs, junior colleges, TVET univs), and MOHR (training centers)	1. DTVET MOE(MOE) is major governing agency for TVE 2. Line ministries run their own TVE institutions (co-ordination among ministries is needed): training centers are under MOL	1. TESDA is the major governing agency for TVET (for VE & VT) 2. Minsitries involved in HRD: MOE, MOHE & TESDA	1. WDA functions under MOL divided to WSG(Workforce Singapore) & to Skills Future Singapore(SSG): WSG remained in MOL & SSG moved to MOE and also overtook CPE function in MOE 2. Currently, SSG is responsible for the following TVET institutions: ITE, polytech. and TVET univs, private training providers(TP): PET(pre-employment training) & CET(Continuing Education & Training)
II. TVET co-ordinating & Regulatory Body		National Skills Standards Authority(NSSA):implement skill standards/ assessment/certification (regulatory body)	TESDA is the regulating body and co-ordinates	
III. NQF	MQF, governed by MOHR, covers qualifications from junior/senior high school level certificates to certificates at HE levels.	MNQF(NQF): 8 levels, now under development in accordance with AQRF	PHLQF links TVET to the general education and high education sector	WSQ certificates administered under SOA

Table 2.18 National Qualifications Frameworks in 10 AMS

ISCED Level	Brunei Darussalam		Cambodia		Indonesia		Lao PDR		Malaysia	
	BDQF Level	TVE Sector Qualifications.	CQF		IQF		LQF	TVET & Profes.*	MQF	TVET Sector Quals.
8	8		8	Doctoral Degree of Technology/Business Education	9	S3(T)	8	Specialist 2		
7	7		7	Master's Degree of Technology/Business Education	7-8	S2(T)	7	Specialist 1		
6	6		6	Bachelor of Technology/Business Education	5-6	• D4 • D3	6	Post Graduate Diploma	6	• Bachelor Degree • Graduate Diploma • Graduate Certificate
5	5	• Advanced Diploma • Higher National Diploma (HND) • Diploma (Level 5)	5	Higher Diploma of Technology/Business Education	3-4	• D2 • Di	5	Advanced Diploma	5	Advanced Diploma
4	4	• Diploma (Level 4) • Higher National Technical Education Certificate (HNTec)					4	Diploma	4	Diploma
	3	• Skills Certificate 3 (SC3) • National Technical Education Certificate (NTec)	4	Technical and Vocational Certificate 3 (C3)	2	Vocational Middle School			3	Certificate 3
3	2	• Skills Certificate 2 (SC2) • Industrial Skills Qualifications (ISQ)	3	Technical and Vocational Certificate 2 (C2)	1	Vocational Middle School			2	Certificate 2
	1	Skills Certificate 1 (SC1)	2	Technical and Vocational Certificate 1 (C1)			3	Certificate 3(C3)	1	Certificate 1
2			1	Vocational Certificate			2	Certificate 2(C2)		Junior Voc. Educ
1							1	Certificate 1(C1)		Junior Voc. Educ

ISCED Level	MN QF	Myanmar — TVET Sector Quals.	PHL QF	Philippines	SOA	Singapore	TN QF	Thailand	VN QF	Viet Nam
8	8		8				8			
7	7		7				7			
6	6	Degree	6	Post Baccalaureate	6	WSQ Graduate Diploma*	6	Bachelor Degree (B-Tech)	6	(practice) Bachelor Degree
5	5	Advanced Diploma	5	Baccalaureate	5	WSQ Specialist Diploma	5	Diploma in Vocational/ Technical Education	5	College Diploma
4	4	• Diploma/ • V&T C/SC4	L5-> L3	• Diploma(NC) V • National Certificate(NC) IV • National Certificate(NC) III	4	WSQ Diploma	4	Diploma in Vocational/ Technical Education	4	
3	3	V&T C/SC3	L2- L1	• National Certificate(NC) II • National Certificate(NC) I	3	WSQ Advanced Certificate	2-3	Vocational Certificate	4	• Secondary • Vocational Diploma
2	2	V&T C/SC2			2	WSQ Higher Certificate	1		1-3	• Certificate I • Certificate II • Certificate III (TVET qualifications)
1	1	V&T C/SC1			1	WSQ Certificate				

Table 2.19 Recent TVET Policy Trends in 10 AMS

Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia
Brunei Vision 2035 (Wawasan Brunei 2035)	Cambodia Industry Development Policy (IDP) 2015 – 2025	Revitalization of Vocational High Schools (Presidential Instruction Number 9 of 2016)	The 9th National Socio-Economic Development Plan (NSEDP)	National Policy on IR 4.0 (2018-2025)
Continuous Education & Training (CET) Programme	National Employment Policy (NEP) 2015 – 2025	Formulation of National Vocational Committee (KVN)	The 2021-2025 TVET Development Plan	
	National Technical Vocational Education and Training Policy 2017-2025	Vocational policy responding to emerging businesses and jobs, including focused methods in digital human online using the blended training method	The Education and Sports Sector Development Plan (ESSDP) 2021-2025	
	TVET Strategic Plan 2019-2023 * MLVT(Ministry of Labour and Vocational Training)	Roadmap Making Indonesia 4.0		
National Youth Policy and Strategy (Dasar Belia Negara dan Strategi (DBNS)) 2020-2035		Tax Deduction for companies that develop HR competencies (Government Regulation No.45 of 2019)		
	DGTVET Strategic Plan 2019-2023	Training of Indonesian migrant workers (Articles 39, 40 and 41 in the mandate of Law No. 18 of 2017)		
		Policy responses to mitigate the impact of the Covid-19		
		Pandemic in the labour sector		

Myanmar	Philippines	Singapore	Thailand	Viet Nam
National response and recovery plan for the education sector	The Enhanced Basic Education Act (Republic Act No. 10533)	Skills Future Initiative (2015~)	The 12th National Economic and Social Development Plan (NESDP)	The Law on Vocational Education (dated 27th November 2014)
Policies for COVID 19 situation	The Philippine Qualifications Framework Act (Republic Act No. 10968)	Workforce Singapore's employment facilitation programmes(i.e. Career Conversion Programme)	Thailand 4.0 (as part of The National 20-Year Strategy)	Vocational Development Strategy 2011 – 2020
	Universal Access to Quality Tertiary Education Act (UAQTEA) (Republic Act No. 10931)	Introduction of National Job Council to cope with COVID-19 pandemic	National Education Plan	Promoting the development of skilled human resources in the new situation (dated May 28, 2020)
	Philippine Green Jobs Act 2016 (Republic Act 10771)		National Education Act, B.E. 2542	Standards and qualifications of TVET teachers
	Tulong Trabaho Act (Republic Act No. 11230)		Labour's Skills Development Act, B.E. 2545	Recruitment, employment, and training apply for TVET teachers (Circular No.06/2017/TT-BLDTBXH)
	The TVET PH 4.0 Framework		Promotion of Non-Formal and Informal Education Act, B.E.2551	Procedure for design, evaluation and issuance of the training programs (Circular No. 03/2017/TT-BLDTBXH)
	TVET arrangements towards the New Normal during the COVID19 Crisis (TESDA Circular 066 series of 2020)			Tuition reduction in public TVET institutions for marginalized students (dated 2nd October 2015)
	Flexible Learning in TVET Under the New Normal (Circular 062 on May 19, 2020)			Scholarships & other allowances for marginalized students (dated 20th October 2015)
	Enterprise-based Training (EBT) Under the New Normal			Project on "Vocational Training for Rural Workers until 2020" (dated 27th November 2009)
	TESDA Online Program (TOP)			

Table 2.20 TVET Strategies and Key Policy Documents of 10 ASEAN Member States

1. Brunei Darussalam

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
Wawasan Brunei 2035 (Brunei Vision 2035) (p. 14)	2007-2035	Prime Minister's Office (PMO)	• An education strategy that will prepare the youth for employment and achievement in a world that is increasingly competitive and knowledge-based. • An economic strategy that will create new employment for the people and expand business opportunities within Brunei Darussalam through the promotion of investment, foreign and domestic, both in downstream industries as well as in economic clusters beyond the oil and gas industry.
Continuous Education & Training (CET) Programme (p. 22)	2014	Manpower Planning and Employment Council (MPEC), Ministry of Education, Institute of Brunei Technical Education	From the webpage of the Ministry of Education of Brunei Darussalam: • To produce highly skilled and professional workforce in response to and support of Brunei Vision 2035 • Offers courses in 7 areas which are agrotechnology and applied sciences, maritime, business and financial services, hospitality and tourism services, energy and engineering, building technological services, electronics and information technology. From the webpage of UNESCO-UNEVOC: • implemented by the Institute of Brunei Technical Education • offers full-time and dual system apprenticeship programs
Dasar Belia Negara dan Strategi (DBNS) (National Youth Policy and Strategy) 2020-2035 (p. 22)	2020-2035	Manpower Planning and Employment Council (MPEC), Ministry of Culture, Youth and Sports (MCYS)	From the webpage of MCYS: • a revision and update of the National Youth Policy published in 2002 • a living document that has been and will continue to be adapted to the needs and current environment that requires the youth of this • describes the vision of youth, youth policy goals, strategies and policy initiatives that outline the mechanisms and roadmaps in implementing the policy

2. Cambodia

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
Cambodia Industry Development Policy (IDP) 2015 – 2025	2015	Council for the Development of Cambodia	• Aims to adequate bridging of the gap between the actual and future labour market
National Employment Policy (NEP) 2015 – 2025	2015	Ministry of Labour and Vocational Training (MLVT)	
National Technical Vocational Education and Training Policy 2017-2025	2017	Ministry of Labour and Vocational Training (MLVT)	• Transforms low-skill workers to medium- and high-skilled workers
MLVT* Strategic Plan 2019-2023 *MLVT: Ministry of Labour and Vocational Training	2019	Ministry of Labour and Vocational Training (MLVT)	• Strategy 1. Develop working condition and harmony of related vocational skills • Strategy 2. Modernizing TVET system • Strategy 3. Develop occupation and job • Strategy 4. Develop national social security fund • Strategy 5. Strengthens good governance
TVET Strategic Plan 2019-2023	2019	Ministry of Labour and Vocational Training (MLVT)	• Supports innovation and modernization of TVET
DGTVET Strategic Plan 2019-2023	2019	Ministry of Labour and Vocational Training (MLVT)	• 1. Strengthen TVET quality • 2. Expand TVET to support socio-economic development • 3. Strengthen public-private partnership and cooperation to ensure TVET sustainability • 4. Strengthen TVET governance • 5. Promoting research and innovation applied technology

3. Indonesia

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
Presidential Instruction Number 9 of 2016			• Revitalizes vocational high schools in the context of Quality and Power Improvement Competitiveness of Indonesian Human Resources
Formulation of National Vocational Committee (KVN)			• Formulates a single oversight system that synergizes all institutions and programs related to vocational education and training
a vocational policy that is in accordance with the emergence of new businesses and jobs, including by changing curriculum and focused methods in digital human online using the blended training method		Ministry of Manpower, Vocational training center (BLK)	• Aims to increase the competitiveness of the industry in global market and ensuring the successful adoption of industry 4.0
Roadmap Making Indonesia 4.0			
government regulation number 45 of 2019			• Super Tax Deduction for companies that develop HR competencies in companies
training of Indonesian migrant workers (Articles 39, 40 and 41 in the mandate of Law No. 18 of 2017)			• Defines that training of Indonesian migrant workers is the responsibility of the Government

policy responses to mitigate the impact of the Covid-19 pandemic in the labour sector			• Provides:
			  ○ training incentives for laid-off workers with pre-employment card program
			  ○ Social security for workers in formal and informal sector
			  ○ Social assistance for informal sector workers in vulnerability
			  ○ Extension of Work Accident Insurance to the damage affected by COVID19
			  ○ Wage subsidies for Indonesian citizen workers whose wage is below IDR 5 million with active social security membership

4. Lao PDR

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
The 9th National Socio-Economic Development Plan (NSEDP)	2021-2025	Ministry of Planning and Investment	It mentions the strengthening the database of old people without detailed interventions. However, there are no precise data available which could support TVET programs. It also mentions targets for the environment: to develop standards for local brands of efficient electrical equipment, explore and implement the strategies to promote green energy for the transportation sector with a target of 14% of the transportation means, to have more than 100 electrical charge or bio diesel stations. It has 6 key targets, and under the target #2 related to human resource development, the government has set 4 focused interventions: • Improve the services on public health and nutrition to universally and more quality. • Improve the quality of education at all levels, as well as create the conditions for access to education, to be ready to integrate with the region and international, as well as dealing with industry 4.0. • The workforce has been developed in terms of skills, professional and high self-discipline, as well as a variety of professions, stable and high-paying jobs, able to meet the needs of socio-economic development. • Promote and apply the research-scientific results, technological, technical, innovation and intellectual to support the socio-economic development.
The 2021-2025 TVET Development Plan 2021-2025	2021-2025	TVET institutions managed by the Department of Technical and Vocational Education (DTVE)[9]	It mentions the following strategies which are declined into detailed activities: • Strategy 1: Improve TVET access • Strategy 2: Improve the relevance of TVET provision • Strategy 3: Improve the quality of TVET provision • Strategy 4: Develop TVET teachers • Strategy 5: Promote cooperation of TVET institutions at national and local levels with the public and private sectors, and international organisations • Strategy 6: Strengthen TVET management • Strategy 7: Develop financing capacities of TVET

9 https://unevoc.unesco.org/pub/lao_tvet_country_profile.pdf

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
			Green TVET and Industry 4.0 are mentioned in the 2021-2025 TVET Development Plan but without detailed targets: • The concept of sustainable and eco-friendly resources management of TVET institutions is a new topic in the TVET Development plan 2021-2025. Schools and colleges are asked to implement it and move forward with "greening TVET" but there is no mention of detailed modalities. • Industry 4.0 is also mentioned as one activity in the TVET Development plan: "Include advanced technology teaching in selected TVET curricula to support industry 4.0"
The Education and Sports Sector Development Plan (ESSDP) 2021-2025[10]	2021-2025	Ministry of Education and Sports (MoES)	Regarding TVET, the policy objectives of the ESSDP are: 1. To provide enhanced post-basic education contributing to and supporting the social and economic priorities of the 9th NSEDP. - To develop a TVET system to create a labour force that is equipped with good quality, moral and fair values, patriotism, honesty, good discipline, good health and good behaviour, a love of lifelong learning, national culture and traditions, advanced knowledge and with scientific prospectives, so as to become a quality driving force in line with labour market demand as well as the demand for the country's national economic growth and to be ready to cooperate and compete with the countries in the region. - To develop and improve the TVET curricula to be aligned to the need of the country's socio-economic development and regional and international integration, with the focus on high-demand sectors, namely: construction; machinery repair; tourism and hospitality; electricity; furniture; automobile; and agriculture. 2. To enhance learning outcomes and reduce disparities through more effective and efficient management of resources. - To increase student enrolment and adjust entrants' quota in TVET programs, with a special focus on female and disadvantaged groups.

10 https://planipolis.iiep.unesco.org/sites/default/files/ressources/lao_education_development_plan_2011-2025_en.pdf

5. Malaysia

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
National Policy on IR 4.0 (2018-2025) (p. 19)	2018-2025	Ministry of International Trade and Industry	From the publication: • Also known as *National Policy on Industry 4.0 – Industry4WRD* • Created as a more streamlined and cohesive national agenda which tightly integrates manufacturing industry with government and academia through private-public partnerships • Consists of strategies in the areas of finance, infrastructure, regulation, skills & talents, and technology

6. Myanmar

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
National response and recovery plan for the education sector	2020 (2016-2021)	MoE in collaboration with UNESCO and partners for the Education and TVET Sector Coordination Group	• Improve teaching and learning, vocational education and training, research and innovation, leading to measurable improvements in student achievement in all schools and educational institutions
Policy response to COVID 19		DTVET	• provided IT infrastructure, and upgraded internet access to its TVET institutions • promoted via online training, blended learning, international webinars, virtual workshops, and online knowledge sharing events during pandemic

7. Philippines

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
The Enhanced Basic Education Act (Republic Act No. 10533)	May 2013[11]		• Mandates compulsory attendance in kindergarten • Adds two more years in what used to be a 10-year basic education • Allows students enrolled in the TVET track to learn technical skills that will give them National Skills Certificates (NC I and NC II) designed to make job-ready after high-school graduation
The Philippine Qualifications Framework Act (Republic Act No. 10968)	Jan 2018[12]		• National qualification framework
Universal Access to Quality Tertiary Education Act (UAQTEA) (Republic Act No. 10931)	Aug 2017[13]		• Waives tuition fees and other school fees in state universities and colleges and public TVET institutions • Provides of the Tertiary Education Subsidy and Student Loan Program • Strengthens the Unified Students Financial Assistance System
Philippine Green Jobs Act of 2016 (Republic Act 10771)	Apr 2016[14]	Department of Labour and Employment (DOLE) TESDA The Department of Science and Technology (DOST)	• Identifies needed skills, develops training programs, and trains and certifies workers for jobs in a range of industries that produce goods and render services for the benefit of the environment, so as to contribute to the transition into a green economy
Tulong Trabaho Act (Republic Act No. 11230)	Feb 2019[15]	TESDA	• Provides free TVET training and financial assistance to two target groups: (a) any individual at least fifteen (15) years of age who are not employed, not in education and not in training (NEET), and; (b) employed workers, who intend to develop their current skills and training.
The TVET PH 4.0 Framework		TESDA	• Aims to produce 4.0 TVET learners ready implementing 10 strategies which span from formulating 4.0 policies to augmenting HR resource with 4.0 skills

11 https://www.officialgazette.gov.ph/2013/05/15/republic-act-no-10533/
12 https://www.officialgazette.gov.ph/downloads/2018/01jan/20180116-RA-10968-RRD.pdf
13 https://www.officialgazette.gov.ph/downloads/2017/08aug/20170803-RA-10931-RRD.pdf
14 https://www.officialgazette.gov.ph/2016/04/29/republic-act-no-10771/
15 https://www.officialgazette.gov.ph/downloads/2019/02feb/20190222-RA-11230-RRD.pdf

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
TVET Arrangements Towards the New Normal During the COVID-19 Crisis (TESDA Circular 066 series of 2020)		TESDA	• Serves as guide for all public and private TVIs in establishing the necessary measures and protocols in the delivery of TVET towards the New Normal in response to the COVID-19 Crisis
Flexible Learning in TVET Under the New Normal (Circular 062 on May 19, 2020)		TESDA	• Defines the guidelines in the management and implementation of flexible learning in the delivery of TVET in the country
Enterprise-based Training (EBT) Under the New Normal		TESDA	• Serves as guide for all public and private TVIs, establishments, Farm Schools in the implementation of the in-plant training component in the approved training plan and with other administrative protocols and requirements prescribed by the government
TESDA Online Program (TOP)		TESDA in coordination with Department of Information and Communicati-ons Technology (DITC)	• Makes TVET accessible and convenient to more Filipinos nationwide

8. Singapore

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
SkillsFuture Initiative	2015	Ministry of Education	From the webpage of SkillsFuture: • A national movement that provides opportunities for all Singaporeans to develop to their fullest potential at different stages of their lives. Regardless of your starting point, you can realise your goals and aspirations through a holistic system of education and training • Main objectives - Help individuals to make well-informed choices in education, training and careers - Develop an integrated, high-quality system of education and training that responds to constantly evolving industry needs - Promote employer recognition and career development based on skills and mastery - Foster a culture that supports and celebrates lifelong learning

9. Thailand

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
The 12th National Economic and Social Development Plan (NESDP)[16]	2017-2021	Office of the National Economic and Social Development Board, Office of the Prime Minister	In the NESDP, education is emphasized in the key development pathways as part of the strategy for strengthening and realizing the potential of human capital: • Increasing the quality of education and life-long learning. (For example, adjust the system of education management and rationalize the allocation of resources for small schools, including making the community a source of quality learning) • Encouraging social institutions to participate collaboratively in strengthening the nation's development. (For example, establish proper measures for the purpose of looking after vulnerable families, and promoting education institutions to become a center of academic knowledge that is accessible to all people)
Thailand 4.0 (as part of The National 20-Year Strategy)[17]	2018-2037	The National Economic and Social Development Council (NESDC)	It comprises of 4 objectives[18], which are: • Economic Prosperity: to create a value-based economy that is driven by innovation, technology and creativity. The model aims to increase Research and Development ("R&D") expenditure to 4% of GDP, increase economic growth rate to full capacity rate of 5-6% within 5 years, and increase national income per capita from 5,470 USD in 2014 to 15,000 USD by 2032. • Social Well-being: to create a society that moves forward without leaving anyone behind (inclusive society) through realization of the full potential of all members of society. The goals are to reduce social disparity from 0.465 in 2013 to 0.36 in 2032, completely transform to social welfare system within 20 years and develop at least 20,000 households into "Smart Farmers" within 5 years. • Raising Human Values: to transform Thais into "Competent human beings in the 21st Century" and "Thais 4.0 in the first world. Measures under Thailand 4.0 will raise Thailand HDI from 0.722 to 0.8 or the top 50 countries within 10 years, ensure that at least 5 Thai universities are ranked amongst the world's top 100 higher education institution within 20 years.

16 https://www.nesdc.go.th/ewt_dl_link.php?nid=9640
17 https://www.aseantoday.com/2019/12/preparing-for-thailand-4-0-revamping-vocation-training-for-the-future-of-work/
18 https://thaiembdc.org/thailand-4-0-2/

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
			• Environmental Protection: to become a livable society that possesses an economic system capable of adjusting to climate change and low carbon society. The targets are to develop at least 10 cities into the world's most livable cities, reduce terrorism risk, and increase the proportion
National Education Plan	1999 & 2002-2016	Office of the National Education Council (ONEC)	It focuses on human-centered development and an integrated and holistic scheme of education, religion, art, and culture.[19] The Plan stipulates 3 objectives and 11 policy guidelines for implementation: • All-round and balanced human development (Developing all people to have access to learning; Learning reform for the benefit of learners; Inculcating and strengthening morality, integrity, ethics, and desirable values and characteristics; Manpower development in science and technology for self-reliance and enhanced competitiveness capacity) • Building a society of morality, wisdom and learning (Developing a learning society to create knowledge, cognition, the good behavior and integrity of the people; Promotion of research and development to increase the knowledge and learning of Thai people and Thai society; Creation, application and dissemination of knowledge and learning) • Development of social environment (Promotion and creation of social and cultural capital limitation; Limitation, decrease and elimination of structural problems for social justice; Development of technologies for education; Systematization of resources and investment for education, religion, art, and culture)
National Education Act, B.E. 2542[20]	1999	Office of the National Education Commission (ONEC), Office of the Prime Minister	It provides for the education system structure, from primary to vocational education. Compulsory school age is from 7 to 16 years
Labour's Skills Development Act, B.E. 2545[21]	2002	Office of the Prime Minister	This Act contains certain provisions in relation to the restriction of rights and liberties of persons in respect of which section 29, in conjunction with section

19 http://www.ibe.unesco.org/fileadmin/user_upload/archive/Countries/WDE/2006/ASIA_and_the_PACIFIC/Thailand/Thailand.pdf
20 https://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=82860&p_country=THA&p_count=441
21 https://ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=82881&p_country=THA&p_count=441

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
			31, and section 35 of the Constitution of the Kingdom of Thailand so permit by virtue of law. Chapter I - Arrangement for Skill Training; Chapter II - Skill Standards; Chapter III - Skill Development Fund; Chapter IV - Rights and Benefits of the Training Provider; Chapter V - Skill Development Promotion Committee; Chapter VI - The Registrar and the Officials; Chapter VII - Revocation of the Status of Training Provider, the Suspension and Revocation of Permit; Chapter VIII - Appeals; Chapter IX - Penalties
Promotion of Non-Formal and Informal Education Act, B.E.2551[22]	2008	Office of the Prime Minister	The Act was adopted with the purpose of promoting life-long learning to persons through informal and non-formal education initiatives in order to develop manpower and social competencies.

10. Viet Nam

TVET Policy	Year Issued & Period Effective	Governing Ministry	Major Contents
The Law on Vocational Education	2014		Law No. 74/2014/QH13, dated 27th November 2014
Vocational Development Strategy 2011-2020	2011-2020		Decision No. 630 / QD-TTg of the Prime Minister
Promoting the development of skilled human resource in the new situation	2020		Directive No. 24 / CT-TTg
Standards and qualifications of TVET teachers			Circular No. 08/2017/TT-BLDTBXH
Recruitment, employment, and training apply for TVET teachers			Circular No.06/2017/TT-BLDTBXH
Tuition reduction in public TVET institutions for marginalized students	2015		Decree No. 86/2015/ND-CP of the Government
Scholarships & other allowances for marginalized students	2015		Decision No. 53/2015/QD-TTg of the Prime Minister
Project on "Vocational Training for Rural Workers until 2020"	2009-2020		Decision No.1956/QD-TTg of the Prime Minister

Chapter III. Analytical Framework II: Analysis of Labor Market Information System (LMIS) and Labor Market Demands for 10 AMS

1. Introduction

The purpose of this part is to assess current labor market information system (LMIS) of ASEAN member states which is essential for the formation and implementation of effective skills policy through accurate understanding about the skills demand and supply of each AMS. To ensure that each country's technical and vocational education and training (TVET) system can effectively adapt to changing labor market conditions, it is necessary to collect and analyze information on current and future demand and supply of skills from various perspectives and communicate the results to diverse stakeholders related to education and training, such as education and training institutions, students, trainees, and even government agencies. To establish such an LMIS, the government must extend beyond one-time statistical surveys and build a variety of institutional, material, and human infrastructures. Before fully implementing related policies, this section comprehensively reviews the status of LMISs in 10 AMS. Through this, it will be possible to determine the directions and details of policies required for the AMS.

Also, in order to assist the identification of economic sectors requiring ASEAN-wide concerted skills training, this part is showing the results of the Delphi survey about the most promising economic sectors in terms of job creation of each ASEAN member states. By combining and comparing the responses from each country, it would be possible to identify some sectors that are commonly regarded as most important in terms of job creation and therefore in terms of skills policy.

More specifically, this part is subdivided into four sections as follows:

Section 1: Policies and practices for tracking skills demand
Section 2: Policies and practices for tracking skills supply
Section 3: Policies and practices for Employer engagement
Section 4: Delphi survey results about most promising sectors of job creation

The first and second sections are respectively dealing with the statistical aspects of skills demand and supply. The information dealt with in these sections is either statistical (quantitative) or qualitative information about the demand and supply of skills for now and in the future.

The third section is about employer engagement which is critical to capture very concrete skills needs from employers and thus ensure the relevance of whole TVET system. This is because in order to secure the relevance of TVET, employers, who are supposed to be the final users of

human resources raised by TVET, need to engage systematically in the planning and implementation of TVET policy.

The final section summarizes the results of Delphi survey about industries and occupations that are regarded as the most promising in terms of job creation in each country. Around 3 to 5 of the most promising sectors by each country are presented to determine any commonalities and/or any differences among 10 AMS.

The content of this section was created through the following procedures:

- LMIS team completes detailed questionnaire for each sub section;
- NRP provides basic information of each county and RC confirms the NRP's response, revises it, and submits it to the LMIS team;
- LMIS team, RC, and NRP complete the country report through several rounds of revisions;
- By consolidating the results of country reports, a draft regional report is prepared.

Accordingly, the following can be seen as the result of close collaboration between NRPs, RCs, and the LMIS team.

2. Policies and practices for tracking Skills Demand

2.1. Introduction

In this chapter, we discuss ASEAN countries' policies and practices for tracking each country's skills demand. Data on skills are important to guide agenda on skills. Especially, statistical information on skills demand, as they are more desirable if quantitatively sufficient and qualitatively accurate, are crucial success factor for design effective skills policy. Such information includes statistics about working conditions, job vacancies and recruitment status, employee competence, and learning demands of adults. Availability of those information will be the foremost criterion to evaluate the status of each country's skills demand data collection. However, more detailed evaluative terms such as the level of coverage (nationally available or limited to a specific region or sector), segregation (how detailed information can be used), and periodicity (how frequently and regularly updated) are also adopted to enable to picture more thorough view and thus to draw more pertinent area of improvement on each country's skills demand tracking methods.

In order to closely examine the status of data collection, we adopted following taxonomy on skills demand statistics.

A. Current skills demand

a. Statistics on employment: Number of employed people, level of wage and/or income
b. Statistics on establishment: number of companies and establishment, number of salaried workers; working hours; salary and labor cost.

c. Statistics on job vacancy: Number of vacant jobs, recruited workers and unfilled vacancy; reason of such vacancy; level of labor shortage.

d. Statistics on training led by firms: Number of companies providing training; number of trained workers by companies; training expenditure of companies.

e. Skills requirement: Required knowledge, competency and/or physical features for specific occupation

B. Future skills demand

a. Statistics on the future labor demand: Number of employment.

b. Required skills in the future: Required knowledge, competency and/or physical features for specific occupations

In this section, the following criteria are used to assess the situation of each aspects of information infrastructure for skills demand:

- ◎ : A system that collect sufficient information for concerned aspect is well established and operating smoothly

- ○: Activities to collect information for concerned aspect are being conducted, but some improvement is needed

- △: The most basic information for concerned aspect is being collected, but considerable improvement is needed

- ×: Information for concerned aspect is not being collected.

These assessments were made by the LMIS research team based on the information in each country report.

2.2. Overall Summary

i. Overall Assessment

This section discusses 10 ASEAN countries' policies and practices for acquiring and managing skills demand information in order to build and implement effective skills policy. Examples of core skills demand information are working conditions, job vacancies and recruitment status, employee competence, and learning demands of adults. Survey is the most common method of gathering information on skills demand and conducting well-designed surveys on regular term might be the most reliable measure to acquiring important skills demand data. Competent labor market information system facilitates those procedures and improves outcome of data gathering both in terms of quantity and quality. One of the important criteria to evaluate the country's state of data gathering practices is the timeframe of data collection. Because labor market dynamics tends to fluctuate in relatively short term (e.g., quarter), traditional yearly LFS are likely to fail to provide sufficient information for effective policy designing. International

Labor Organization (ILO) already explicitly articulated this aspect of data collection, to recommend data collection on quarterly and further, monthly terms.

In addition to regular surveys, more unstructured data gathering methods can be also useful in cases, for example, obtaining in-depth information. We obtained information of recently conducted surveys and studies on skills demand of 10 countries and analyzed each country's status of managing skills demand information. Major criteria for analysis are data coverage (nationally available or limited to a specific region or sector), level of segregation (how detailed information can be used), and periodicity (how frequently and regularly updated) can provide a broad picture on the current situation and identify the main areas for improvement.

First, all countries obtain basic skills demand information, by conducting nationwide and routinely surveys for employment or unemployment information. While most countries also regularly have means to access the current job vacancy, current skills demand, and future labor demand data, handful of countries (e.g., 4 countries out of 10 countries surveyed) also do not operate surveys about the establishments and their TVET policies, severing the bridge between the labor in demand in the market and the availability of the TVET programs in the private sector to satiate the demand. Additionally, even though many countries operate live and centralized online platforms for job search in which countries can freely post their job vacancies and explicitly state soft and hard skills that are sought for in candidates, these platforms may not retain historic data, truncating the extent to which the information can be used. Lastly, while the current skills requirements and future labor demand are surveyed in most countries, the future skills requirement are not studied equally in those countries.

Viet Nam, the Philippines, and Singapore are identified to have the most active and comprehensive efforts to collect information that can be used to discern the characteristics and trends in labor and skills demand. Although Singapore has not been reported to conduct statistics to exploit intra-firm training information, the country has also actively implemented policies and programs to collect skills demand data on a national level. Table 3.1 provides an overview of the assessment by country and statistics criteria.

Table 3.1 Assessment of the Overview Summary

Countries	Statistics on						
	Employment	Establishment	Job vacancy	Training led by firms	Skills requirement	Future labor demand	Required skills in the future
Brunei Darussalam	◎	△	◎	◎	◎	×	△
Cambodia	◎	△	△	△	△	△	×
Indonesia	◎	◎	×	×	×	◎	△
Lao DPR	◎	○	◎	○	○	○	○
Malaysia	◎	×	○	○	△	○	△
Myanmar	◎	◎	×	△	○	○	△
Philippines	◎	○	◎	◎	○	◎	○

Countries	Statistics on						
	Employment	Establishment	Job vacancy	Training led by firms	Skills requirement	Future labor demand	Required skills in the future
Singapore	◎	△	◎	×	○	◎	◎
Thailand	◎	○	○	○	○	○	○
Viet Nam	◎	○	◎	○	◎	◎	○

ii. Explanation by Country

In Brunei Darussalam, for 6 out of 7 sub-topics of skills demand, nationwide information is available mainly sourced by the Job Centre Brunei, a centralized platform for which companies can register job openings, training opportunities, list of skills required (e.g., teamwork, people skills, problem-solving skills, communication skills). Also, although the Centre for Strategic and Policy Studies is referenced to supply information about the required skills in the future, it remains uncertain as to whether the presentation about future jobs based on the (existing) trends and impact of industrialization specifically disclose information about the required knowledge, competency or physical features required per occupation in the future. Lastly, it is noted that there is yet to be a statistic on the future labor demand. In terms of frequency of data collection, statistics on employment and establishment are collected regularly, mainly on yearly basis, and statistics on job vacancy and firm-based trainings and skills requirements are tracked in continuous term. Whereas statistics on future labor demands are not collected as frequently as data on current demands.

In Cambodia, various surveys and research are conducted to capture skills demand for designing practical skills policy. For example, the Cambodia Socio-Economic Survey presents various statistics on skills demand that include, among others, statistics on employment by sector, sex, education and worked hours, and employment status by the main occupation and by geographical domain. However, despite the availability of surveys, particularly the Employer Survey and the Labor Market Forecasting 2017-2027, data from these sources are available by 2-digit industry occupation with irregular periodicity. The country conducts annual surveys on employment statistics, but other data on labor demands are infrequently collected or not surveyed.

In Indonesia, the sub-topics available for germane surveys have high coverage, segregation level, and periodicity. Nevertheless, some sub-topics such as job vacancy, intra-firm training, and current skills requirement are not backed by any surveys or studies. Additionally, although an additional explanation that the Projected Labor Needs by Sector and Position of the Year 2019-2024 and the Future of Jobs in 2020 provides projections of workers as well as the information emerging and current skills in the focus of existing reskilling/upskilling programs, the assessment was performed based on the information provided in the table. In terms of frequency of data collection, statistics on employment are collected quarterly but statistics on establishment are done several years' term. On future skills demand, statistics on future labor

demands are only surveyed occasionally but the country conducted yearly study on required skills in the future.

Lao PDR conducted various surveys and research to capture the concrete situation of skills demand for designing effective skills policy. However, although some of the surveys in the list are comprehensive in terms of coverage and segregation levels, they are not regularly conducted. For example, statistics on employment such as LFS are done longer than yearly terms, and statistics on trainings led by firms and skills requirement are collected only occasionally. Statistics on future skills demand are also collected infrequent terms. However, statistics on establishment and job vacancy are tracked less than a month's terms.

In Malaysia, besides employment surveys, quarterly Employment Statistics, annual Human Resources Development Fund (HRDF) Industry Training: Participation Report, and HRD Corp Webinar Series 1 are primary sub-topics. However, the assessment also reflects the limitations that the Webinar Series is not explicitly a survey or a study and does not provide information about the level of segregation of information. Malaysia collects employment statistics quarterly and annually and establishment statistics quarterly. Job vacancy statistics are collected quarterly terms and firm-based trainings and skills requirements are tracked annually. The country also displayed earnest efforts to collect future skills demand data, as future labor demand on quarterly terms and required skills on yearly terms.

In Myanmar, several surveys and equivalent analyses on statistical information are performed to gauge the current skills demand in the past three years, except for the statistics on job vacancies for which there exists no relevant study. Although each survey provided the necessary information for its targeted objective, some embody characteristics of specificity and irregularity, potentially indicating a need for a nationwide, comprehensive panel data segregated by more than one level. Also, the listed skills demand surveys in Myanmar are more often than not conducted on an ad hoc basis, particularly given that 11 out of 14 listed surveys were performed "Not regularly" or "Occasionally", affecting the assessment of all sub-topics. Situational factors may contribute to such situation, for example, last LFS was conducted in year 2017 due to Covid pandemic and the country's political upheavals.

In the Philippines, the Integrated Survey on Labor and Employment and JobsFit are two sources referenced to most sub-topics. Notably, the former collects nationwide data by industry occupation code and sex every two years while the latter covers the whole country by 1-digit industry occupation in an unspecified time interval. Even though the high dependency on these two sources for skills demand analysis, they also have high coverage, multiple levels of segregation, and regularity. In terms of data collection frequency, LFS are conducted monthly and statistics on establishment are collected annually. Other statistics are reported to be collected biennially.

Overall, in Singapore, the government has led efforts on a national level to provide a platform for firms to advertise job vacancies and skills in demand and forecast skills demand in the future. It is noteworthy that the Ministry of Education, Skills Future Singapore, conducts

analysis on the labor outlooks and does not publish the data utilized for the analysis for public use. No recent surveys or studies were cited for the sub-topics of statistics on establishment and training led by companies. Employment statistics are surveyed annually whereas establishment statistics and job vacancies statistics quarterly.

Thailand conducts various surveys and research conducted to capture the concrete situation of skills demand for designing effective skills policy. However, although some of the surveys in the list are comprehensive in terms of coverage and segregation levels, they are not regularly conducted. Employment statistics are collected quarterly and annually in Thailand and yet statistics on establishment and skills requirement are collected occasionally. Statistics on future labor demands and required skills in the future are also collected infrequent terms.

In Viet Nam, various state-level surveys are led by the General Statistics Office, the Department of Employment in coordination with the General Department of Vocational Education, and the Ministry of Labor Invalids and Social Affairs. Several studies and reports are referenced as sources of information relevant to analyzing the skills demand with a caveat that statistics on establishments, including the enterprise survey data and intra-firm vocational trainings, and future skills demand do not occur on a routine-basis. Viet Nam collects employment statistics quarterly and annually and establishment statistics yearly. The country also collects statistics on future labor demand on quarterly terms and job vacancy is tracked rapidly. However, other statistics are collected more infrequent terms.

2.3. Brief Assessment on Each Country's Situation

i. Representative cases: the Philippines and Singapore

Distinct from its neighboring countries, the Philippines have several nationwide or government-led surveys to analyze labor demand. For example, Labor Force Survey is a nationwide quarterly survey conducted by the Philippine Statistics Authority, which refers to the population of 15 years old and over who contribute to the country's production of goods and services. Integrated Survey on Labor and Employment is also a nationwide survey of establishments employing at least 20 workers, often being used for inputs to study industry trends and practices and for bases for the formulation of labor policies. In addition, JobsFit Report is a labor market study by the Department of Labor and Employment, highlighting the in-demand and hard-to-fill occupations of the critical industries that are projected to be the primary source of employment growth in the country for the next seven years. Lastly, data from the Skills Needs Anticipation reveals the employers' desired skills and competencies of its workers and their satisfaction with the competencies and performance of TVET graduates in the workplace and is used to inform future training programs, support, and other programs of the government for capacity building and innovation of the industry.

In the Philippines, sufficiency and accuracy of information are both rated as 3 out of 5 because the information on skills demand does not provide the level of specificity needed to formulate

VET policies and is generated as per the requirements of the Department of Labor and Employment or the Philippine Statistics Authority, not mainly accounting for its use in developing TVET policies. Additionally, there is no data congruence between the demand side (e.g., job titles of workers needed) and the supply side (e.g., training program graduates).

In Singapore, the sufficiency and accuracy of the skills demand information is rated at 4. Besides the official, detailed, and methodically gathered LMI, there is also access to less official information or anecdotal LMI, such as reports from local or international news, recruitment, or headhunting companies. Also, while the data collection methods are robust, the accuracy of the data collected is not necessarily attained due to the self-administering nature of the collection process and the possibility of varying interpretations of the questionnaires. It is noted that even with the use of government data sources like the Central Provident Fund, there continues to exist the risk of some inaccuracy in the information arising from cases such as workers not reporting or contributing to their CPF.

ii. Assessment by country: Other countries

For Brunei Darussalam, the degrees of sufficiency and accuracy of the information on skills demand both on a scale of 5 (1=poor, 5=great) are rated as 3 and 2, respectively. It is reported that Brunei Darussalam does not have an agency that provides data on skills demand. Although the Job Centre provides live data on the current demand based on the input from employers who announce job vacancies, the information is not comprehensive as non-participating companies exist in the market. Furthermore, it lacks historical and forecasting data and has limitations with the data grouping, debasing its usefulness as a reference for TVET institutions.

In Cambodia, the sufficiency and accuracy of the skills demand information are rated at four on a scale of 5. The basis of the ratings can be attributed to the existence of a survey on skills demand regularly conducted by the National Institute of Statistics of the Ministry of Planning and the TVET Management Information System by the Directorate General of TVET under the Ministry of Labor and Vocational Training. The NIS compiles and consolidates statistics provided by decentralized offices and collects primary data through household and establishment surveys and population, agricultural and economic censuses. In addition, the TVETMIS collects data entry from public and private TVET institutions and then processes this data into indicators useful for decision making.

In Indonesia, sufficiency and accuracy of the skills demand information are rated at 3 out of 5. First, although a skills demand survey exists, the country relies heavily on this statistical survey commenced by BPS. Second, the number of sampling needs to be increased for improved accuracy in the forecast; however, the geographical and digital gap across the archipelago challenges collecting massive and real-time data in Indonesia.

In Lao PDR, the sufficiency and accuracy of the currently available information are rated at 2. First, the ratings are assigned based on the assessment that comprehensive data on skills demand insufficiently includes its projection. Furthermore, the most extensive survey in Lao,

the Lao Labour Force Survey, focused mainly on the Labor Force and was conducted twice in 2010 and 2017 due to the financial constraints in lieu of every five years as recommended by the Statistics Law. Other surveys on the skills demand have limited scope (some provinces, some occupations, some sectors only) and are based on projects. Secondly, as most of the detailed surveys are based on projects, there is no clear mechanism to provide precise information on skills demand for designing the future VET policies. On the other hand, employers' surveys often give precise information about the concerned sectors because these federations or associations have a deep understanding of their business trends and occupations.

In Malaysia, the sufficiency and accuracy of the information on skills for future VET policies are rated at 5. The Malaysian government continuously studies and revises skills demand by conducting comprehensive surveys quarterly or annually, covering the whole nation across all industry sectors. However, as the information is difficult to access, developing a more efficient information management system would make it easier to read and process data.

The sufficiency and accuracy of the information available in Myanmar are rated to be 2.5. The below-average judgment can be attributed to two reasons. First, the lack of cooperation among ministries responsible for TVET to organize a comprehensive labor information database has hindered the country from attaining sufficient information. Second, there have been inadequate efforts to update official statistics on skills demand, leaving the majority of the research and surveys done by the government authorities to rely on previous surveys, especially the 2014 National Consensus. In addition, industrial and sectorial surveys were primarily done in small sample sizes or batches such that their results may not as accurately represent the population as a nationwide or regional survey would.

Thailand has seven main kinds of surveys on skills demand, including one recent one linked to the COVID situation. The central governmental survey is the Thailand force survey that is comprehensive and used to provide information on both skills and supply. First, the sufficiency of the Skills demands information in Thailand is rated at three on a scale of 5 due to the unwillingness or the culture of industries to disclose information on the development plan and labor force requirements. Secondly, the degree of information accuracy on skills demand is rated at three due to the lack of long-term statistics or information for planning future VET systems as a whole. VET demand has been identified in only some specific sectors or development projects but is not regularly surveyed. As a solution, collective efforts, such as the Thai Chamber of Commerce and the Federation of Thai Industries, have been drawn to understand trends in business and occupations better.

In Viet Nam, the sufficiency and accuracy of the currently available information are rated at three due to the irregular implementation of in-depth surveys. For example, the Department of Employment has conducted a relevant survey in 2016, 2017, and 2019, skipping 2018, 2020, and 2021. Although it calls for an additional annual budget allocation, regular surveys can provide general information. Also, most in-depth studies on skills demand are conducted, irregularly again, by international organizations like Manpower, and few have separate studies on Viet Nam.

2.4. Required Policies

i. Overall recommendation

While countries in the ASEAN region have unique strengths and challenges in the ways they operate various skills demand surveys and TVET policies, they also share two common limitations. Firstly, a need for a comprehensive, nationwide labor demand survey for all industries on a routine basis (e.g., annual) has continuously and commonly identified. Even in countries where nationwide surveys exist, the majority are identified to lack consistency in the covered time or scope across series and surveys, which has debilitated their usefulness. Moreover, such extensive surveys expectedly require sizable financial budget and flexibility to be tailored to the sociocultural uniqueness of each state, making it unrealistic to expect the private sector or international organizations to be the main agent leading the conduct. Therefore, it is best recommended for each government to pledge to take an initiative in producing nationwide data relevant to design effective TVET policies for all industry sectors. Even though most countries already acknowledge the financial constraint as a major impediment to performing a nationwide survey, there already exist localized, irregular, or most importantly overlapping efforts by either private institutions or various governmental bodies to essentially collect the information in demand. Centralizing these scattered efforts may congregate dispersed budgets currently allocated to several smaller-scale studies.

Secondly, as shown in table 2-1, while all countries survey employment data annually at a minimum, some do not take a necessary step to understand specific skills or knowledge in demand per occupation. Even among those countries that responded they have a survey that includes information about the skills demand, it is mostly the case that either their descriptions remain unclear (e.g., "Labor Demand Forecast in 10 key industrial sectors, and Skill Gap") or somewhat irrelevant (e.g., "Employment of specific groups of workers, occupational shortages and surpluses, and labor cost of employees"). As the skills requirements for both current and future demand may vary between industries, vocations, and countries and can directly affect national TVET policies, it is recommended that all countries include inquiries regarding the required skills for each occupation.

For successful implementation of the two recommendations, it is noteworthy to highlight the significance of international (i.e., between countries) and international (i.e., between private and public sectors) cooperation. The idea of cooperation may start with maintenance of close communication and alignment of structures and references (e.g., codification of industries, occupations, or skills). For instance, periodic forms or consortiums can be held for both experts and employers to exchange qualitative information on skills and labor demand. Aligning research systems between countries, as trivially as agreeing upon common references, can help maintaining consistency and comparability over time and beyond borders in the ASEAN region and, thus, foster seamless flow of information.

ii. Policy recommendations collected from each country

In addition to the recommended policies described above, particularly for the Philippines, a policy to implement a common language reference such as the Philippine Standard for Industry Classification and the Philippine Standard for Occupation Classification is suggested. This may contribute to an easier alignment of the demand and supply data while significantly increasing the flexibility and thus usefulness of the surveys currently in operation, regardless of the organizers of these surveys. In addition, it is suggested for the government to specify skills demand data collected from employers.

For Indonesia, as a solution for the existing issues, the government is recommended to improve its organizational framework of labor market information system and collect real-time data of job occupancy from the private sector by promoting public-private partnership in line with the overall recommendations provided above. Lastly, the government must ensure a public LMI system to produce reliable and relevant information in user-friendly ways with an objective to increase the likelihood of improving the efficiency of markets.

For Lao PDR, following the assessment on the available information, suggestions for improvements are made: to develop the Labor market information system to provide 17 fundamental indicators related to the Labor market and indicators on Sustainable Development. At present, the Department of Skills Development and Employment has finished drafting the Prime Minister Decree on the Labor Market Information System, which will be approved by this year.

In Malaysia, to address the difficulty in accessing the existing information, a more efficient information management system can be developed. This will enable for users to read and process the already available data more easily. In addition, a policy to re-strategize the planned budget to maneuver TVET development in Malaysia to meet the demands created by the Covid-19 pandemic may help assessing the temporary and permanent changes caused by an external shock to the economy. Further government-industry collaboration and coordination through the restructuring of strategies will help achieve the expected outcomes.

For Myanmar, three policy suggestions are made to improve the situation. First, advisory and counseling service centers can be established to identify skills demand at national and regional levels. This suggestion is in line with the aforementioned overall policy recommendations. Given the country's financial situation, Myanmar may need to concomitantly secure financial support from international development partners. Second, development of a "coordination and cooperation" mechanism among government bodies as well as between private and public sectors for LMIS is proposed. Lastly, a policy to enforce adoption of the ASEAN framework and guidelines on LMIS in future is recommended.

For Thailand, in addition to the existing measures, it has been recommended that the government policies facilitate and finance the survey or research on the requirement of VET for future policies in collaboration and coordination will industry and related government agencies. The Federation of Thai Industry should organize the study through each industrial group in collaboration with the ministry of education. Furthermore, the Chamber of Commerce,

Tourism Association, and other professional or occupational groups should provide the demand in their sector at least every three years.

For Viet Nam, based on the assessment mentioned above of the currently available information, it is suggested that the skills demand and the skills need indicator should be included in the national indicator system in national surveys.

Several countries, such as Singapore, Brunei Darussalam, and Cambodia, have already adopted an improved set of TVET policies and thus are currently in the process of implementing the new rules. For these countries, no additional policies are suggested to focus on the continued efforts. In the case of Singapore, the government has already pledged to make improvements in recent years, starting with enhancing responsiveness. SkillsFuture Singapore has dedicated its Jobs-Skills Insights Division (previously the Jobs and Skills Division) to analyzing data from the vast array of sources and another site to assisting stakeholders like training providers and learners in interpreting the jobs-skills data. In addition, SkillsFuture Singapore has been developing a new methodology and system to update LMIs, using AI and Machine Learning, which is expected to be released in late 2021. For Brunei Darussalam, the Manpower Planning and Employment Council has also already announced a plan to produce the skills demand data, including projections. In the meantime, a policy requiring all companies and or employers to update their company profiles, especially regarding the number of existing and needed employees by occupations, is recommended. Cambodia has already dedicated efforts to develop the National TVET Policy for 2017-2025 and is further recommended to develop 4IR transformation road maps for critical sectors and consider the development of Industry Transformation Maps similar by benchmarking the case of Singapore.

3. Skills Supply

3.1. Introduction

Various kinds of statistical information on the supply of skills are also required for designing effective skills policy. Such information includes statistics about how many people are available for jobs, how many schools and training institutions are available, and how those schools and institutions are doing in terms of relevance compared to the industrial demand. In particular, by assessing the availability of those information in terms of coverage (nationally available or limited to a specific region or sector), level of segregation (how detailed information can be used), and periodicity (how frequently and regularly updated), it would be possible to have broad picture on the current situation and identify the main areas of improvement.

Following aspects are examined:

a. Statistics on labor supply: Number of total population and economically active population.

b. Statistics on education and training: Number of school graduates and adult training participants.

c. Surveys and researches on learning to work transition: Possibility of finding jobs after school graduation and degree of skills mismatch in the youth labor market.

d. Statistics on job seeker: Number of active job seekers or unemployed people; number of underemployed workers.

e. Evaluation on the quality of education and training: Level of satisfaction of employers and/or learning participants to education and training.

In this section, the following criteria are used to assess the situation of each aspects of information infrastructure for skills supply:

- ◎ : A system that collect sufficient information for concerned aspect is well established and operating smoothly

- ○: Activities to collect information for concerned aspect are being conducted, but some improvement is needed

- △: The most basic information for concerned aspect is being collected, but considerable improvement is needed

- ×: Information for concerned aspect is not being collected.

These assessments were made by the LMIS research team based on the information in each country report.

3.2. Overall Summary

Evaluation results of the information infrastructure for skills supply based on each AMS's report are summarized by policy issue as follows.

First, regarding the survey on labor supply, most of the countries are conducting labor force surveys (LFS) regularly with certain time intervals. However, still some countries conduct LFS only annually and therefore fail to detect the short-run changes of labor supply which could be measured through increase or decrease of unemployed people and discouraged job seekers. Given that the purpose of LFS is to identify short-term dynamics in the labor market especially and to and respond to urgent employment policy tasks according to International Labor Organization (ILO) guidelines, it is necessary to develop it into quarterly statistics at least, and, furthermore, into monthly statistics.

Next, regarding the statistics on education and training, most countries have established basic statistical system on the education sector. Particularly for official or formal education system, there is information on the number of schools and number of students by detailed aspects such as types of schools, majors and fields of education, regions etc. However, statistics on vocational training for adults, including not only vocational training for the unemployed, but also statistics on vocational training conducted by employers, are scarcely prepared except in Singapore and the Philippines.

Furthermore, there was generally insufficient information on the learning to work transition, that is, the process of transitioning to the labor market after completing education and training. Even if information on the learning to work transition was available, it was often limited to the level of individual educational institutions. Therefore, countries lacking these statistics must refer to cases in the Philippines, Singapore, and Malaysia.

Statistics on job seekers, who are searching for jobs in the labor market, are comparatively well-established as a part of LFS. Nevertheless, LFS cannot offer a more detailed picture of job search and recruitment conditions by job type. This is because the statistics covered under LFS only provide information on the total number of job seekers or their age or gender. As such, to obtain detailed, real-time information on job seekers by job type, the infrastructure for job search and recruitment information must be reinforced in connection with the expansion of public employment services.

Finally, along with the learning to work transition, there is insufficient information on the quality of education and training. It is crucial to understand how much quantitative increase in education and training contributes to the labor market. Since vocational training requires extensive government investments, it is vital to avoid wasting such huge investments. Despite this importance, the information infrastructure for this area is weak overall. Countries that want to develop information infrastructure may refer to the user satisfaction survey in the Philippines.

Overall, the basic information infrastructure for skills supply was found to be well-established or recently established. However, the information infrastructure for the practical feasibility of skills supply is still inadequate. Moving forward, more attention and efforts are required at the ASEAN level and by each country (Table 3.2).

Table 3.2 Assessment of the Overall situation

Countries	Statistics on				
	Labor Supply	Education and training	Learning to work transition	Job seekers	Quality of education and training
Brunei Darussalam	○	○	○	○	○
Cambodia	△	○	△	△	△
Indonesia	○	○	△	◎	○
Lao DPR	△	○	△	△	×
Malaysia	◎	◎	◎	◎	×
Myanmar	△	△	△	×	△
Singapore	◎	◎	◎	◎	×
Thailand	◎	○	○	△	×
The Philippines	◎	◎	◎	◎	◎
Viet Nam	○	○	×	◎	△

3.3. Brief Assessment on Each Country's Situation

In Brunei Darussalam, basic elements of information infrastructure for skills supply are generally well established. Regular nationwide LFS is being conducted and detailed statistics on education sector is regularly compiled. Also, individual institutes are conducting regular Graduate Employment Study (GES) survey about graduates' employment situation and Employers' Satisfaction Survey (ESS) about the employer's responses with the support and guidance of the Ministry of Education, and based on verification by SEAMEO VOCTECH. They could be used as basic indicators of the relevance of education and training programs but still need to be interpreted with some care in terms of objectivity as they are collected in the survey conducted by each institution. In addition, regarding the information about job seekers, information about registered job seekers data from Job Center Brunei is available with complement the unemployment data from LFS.

In Cambodia, on the supply side of skills, the labor market information infrastructure needs to be improved significantly. First of all, regular LFS is not conducted, only ad hoc surveys such as Cambodia Socio-Economic Survey 2019/2020 are being conducted irregularly. In such a situation, it is difficult to systematically track changes in labor supply. Next, although basic information infrastructure is working for regular education and training, information collection for vocational training is significantly insufficient. Finally, there are no regular surveys on the transition process from schools to the labor market or the quality of education and training. Considering all these points, it can be said that the expansion of information infrastructure for skills supply in Cambodia needs to be done promptly and on a large scale.

Indonesia seems to have a relatively well established and operated information infrastructure for labor supply. First of all, regular and national LFS is being implemented, and Statistik Pendidikan/Education Statistics provides detailed information about the education sector. Regarding surveys and research on learning to work transition, the Research on the School-to-Work Transition in Indonesia (ILO) provides information on education and training by group and region, duration of job search before finding the first job, etc. The Evaluasi trend kualitas pendidikan di Indonesia/Evaluation of the Trend of Quality of Education in Indonesia assists in the evaluation on the quality of education and training. Of course, there are things that need to be supplemented in various aspects. For example, since the LFS is a quarterly survey, the survey cycle needs to be shortened, and the lack of statistics on adults in education and training needs to be supplemented. Also, the survey on the transition from schools to the labor market needs to be improved as current surveys are just occasional surveys on specific region supported by external donors.

Lao PDR also has many weak points in terms of tracking the situation of skills supply. Even basic regular LFS has not been established, and the transition process from schools to the labor market is not systematically monitored. A survey to evaluate the quality of education and training has not been conducted either. While there are basic statistics about education, such as the number of vocational education students in the education sector, statistics on training

participants are not systematically produced. Of course, as the Ministry of Education and Sports has developed the Lao Education and Sports Management Information System (LESMIS), which has combined several specific databases separated by sub-sectors, the production of information related to vocational education is expected to be strengthened in the future.

Malaysia could be assessed as having well established and functioning information infrastructure for labor supply. It is one of the few ASEAN countries that conduct monthly LFS survey, so the short-term changes of the labor markets are well tracked. Next, detailed information on the status of regular education is regularly collected, and further, information on vocational training is well collected, such as statistics on training supported by HRDF. Surveys to understand the employment status of graduates are also conducted on a regular basis, and information on school-labor market transitions is also being grasped. However, there is no survey on employers' opinions on the quality of education and training, and only indirect estimate using graduate employment data is available.

Myanmar has a very weak labor market information infrastructure that needs significant improvement in tracking the situation of skills supply. Even basic regular LFS has not been established but only once in 2017 with external assistance. Also, while regular surveys on education and training are not conducted, only occasional education sector surveys are being conducted. Also, regular surveys on the transition process from schools to the labor market are not conducted, and only occasional surveys that do not provide specific information at the school level are being conducted. There is no systematic evaluation of the quality of education and training from the point of view of consumers.

In the Philippines, overall, the key elements of labor market statistics are well established in terms of skills supply. Various surveys and research that provide information on skills supply are conducted such as monthly Labor Force Survey, Integrated Survey on Labor and Employment, Education and Training Statistics from DepEd, CHED, and TESDA, Survey on the Employability of TVET Graduates, and ESS. The Education and Training Statistics from the three major education groups in the Philippines provide data on enrollment and graduates, by field of education and training while the Survey on the Employability of TVET Graduates presents the employment rate of TVET graduates and the duration of job search. Moreover, the employers' overall level of satisfaction with TVET graduates is captured in the Employer Satisfaction Survey on TVET Graduates conducted every two years. The experiences of Employer Satisfaction Survey in the Philippines could be importantly taken into account by other ASEAN countries in assessing the performance of education and training programs from employers' viewpoint. Also, particularly noteworthy is the systematic follow-up system for vocational training participants. The basis of such system is the TESDA Training Management Information System (T2MIS). This system captures all information from TVET training providers all over the country using Unique Learner ID (ULI) assigned to every TVET trainee. By using ULI, TESDA is able to track the learners from enrollment to graduation, to assessment and certification, to employment and future attendance in upskilling programs. In particular, surveys on employment after education and training are conducted not by individual

institutions but by TESDA, and the survey results are also analyzed in detail. This can likely serve as a benchmark for other AMS.

Singapore appears to have a well-established and operationally structured information infrastructure for identifying skill supply. In Singapore, the Singapore Department of Statistics gathers comprehensive data on its population with detailed information on employment and unemployment statistics broken down by age and gender. Singapore has unique well established LFS, which comprises two kinds of survey, the first one is monthly LFS for collecting employment and unemployment data throughout the year, and the second one is comprehensive version of the survey between May and July each year for collecting key information on demographic and socio-economic characteristics of population. Regarding the education and training data, Singapore has a regular and detailed information about education sector and also data available for subsidized training. Additionally, regular surveys about graduates' employment situation are conducted.

In Thailand, the information infrastructure for skills supply seems comparatively well established. Monthly LFS is well established, the education sector has a considerably well-established information infrastructure, and educational institutions are also conducting mandatory post-education follow-up surveys which are managed by OVEC. As such, Thailand could be regarded as a country with relatively well developed information infrastructure for skills supply. However, there still exist some aspects that require improvements, particularly with regards to the information related to the quality of education and training.

Viet Nam has an information infrastructure for skills supply which requires improvement in many respects. A positive development is that Viet Nam has shortened the frequency of LFS from annual to quarterly surveys since 2012 and also started applying new ILO guidelines in 2021 with supports from the ILO. However, still it is a quarterly survey and needed to increase the frequency. Also, there exists comprehensive statistics on the education and training but, with limited detail. Regarding the school-to-work transition, the statistics from the Survey of Labor–Employment only show the results of transition but no information about the transition process. In addition, although it is possible to grasp basic information on industry demand through irregular surveys conducted by MOLISA, systematic and regular surveys on industry satisfaction with the quality of education and training have not been conducted.

3.4. Required Policies

Based on the results of the above analysis, policy proposals for each country can be presented as follows.

For Brunei Darussalam, the first thing to do is to shorten the LFS survey cycle to a monthly basis. Through this, it will be possible to track short-term changes in the labor market and provide necessary labor market policies immediately. Next, it is necessary to establish and supplement various surveys to measure the performance of education and training. First of all,

it is necessary to consider conducting a follow-up survey of graduates independently and objectively by government agencies beyond the survey conducted by individual educational institutions on their own. Next, it is necessary to investigate not only education but also training. To this end, a new survey on vocational training conducted by companies should be introduced, and follow-up surveys on individual training participants should also be considered. Lastly, the establishment of a survey that can directly measure companies' satisfaction with education and training should be considered.

Cambodia is a country in need of significant improvements in its labor market information infrastructure. The first thing to do is to set up the LFS as soon as possible, at least on a quarterly basis. To this end, the expansion of an organization in charge of statistical surveys and the securing of a budget must be made urgently. Secondly, information on the implementation status and the impacts of education and training should also be significantly improved. Even though essential statistics about education, such as the number of schools, students, teachers are being collected, systematic monitoring on the labor market performances of school graduates and training participants haven't been regularly conducted. In addition, systematic information collection and analysis on vocational training conducted by companies and NGOs is necessary. Since collecting and managing individual trainee information will require a significant investment, it would be desirable to start with collecting and managing information at the program level. Regarding the performance of education and training, regular follow-up surveys of graduates at the institutional level should be conducted, and separately from these surveys, it should be considered to examine the labor market situation of recent graduates in the form of a side survey that includes additional survey questions in the LFS.

Indonesia is a country which is geographically dispersed with not just a large population but also high racial diversity. Therefore, it is truly a big challenge to collect labor market information on the entire country in real time. Given these conditions, a quarterly LFS seems unavoidable. Nevertheless, at least in urban areas, the LFS cycle must be shortened, or more detailed labor market statistics must be established. Regarding education and training, statistics on not only vocational education but also vocational training must be expanded. Specifically, it is necessary to identify the skill level of trainees and the industry's corresponding response. In this respect, if nationwide follow-up surveys by individual education and training institutions are difficult, then specialized agencies should perform follow-up and user satisfaction surveys, even if limited to certain regions such as urban areas.

As explained in the assessment part, Malaysia has a well working labor market information system on skills supply. However, even though general system is well established, since 11 ministries carry out education and training, sometimes comprehensive data for all of them are not systematically provided. Therefore, a common data infrastructure that all ministries can use must be established. In relation to this, National Technical and Vocational Education and Training Council (MTVET) and the National Skills Development Council (NSDC) are recommended to serve a key role in devising and implementing strategic plans for data infrastructure in the future.

Myanmar is the country in need of most active efforts to improve the labor market information infrastructure for skills supply. As in Cambodia, the LFS should be established as a regular survey as soon as possible, and information on training as well as basic statistics on education should be greatly expanded. To this end, it is necessary to introduce a survey on the status of vocational training for companies, and also conduct a survey on vocational training conducted by private institutions. Also, along with the implementation of follow-up surveys of graduates at the institutional level, separate survey should be introduced to produce accurate and objective information on the contributions of education and training in the form of a side survey that includes additional survey questions in the LFS.

Lao PDR is also required to make a significant amount of investment for the improvement of skills supply related information system. It should expand its basic labor market information such as regular LFS and produce much more information on the capabilities of education and training participants and actual relevance in industrial fields. It should consider to introduce surveys to companies on their training activities and the employers' satisfaction about education and training programs. Laos also needs to introduce a special tracer survey targeting for youths as a side survey that includes additional survey questions in the LFS. At the same time, as Lao PDR is a small country with limited human and material resources, it is questionable whether the country can independently perform all these surveys by itself. In this regards, coordinated support at the ASEAN level would be required.

The Philippines has a well-designed and functioning labor market information system. However, the following points can be pointed out to improve the effectiveness of the Philippine education and training system. Firstly, through Integrated Survey on Labor and Employment, basic information on vocational training provided by employers is being investigated, but the content of the survey is limited as it only covers the total number of trainees and training costs. Fundamentally, considering that vocational training should be activated as part of various methods for strengthening corporate organizational capacity, the current survey contents need to be much more diversified. In addition, information on training status at the individual level as well as the company level training status is required. In order to collect information on this aspect, it may be considered to establish a new survey on vocational training for adults as an affiliated or special survey of the LFS. Next, TESDA publishes a survey report on the employment process and employment outcomes for each year's TVET graduates. Basic information about how well TVET in the Philippines works can be confirmed through this research analysis. However, in order to more strictly check the practical usefulness of TVET, it is necessary to understand not only the employment situation at the time of graduation, but also whether they are actually working well at those jobs several years after graduation. In this regard, in addition to the current annual survey of graduates, it should be considered to conduct follow-up surveys of at least some of the graduates after a certain time has passed since graduation. By complementing these aspects, TVET in the Philippines will be able to better respond to industrial demand and contribute more to socio-economic development.

Singapore has also a very well developed and sophisticated labor market information system about skills supply. Therefore, in Singapore, there is not much need for further improvement in the information infrastructure related to skills supply. Nevertheless, at least two things can be mentioned. Firstly, information on micro-courses is not published and the results of follow-up surveys on education and training participants are said to be not widely disclosed. Accordingly, it is encouraged to not only accumulate information at the government level but also publicly disclose information, as appropriate, so as to analyze the state of Singapore's education and training system from a multilateral perspective. Next, although Singapore's business owners have been checking their opinions on education and training through various channels, it may be possible to consider establishing a new survey to more systematically identify their opinions. In this regards, Singapore could consider the introduction of an employer survey about the quality of education and training benchmarking the survey of Japanese and Korean case (University Education Assessment from Industry Perspective) or the Employer Satisfaction Survey on TVET Graduates of the Philippines.

Thailand appears to have a relatively good information infrastructure for skilled supply, though it still has a number of improvements. Firstly, it is necessary to collect and utilize detailed information on not only vocational education but also vocational training. For example, it is necessary to check how much vocational training is provided for employees of the companies and how much money companies spend on vocational training. Also, information on the labor market situation of those who have received vocational training should be collected. To this end, a survey on companies about their vocational training and a survey on households to understand the participation of adults in vocational training should be introduced. Next, regarding the effectiveness of education and training, systematic follow-up surveys by objective institutions are necessary, extending beyond those by individual educational institutions. These surveys must be sufficiently large-scale to produce region-specific statistics and detailed statistics by demographic attributes. Finally, in order to grasp the responses from employers, Thailand could consider the introduction of an employer survey about the quality of education and training benchmarking the survey of Japanese and Korean case (University Education Assessment from Industry Perspective) or the Employer Satisfaction Survey on TVET Graduates of the Philippines.

In the case of Viet Nam, despite recent efforts, the overall labor market information system does not appear to be sufficiently developed. It can be positively evaluated that LFS was recently launched in Viet Nam and started to provide basic information on the entire Viet Nam labor market. In the future, while continuing the current efforts, more active effort to improve the current information infrastructure will be required. The first thing to do in this regard is to shorten the cycle of the LFS to a monthly basis considering the necessity of understanding the short-term dynamics of the labor market. In addition, information on adult vocational training as well as vocational education should be widely collected. To this end, it is necessary to consider introducing several new surveys, the first one for employers about training activities and training investment and the second one for households about individual-led training. In

addition, the collection of information that can measure the quality of actual education and training should be strengthened. To this end, regular follow-up surveys for TVET graduates on the transition process from school to the labor market should be introduced. Also, the introduction of a survey on employer satisfaction to education and training should be considered as a measure of the overall validity of TVET.

4. Employer Engagement

4.1. Introduction

To validate each country's technical and vocational education and training (TVET) system can effectively adapt to changing labor market conditions, it is desirable to collect and analyze information on current and future demand and supply of skills from various perspectives and communicate the results to diverse stakeholders related to education and training providers, students, trainees, employers, industrial bodies, and even government agencies. In order to build sustainable national skills system, it is important to engage employers in the overall process of skills strategy formation. Employers' engagement to the TVET system at national, sectoral, and regional levels are assessed via analytical framework. On the basis of analysis, findings, challenges, and policy implications are suggested.

4.2. Overall Summary

i. Overall Assessment

In this section, employers' engagement in providing labor market information reflecting the specific situation of individual sector or region is described. The varieties of players are engaged in TVET policy making and the implementation processes, which are employers' engagement in developing/ accrediting/ assuring qualifications, sector councils' engagement in TVET curriculum development or National Competency Standards Development, Sector councils or Regional councils engage in program operation, the way in which to help TVET graduates with career guidance. Plus, the unresolved issues or obstacles to engage employers in TVET programs are described.

The existence of meetings and the existence of law or regulations at national, regional, and sectoral levels are identified in terms of the 10 ASEAN member states (Table 3.3).

Table 3.3 The existence of meeting & law or regulation

Countries	The Existence of meeting			The Existence of Law or Regulation		
	National	Regional	Sectoral	National	Regional	Sectoral
Brunei Darussalam	○	○	○	x	x	X
Cambodia	○	x	○	○	x	○
Indonesia	○	x	○	x	x	X
Lao PDR	○	○	○	○	○	○
Malaysia	○	x	○	○	x	○
Myanmar	○	○	○	○	○	○
Singapore	○	NA	○	○	NA	○
Thailand	○	○	○	○	○	○
The Philippines	○	○	○	○	○	○
Viet Nam	○	○	○	○	○	○

Note: NA- not applicable

In terms of the existence of meeting and law or regulation, in all countries, employers are engaged at the national and sectoral level. All countries have laws and regulations related to the employer engagement at national and sectoral level except Brunei Darussalam and Indonesia.

Depending on the size of population and national territory, some countries did not have employers' engagement at the regional level. Cambodia, Indonesia, Malaysia, and Singapore do not have the meeting at the regional level. The absence of meetings indicates the absence of laws or regulations as well.

The impact of employers' engagement could be seen as relatively substantive at the national level. Nonetheless, it is less so in some cases at the sectoral level, while it is least significant at the regional level.

Table 3.4 The degree of influence to TVET

Countries	The Degree of Influence of meeting to TVET			The Degree of Influence of the employers to TVET		
	National	Regional	Sectoral	National	Regional	Sectoral
Brunei Darussalam	◎	◎	◎	◎	◎	◎
Cambodia	◎	NA	◎	◎	NA	◎
Indonesia	◎	NA	◎	◎	NA	◎
Lao PDR	○	△	△	○	△	△
Malaysia	◎	NA	◎	◎	NA	◎
Myanmar	◎	◎	◎	○	○	○
Singapore	○	NA*	◎	○	NA*	◎
Thailand	◎	◎	○	◎	◎	◎
The Philippines	◎	◎	◎	○	○	◎
Viet Nam	◎	○	○	◎	○	○

Note' 5-4 ◎; 3 ○; 2-1 △ ; NA – not available (* for Singapore, not applicable)

The degree of influence of meeting to TVET was deviated depending on the ASEAN Member States' skill system and mechanism. Depending on the size of the population, regional council is not necessary. Either regional or sectoral councils can exist based on the member states' situation. However, both the degree of influence of meeting to TVET and those of the employers to TVET is at sectoral level becomes more important for ASEAN Member States. It is difficult to present meaningful differences of ASEAN member states based on the ratings about the degree of influence of meeting to TVET and those of the employers to TVET (Table 3.4).

ii. Explanation by Country

Considering that Brunei Darussalam is a small country, all meetings occur at the national level. In terms of the influence of employers at sectoral level, meetings take place several times a year for a single-industry sector and annually for the cross-industry sector. More coordinated and sustainable mechanisms for employer's engagement are needed. There is no specific budget allocation to support employers' collaboration.

Regarding the participation of employers, given that the Manpower Industry Steering Committee (MISC) is newly established and operated is somewhat positive. However, since the MISC is still in its early stage, it is necessary to carefully monitor the actual activities of the MISC and the participation of employers, and also check the actual use of the Brunei National Occupation Skills Standards (BNOSS) developed by the MISC in the industrial field. Through this, institutional improvement should be pursued so that employers can exercise more influence over the overall TVET policy as well as BNOSS.

In Cambodia, the government tries to provide sufficient support to employers' engagement in terms of legal basis and financial support to draw the intended results are assessed. In addition, in Cambodia, the government provides direct financial support to employers' engagement.

In Indonesia, employers are involved in contributing to labor market information through job fairs online or offline which is conducted every year through cooperation between government, employers, and online job fair application provider. Furthermore, experts from the industry are often sought out and engaged in evaluating and further developing Indonesian Qualification and Standards National Competency through regulations issued by the Ministry of Manpower regarding procedures for compiling competency standards. In particular, as the development of Indonesian National Work Competency Standards is regulated by industry-specific associations, the industry is also involved in qualification and competency standards. However, since there is no legal basis for the participation of industry representatives at the national or industry level so far, it seems that industry participation in Indonesia has not been carried out with an institutional framework.

In Lao PDR, according to the national report, the government has very limited budget to support vertical governance. Also, the engagement of employers to TVTE policy making and implementation is confined to certain number of employers such as multinational companies.

Therefore, in spite of the existence of legal basis for employer's engagement, actual level of engagement of employers could be said as relatively inactive compared to other countries, as shown in Table 3.4 with limited degree of Influence of the employers to TVET.

In Malaysia, the government directly supports employers' engagement with providers with financial support and also incentives, such as income tax deductions for those employers involved in education and training.

In Myanmar, the cases of greatest influence of employers at the regional and sectoral levels are in progress. Due to their socio-political situation, special attention is needed to identify the degree of influence of meeting to TVET and the degree of influence of employers to TVET. Currently, the employers are not in the position participating in leading the organization.

In Philippines, employers at the national level have the power to influence the identification of priority occupations in TVET and the development of Training Regulations (TRs) used for the entire country. Once developed with the assistance of industry experts, the TESDA Board deliberates and approves the promulgation of the priority occupations and the Training Regulations. Especially, industry boards or industry associations usually cover the entire industrial sector. Industry engagement at both national and school levels has been enhanced and thus the government can receive sufficient information on skills. Employers are also involved in curriculum design, assessing, and assuring TVET qualifications through various committees both at institutional level and national level.

In Singapore, there is not much involvement of or interference in employer's engagement from the Government; generally, the fraternity or community determines and manages their own agendas. Generally, Skills Councils set the policies and guidelines for members. In terms of the validating skills framework, professional bodies are associated with multiple stakeholders at the sectoral level. Employers are engaged in the overall process of developing, accrediting, and quality assuring qualifications.

In Thailand, the greatest employers' influence at all levels is identified, which incorporates national, regional, and sectoral level. Thailand tries to make efforts to reinforce employers' engagement in providing labor market information reflecting the specific situation of individual sector or region.

Thailand introduced a levy scheme in 2002, which promotes training efforts by granting a 200% tax deduction to enterprises for investing in skills development. The funds collected by the levy scheme aim to improve the skills standard of Thailand's existing labor force and are compulsory for companies with more than 100 employees. Enterprises that provide staff with occupational training (approved by the Ministry of Labor) are eligible for certain privileges and benefits. Training should be organized on a yearly basis and provided to at least 50% of the company employees. To encourage employers to participate in the apprenticeship system, the Thai government implemented a 100 percent tax exemption for expenditure incurred because of this system.

In Viet Nam, the case of greatest influence of employers at the regional and sectoral levels is piloting the establishment and operation of the *Agricultural Skills Council* in Viet Nam at the proposal of the International Labor Organization (ILO).

4.3. Challenges on Each Country's Situation

i. Challenges by country

In Singapore, the support provided by the government is sufficient to support the intended results. However, the key challenge for employers is the compliance required in order to tap into such support. E.g., to benefit from the PCPs or traineeships, employers need to have structured workplace learning programs. Such programs can be difficult for most employers to set up as they lack pedagogical expertise.[23]

In Philippines, the biggest challenge of TESDA is the lack of employer's participation in enterprise-based training program. Companies see it as a disruption to their operation and also an unnecessary company expense. Advocacy is being done to educate the companies on the advantages of training in-company. TESDA also needs to improve the incentive to attract more companies. Although employers are consulted at every level (national, regional, provincial, and institutional), provision of TVET largely remain supply-driven than demand-driven.

4.4. Required Policies

On the basis of analyzing employers' engagement, it is crucial to engage employers to build national skills strategy. In order to foster sector-based skills bodies, laws and regulations should be equipped and rearranged. Overall, the raison d'etre of skills system should be targeted to the needs of industries.

Based upon what we have learned from various countries, we propose more engagement of employers in some skills system. To align skills system with individual organization's business strategy, the way in which to engage employers at the national, sectoral, and regional level should be identified. The government needs to inform employers how to engage in the meeting and how to make impact in the skills development and utilization. National skills system is a-whole-of a government approach including the ministries, regional and sectoral bodies, and individual organizations as well. Three recommendations are followed;

First, skills policy should be formulated to engage employers at the national, regional, and sectoral level. Various types of forums can be coordinated and articulated for employers to

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23 The Singapore Government, through Workforce Singapore's initiatives, supports employers in these efforts. (i.e., Career Conversion Programme and the Career Trial). More info can be found on WSG's website: https://www.wsg.gov.sg/SGUnited.html; https://www.ssg.gov.sg/sgunitedskills; https://www.wsg.gov.sg/programmes-and-initiatives/career-conversion-programmes-individuals.html

associate in vertical and horizontal ways. Rich and resourceful discussion will be helpful to foster forums.

Second, the individual forum agenda should be clarified so that employers can fully engage in the systemic dialogue. The forum agenda should be open to the needs of business strategy. The results of the forum need to be reflected in skills policy systematically, and thus keeping the record of meeting minutes will be important and make it in public.

Third, ASEAN Member States should seek 'high skill equilibrium' but not low skill equilibrium. High skill equilibrium in skills system can be only possible with high degree of employers' engagement and through the reflection of business needs.

5. Summary of Delphi results on the most promising sectors of job creation

A Delphi survey was conducted on the industries and occupations with the greatest potential for job creation among labor market experts in each country to get some insights into which areas of ASEAN countries should focus on the development of education and training. Detailed results of the survey can be found in Appendix 3 Summary Tables of Most Promising Sector of Job Creation for 10 ASEAN Countries. According to them, it can be seen that the sectors with highest job creation potential are quite different as each country has different economic conditions in the present and in the near future. Nevertheless, at least the following sectors were ranked as those with the highest potential for job creation in many countries (more than 6 out of 10). Therefore, they could be considered as the sectors mostly requiring quantitative expansion and qualitative improvement of education and training for skilled workers for them.

Sectors selected by the large number of countries

Sector	Country
10 - Manufacture of food products	**9 countries:** Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, Viet Nam
85 - Education	**9 countries:** Brunei Darussalam, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Viet Nam
86 - Human health activities	**9 countries:** Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Viet Nam
62 - Computer programming, consultancy and related activities	**8 countries:** Brunei Darussalam, Cambodia, Indonesia, Malaysia, Philippines, Singapore, Thailand, Viet Nam
41 - Construction of buildings	**7 countries:** Brunei Darussalam, Cambodia, Lao PDR, Myanmar, Philippines, Singapore, Thailand
61 - Telecommunications	**7 countries:** Brunei Darussalam, Cambodia, Lao PDR, Malaysia, Philippines, Singapore, Thailand

Sector	Country
26 - Manufacture of computer, electronic and optical products	**6 countries:** Lao PDR, Malaysia, Myanmar, Philippines, Thailand, Viet Nam
64 - Financial service activities, except insurance and pension funding	**6 countries:** Cambodia, Indonesia, Myanmar, Singapore, Thailand, Viet Nam

6. Policy recommendations

Based on the detailed review results so far, it can be confirmed that the current level of development of the labor market information system in ASEAN member countries shows significant differences. While some countries even produce and utilize information on the future labor market based on sophisticated labor force surveys and business surveys, some countries are unable to conduct even basic statistical surveys on a regular basis. To address this situation and to pursue the common development of TVET policies in ASEAN member states in terms of enhanced responsiveness to the changing labor market situation, it is strongly required to actively develop the LMIS in ASEAN MSs, especially starting with the countries with the weakest LMIS. In this development process, ASEAN should play a pivotal role and the required activities at the ASEAN level, along with the activities at national level that are specified in country reports, could be suggested as follows.

6.1. Raising awareness among key policy makers on the complex relationship between the changes in the product market and the changes in the labor market

For the practical improvement of the labor market information system, first of all, key policy makers involved in the labor market policy must understand the importance of the LMIS and the various challenges and tremendous difficulties entailed to make it improved. In particular, it is important to understand that the changes in demand and supply in industry could be reflected in various manners on the changes in demand and supply in education and training. That is, the change in demand and supply proceeds as follows through at least three-stages of derivation: Changed demand for product → Changed demand for labor → Changed demand for competencies → Changed demand for education and training. At each of these stages, various types of disturbances and mutations occur.

Take the automobile industry for example. In these days, the demand for electrical and electronic engineers is on the rise, as well as mechanical engineers, in the automobile industry due to the electrification of automobiles and enhanced self-driving functions. Moreover, even though mechanical engineers maintain the same job title, required knowledge and skills for this occupation have been changing. In the past, mechanical engineers are only required to know about the mechanical functions of machines; but nowadays they are also required to have the knowledge about the complicated implementation of electrical and electronic engineering into

mechanical devices. In addition, additional considerations in terms of education and training policies are that the changes in required competencies do not mean that they must be taught at school. For instance, a mechanical engineer does not necessarily have to obtain the knowledge in electrical and electronic engineering from the school he or she has studied, even if he or she needs an understanding on those issues. Rather, learning by self-studying in the workplace may be enough. In other words, in order to establish education and training policies that respond to the changing labor market, it is necessary to know not only what skills are required in which professions, but also at where those skills should be developed either in school or in the workplace. Moreover, to properly understand these points, it is possible to consider the specific circumstances of each country. It is clear that such understanding is not easy and also, developing LMIS will face very diverse and complex policy challenges. In this regard, ASEAN TVET Council may consider organizing and operating high-level policy dialogues such as ministerial meetings, high level policy forums and policy conferences on this issue to attract the attention of high-level decision-makers in each country as LMIS practitioners in their country usually would find it difficult to persuade high-level decision-makers on the complexity and demanding nature of developing LIMS.

6.2. Regularization and settlement of Labor Force Survey

The next thing ASEAN TVET Council should do is to ensure the regularization and settlement of Labor Force Survey in every member states as the very basis of the labor market information system. In this regard, it should be emphasized that regular Labor Force Surveys should be conducted at least quarterly in countries where labor force surveys are not routinely conducted, or in countries with long survey periodicity, even though they are regularly conducted. Since regular Labor Force Survey shows the overall employment and unemployment situation in the current labor market, it is a very basic guide to the current labor market policy, and furthermore, by accumulating the information on the labor market situation at each time point for a long period, it will become possible to make reliable prediction about the future labor market situation. In fact, there already exists a globally standardized model for Labor Force Survey itself, so it will not be a matter of designing appropriate methodology for Labor Force Survey but a matter of securing sufficient resources for the regular implementation of the survey. As member countries where Labor Force Surveys are not conducted properly at present may face difficulty if securing such resources by themselves, ASEAN Council may devise special (financial and human) support programs to assist these countries.

6.3. Improvement of information basis for the situation of companies

Next, there is a need for supporting the improvement of obtaining information about the situation of companies in ASEAN countries. This is because, for instance, as shown in the current status of the surveys on skills demand and skills supply, surveys on companies do not

seem to be sufficiently developed in many ASEAN Member States. Such development should be pursued in at least three aspects, not limited to the ways of conducting surveys to companies.

First, statistical information, obtained through various channels including traditional statistical surveys and online job postings, about the situation of hiring new employees, in particular information about opened job posts, unfilled job vacancies and the level of skills shortages should be significantly improved by introduction of company surveys for hiring and separation of employees and implementation of analysis on recruitment advertisements. This is because, in order to properly promote the reform of the education and training system, it is necessary to accurately understand the difficulties faced by companies in the recruitment process. This will be even more important when considering the changes in the job seeking behavior of workers after COVID-19.

Second, the information about company-led education and training should be expanded. In particular, it is necessary to know how many companies are providing training, how many employees are trained and in what manner and at what cost as well as the effectiveness and obstacles of company-led training. That could be achieved through the introduction of statistical surveys about companies' training activities benchmarking the Continuing Vocational Training Survey of EUROSTAT, European Union Statistical agency, and the Company Vocational Training Survey of Korea. The findings from those surveys will provide information on how much importance companies are currently attaching to competency development of their workers, as well as suggestions for the direction in which education and training outside the company should develop in the future.

Thirdly, additional attention should be paid to the development of appropriate methodology of collecting information about informal sector businesses. That is, in some ASEAN countries where the proportion of the informal sector is high, if business surveys are limited only on businesses that are officially registered with the government, and business-related statistics are prepared based on the results from those surveys, various statistics on wage earners will not properly reflect the actual labor market situation. Therefore, while general business survey methods could be utilized to determine wages, working hours, and labor costs of formal sector businesses, special survey methods should be devised, such as the annual special survey method of the quarterly labor force survey, to detect the employment situation of informal sector businesses. For instance, once identified as employers during the labor force survey process, additional questions about official registration of the business could be asked. Similarly, once identified as employees, additional questions about enrollment to social insurance could be asked if the enrolment to social insurance is compulsory for formal sector workers. In order to improve the method of collecting information on companies in ASEAN member countries, the ASEAN TVET Council could consider operating special support programs to disseminate the best practices of ASEAN member countries to other member countries, or conduct research and training programs for cases of non-ASEAN member countries.

6.4. Setting up of ASEAN-wide joint projects for the improvement of LMIS

For the actual improvement of LMIS, ASEAN TVET Council should consider setting up several ASEAN wide joint projects on specific issues of LMIS, of course not necessarily covering every ASEAN member states, but sometimes just for certain number of member states, that are sharing common socio-economic challenges and with similar issues of LMIS. This is, on the one hand, to minimize the unnecessary duplication of policy inputs of individual countries and, on the other hand, to supplement each other when devising policy measures by mobilizing collective intelligence of various member states experts. An example of such joint projects would be the current ASEAN SLOM-WG project on Strengthening LMIS in ASEAN Member States for the Philippines, Viet Nam, and Indonesia with the support of ASEC, GIZ/RECOTVET, and ILO. Such efforts should be far more diversified and broadened.

Hence, countries with similar LMIS issues and socio-economic conditions could be able to propose and implement joint projects to improve current situation. To this end, the ASEAN Council could invite the member states to make proposals on joint projects on the improvement of LMIS. Topics of such joint projects may include the various statistical surveys or research studies mentioned above, for instance, joint survey and/or research on the impacts of green and digital transformation to labor intensive industries, joint study about the changing skills requirements for core workforces such as engineers and technicians of some key manufacturing industries and/or service sectors, etc.

6.5. Necessity of ASEAN-wide skills committees

As mentioned earlier, employer engagement plays a key role in concretizing specific skills needs required by employers. However, employers' requests could not be properly reflected if they are just occasionally invited and requested to express their opinions. In this regard, the importance of establishing institutionalized and stable channels of continuous dialogue between employers and education and training institutions should be emphasized. However, there would be some countries where employers are not able to take part in a systematic dialogue with the education and training sector as they are generally too small or not much interested in developing skills.

In that case, it could be suggested to form ASEAN-wide (or only for certain MSs) skills committees by industry or professions so that the good practices of such committees can spread among the participating AMS. For that purpose, the ASEAN TVET Council (ATC), which was just recently set up, could play a role in organizing such ASEAN-wide industry- and occupation-specific skills committees involving representatives from major companies doing business in ASEAN countries and representatives of education and training sectors, in practice public institutions and government officials. Also, the national representatives of ATC can help organizing such Regional Skills Committee by facilitating linkage between national level skills committees and intra-regional skills committees. Such Regional Skills Committee could be

considered as an extension of current Regional Skills Technical Working Group (RSTWG) Meeting in a sense that the topics of Regional Skills Councils could cover various issues such as identification of future skills needs, reform of education and training curricular, upgrading of TVET teachers/trainers' competences with most advanced technical expertise, beyond the topic of the implementation of Mutual Recognition of Skills (MRS) of ASEAN Member States (AMS) which is the current focus of RSTWG.

6.6. Reinforcing ASEAN standards on skills as a basis for cooperation on ASEAN-wide skills issues

In order for the labor market information identified through LMIS to be practically reflected in education and training, the Skills Framework must be well established and utilized. In this regard, establishing ASEAN-wide skills standards is important as a basis for strengthened cooperation on ASEAN-wide skills issues. Particularly, the ASEAN Qualification Reference Framework (AQRF) can serve this purpose. The AQRF, which is currently in the process of establishment among the AMS is expected to play an important role to promote cooperation on skills development issues among the AMS. The shared skills standards can help AMS easily adopt and utilize TVET practices that are proven to be effective in other AMS. Furthermore, the skill standards will help promote cooperation in TVET among the AMS so that the AMS can achieve more competitive labor force. The starting point in this regards would be the scale up of current projects and strengthening of the role of the AQRF Committee (AQRFC) which was established in 2017 for the coordination of referencing process of participating AMS.

Chapter IV. Analytical Framework III: TVET Responsiveness to the Labor Market in ASEAN States: Summary and Comparison

1. Introduction

This AF III chapter analyzes how each ASEAN member state operates TVET curriculum to resolve issues related to the demand and supply of human resources within the labor market. Job mismatch due to the rapid industrial and labor market changes is a problem faced by many countries undergoing rapid economic growth like the ASEAN member states. Through the effective designs and operation of TVET programs, each country can resolve the job mismatch and smoothly achieve the goal of mid- to long-term industrial development, thereby contributing to raising the economic status of the ASEAN member states overall.

This chapter is comprised of six parts, each of which selects and describes the most typical programs of each country in two industries. These cover 1) identification of manpower demand in each industry, 2) TVET curriculum design, 3) TVET curriculum implementation, 4) TVET curriculum evaluation, 5) apprenticeships, traineeships, and work-based learning programs, and 6) policy implications.

As previously mentioned, this chapter is comprised of multiple subtopics, and there is a critical requisite that penetrates all of them: industry engagement in TVET. One of the major trends in TVET is to develop manpower that consumers actually want by inducing active industry engagement in the process of design, implementation, and evaluation of TVET. Here, consumers refer to those who demand "skills," which are primarily represented by industry and business. Of course, "individuals" trying to develop skills are also fundamentally consumers, since it is becoming important for individuals to actively develop lifelong vocational competencies to enhance their employability. However, according to the scope of research, this chapter focuses on industry and business as those demanding skills. Within this framework of TVET governance, each country must consider how to develop the subfactors of TVET operation.

To draw implications in regards to responsiveness of TVET programme, we had asked NRPs and RCs of one TVET programme each from two industries in each nation. Each programme has some specific characteristics, and we have addressed what traits each nation's programme has, and in recommendation part we have also suggested what could be improved in the future.

Before looking into details, suggested below is a brief summary table of selected programmes from each nation (Table 4.1). The table shows what programmes have been proposed from each nation, and it also addresses how discrete the two programmes are (evaluated from the contents as it stands in the report), since, as a matter of fact, generally it is more advisable to have distinctive programmes in terms of their designing, implementing, delivering and

assessment given that two programmes are from different industries. However, it is far from saying that it is inappropriate to have more similarities between the management of two programs, given that the industries selected might not be distinctive from each other in the first place. We also identified some main strength after evaluating from each country's report in regards to how responsive the TVET programs are, looking into overall TVET governance and running of the programs (including designing, implementing, delivering and assessment of the programs).

Table 4.1 Summary table of selected fields of programmes (industry sector) from each AMS

Countries	Programme1	Programme2	Distinction between the two programmes[24]	Major strengths
Brunei Darussalam	Building Construction	Hospitality and Tourism	Not known	• To provide information on occupations and occupational skill requirements that can be reflected in the curriculum, the Manpower Industry Steering Committee (MISC) was formed in 2019.
Cambodia	Garment manufacturing	Tourism	Not known	• Establishment and operation of the SSCs (Sector Skills Councils) • Launch of National E-Learning Platform
Indonesia	Food and beverage	Textile	Not known	• Student-Centered Learning (SCL) paradigm is applied where teachers act more as facilitators • Various VET institutions have implemented a blended learning model
Lao PDR	Automotive mechanic	Electrical installation	Almost similar	• TVET is shifting from the traditional training to the competency-based training(CBT). • Design and development of the curriculum is done based on several technical workshops to define and analyse the tasks and interpret them in terms of modules.
Malaysia	Electrical & Electronic	Chemicals	Not known	• Industry experts are involved in TVET curriculum development to ensure future TVET workforce quality is in line with current needs of industry • Work-based learning has been identified as a means of responding to the needs of employers, particularly in SMEs.

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24 As it stands in the report.

Countries	Programme1	Programme2	Distinction between the two programmes[24]	Major strengths
Myanmar	Manufacturing	Hospitality and Tourism	Distinguished to some extent	• Government Technical Institutes (GTIs) are in collaboration with companies based in the nearby industrial zones, which has become essential because of the rapid economic development in the region.
Philippines	Construction	Tourism	Not known	• TESDA(Technical Education and Skills Development Authority) focuses on enhancement of the blended learning programmes, expansion of partnerships, establishment of innovation training centres and special provisions of livelihood support and assistance to the communities. • Both sectors(construction and tourism) guarantees a proactive exercise by industry partners in TVET governance
Singapore	Computer and Information Services	Electrical and electronics	Not known	• SkillsFforwork provides up-to-date information on employment, career pathways, occupations, job roles, skills and competencies, relevant training programmes • Design and development of training modules are carried out by certified developers.
Thailand	F&B Services Tourism& Hospitality	Automotive mechanic	Distinguished to some extent	• Industries representatives or specialists in the field advise for the selection and installation of equipment and practice materials
Viet Nam	Tourism& Hospitality	Food crops processing	Almost similar	• Strong regulation from MOLISA to guarantee the quality of programme • Business representatives and experts from the field are involved at the school level with diverse activities

2. Overall Evaluation, Strengths, and Standing Issues of Each System

2.1. TVET Curriculum Development: Process

2.1.1. Overview of Diagnosis in the TVET System of ASEAN Member States

Technological changes accelerated by the 4th industrial revolution, the rapid changes in the industrial and occupational structure due to economic growth, and COVID-19 are all demanding innovation in the TVET system. In particular, besides quantitative and qualitative changes in jobs, there is a demand for innovation from "job" to "work" and from "knowledge" to "competency & performance", along with a growing need for a "TVET system that supports anyone to participate in any kind of learning they want throughout their lives." In other words, the environments that are likely to affect TVET are changing to a greater extent.

The changes in the external environment, such as COVID-19, and the fourth industrial revolution result in the following limitations. TVET learners, who are isolated from school (or learning space) where work-life-study alignment exists, are cut off from active learning as the subject, and is now faced with limited study options that are only focusing on efficiency without reflecting individual characteristics. Under these constraints ASEAN member states are seeking to transform into a competency-based TVET system that is based on the ASEAN Qualification Reference Framework (AQRF) and National Qualification Framework (NQF) for alignment among ASEAN member states.

The strengths of the current TVET system in the ASEAN member states can be seen as follows.

First, each of them has a competency-based TVET system with its own established NQF and national competency standards (NCS) developed in top-priority industries. Nonetheless, some ASEAN member states are yet to have a fully established TVET program development and operation system based on the NQF, or their partnerships with industry are not operating properly.

Second, when focused on the priority sectors of each AMS, ASEAN member states have made an accomplishment by seeking close industry-academia collaboration among companies, Industry Sector Committees (ISCs), and TVET institutions. However, some member states are operating industry councils that have only limited functions such as advisory functions rather than having an established and extensive function as Industry Skills Councils (ISC). Moreover, most ASEAN member states have field practice at firms as part of their regular TVET curriculum, thereby providing institutional grounds and infrastructure to improve the job competencies of students. Also, many were found to be striving to guarantee students' right to learning during field placement.

Third, based on the NQF of individual nations, ASEAN member states have established a linked system between educational qualifications and vocational qualifications, thereby creating an institutional infrastructure necessary for linking work and study, education and training, and study and qualification. Most ASEAN member states were aligning the secondary

education level with Levels 1-4 of the NQF and the higher education level with Levels 5-8. However, it is necessary to constantly examine the equivalence between educational qualifications in the secondary and higher education levels and vocational qualifications in the NQF, as well as to make various efforts to ensure equivalence among qualifications.

Fourth, ASEAN member states are improving the effectiveness and efficiency of their policies by developing and operating TVET curriculums with a focus on industries that have strengths, rather than developing and applying NCS or vocational qualifications for all industries. In most of the AMS, the governmental research institutes or steering committees, ISCs, representatives from academia, employer representatives and labor union representatives, and school representatives were collaborating together for the development of vocational qualifications and TVET curriculums. Nevertheless, constant policy efforts need be made to secure the representation of industry experts and establish an infrastructure to induce active participation of industry.

Meanwhile, there are also several obstacles observed in implementing competency-based TVET programs in the AMS. They are as follows.

First, by developing and applying NQF and NCS focused on a few industries, they have difficulties in nurturing and utilizing talented human resources across various industries presented in the economic and industrial development plans of individual states.

Second, there are limitations in systematically connecting vocational education institutions managed by the Ministry of Education, since NCS is developed around the Ministry of Employment and Labor, and curriculums and qualification courses are set up and operated in vocational training institutions.

Third, despite the institutional infrastructure to form close industry-academia collaboration between TVET institutions and companies (or ISCs), there are insufficient mid- to long-term operational plans as well as plans for administrative and financial assistance to support the improved industry-academia collaboration activities.

Fourth, some ASEAN member states were using an increasing number of foreign manpower due to insufficient domestic skilled manpower. Some also lacked TVET programs or policy support in the public sector to train skilled manpower in the relevant industry sector. TVET programs were operating in the private sector even if there were none in the public sector, but private TVET institutions had limitations in operating programs for key national industries while seeking profits at the same time.

Fifth, most ASEAN member states were aware of the importance of supporting lifelong career development for workers, but not many of them were emphasizing the system for that at the national level. Nonetheless, Singapore's re-training and re-skill programs for mid-level workers are a good case of support for the lifelong career development of workers.

Sixth, due to the negative perception of TVET, the education system was focused on general education among citizens and policy makers, and the lack of policy interest in TVET led to the

difficulty in securing the budget and establishing cooperative relations with various participants. Most ASEAN member states were establishing TVET development plans, but they were emphasizing higher education more than TVET programs.

2.1.2. Key issues of TVET in the representative industry sectors in each AMS

Two industry sectors that are identified as the priority sectors or most representative sectors for each AMS are as follows.

Table 4.2 Representative Industry Sectors of 10 AMS identified in AF III data collection

Countries	Industry sector 1	Industry sector 2
Brunei Darussalam	Building Construction	Hospitality and Tourism
Cambodia	Garment Manufacturing	Tourism Sector
Indonesia	Food and Beverage	Textile and apparel
Lao PDR	Automotive Mechanic Diploma	Electrical Installation Higher Diploma
Malaysia	Electrical & Electronic (E&E)	Chemical
Myanmar	Manufacturing Sector	Hospitality and Tourism Sector
Philippines	Construction Industry	Tourism Industry
Singapore	Computer and Information Services (Information and Communication)	Electrical and Electronics (Manufacturing)
Thailand	Food & Beverage Services and Tourism & Hospitality Technical Diploma	Automotive Mechanic & Automotive Parts Mechanic Vocational Certificate
Viet Nam	Tourism and Hospitality Management Diploma of Vocational College	Food Crops Processing Diploma of Vocational College

In terms of the representative industry sector, hospitality and tourism marked the highest rank, selected by seven member states. The automotive sector, the electrical and electronic sector, and the food processing sector were each selected by three AMS, the textile and apparel sector and building construction sector each by two AMS, and the chemical, computer, and manufacturing sector each by 1 AMS, as the most representative or the priority sector of the AMS.

We have collected information on how each AMS is approaching in order to solve the problem of mismatches in the selected representative sectors. While each country has different socio-economic settings and different industry environment, it would be insightful to analyze the reason for labor market mismatch in those sectors and to draw implications therefrom.

First, Brunei Darussalam pointed out the quantitative and qualitative shortage of skilled domestic workers due to a lack of interest in the building construction sector among domestic students and emphasized that the labor market in the hospitality and tourism sector was also facing great changes and challenges due to COVID-19. Thus, Brunei Darussalam must discover and promote successful career development cases of workers in the building construction sector and establish a lifelong career development support system for workers in this sector while also planning to nurture high-skilled workers.

Cambodia is facing difficulties in the garment and tourism sectors due to low-skilled workers and labor-intensive activities and is especially concerned about the downswing of these sectors due to COVID-19. In particular, business automation owing to the fourth industrial revolution is increasing the need to develop and operate systematic TVET programs to not only improve the skills of existing workers but also train potential workers for high-skilled technical manpower. Therefore, it is necessary to develop systematic job improvement programs for existing workers in these two sectors, establish ways for learners to actively participate, and develop and operate TVET programs for high job performance.

Indonesia has a high ratio of workers in the food sector (27%) and textile sector (5.8%), and the latter is constantly increasing. There are no separate statistics related to students participating in TVET in the food sector, but the number of total students in vocational colleges is increasing, and the government is also providing active support. However, there are challenges such as lack of lab space and the need to modernize obsolete educational materials and equipment. It is also necessary to secure expertise by promoting the field experience of TVET teachers and inducing corporate participation in industry-academia collaboration activities such as field placement.

Lao PDR has established development plans for seven industry sectors under the TVET development plan, such as construction, agriculture, machinery repair, hospitality, electricity, furniture, and automobiles. The student participation rate is low in construction, thus foreign workers are employed in that sector. The plans to resolve this TVET Divide will be covered again later.

Malaysia selected the electrical and electronics sector and the chemical sector as the sectors with a quantitative and qualitative mismatch in the labor market, which is caused by the rigidity in curriculum revision, difficulty in securing the budget to modernize educational facilities and obsolete equipment, and insufficient corporate participation for industry-academia collaborations. In particular, Malaysia emphasized the intensifying mismatch in the chemical sector from the perspective of research and development (R&D) personnel.

Myanmar pointed out quantitative and qualitative mismatch in the food processing sector and hospitality and tourism sector, which account for 63.5% of micro, small, and medium enterprises (MSMEs), as the challenge. Computer ICT skills, specialized skills, and creativity were set as critical competencies for skilled workers and are reflected in the curriculums. Some of the excellent programs include the industrial engineering course at the Government Technical Institute and the Hospitality Professional Course at the Center of Vocational Training (CVT).

The Philippines shows a quantitative and qualitative mismatch in the construction sector and tourism sector. The key issues of the construction sector are AR/VR, clones, construction, wearable IT, drones, robots, 3D printing, and smart construction. In particular, the Philippines diagnosed the difference between competencies necessary in specialized skills, health and

safety, and soft skills (core competencies) in the tourism sector, and based on them, reflected the core competencies in the curriculums.

Singapore pointed out quantitative and qualitative mismatch in the computer information service sector and the electrical and electronics sector and focused on the "re-training or re-skill programs for the lifelong career development of mid-level workers" rather than degree/non-degree programs for manpower training.

Thailand pointed out (1) food & beverage services and tourism & hospitality technical diploma, and (2) automotive mechanic & automotive parts mechanic vocational certificate. The TVET programs were emphasized the practice subjects in order to enhance the learner's competencies based on the real workforce experience.

Viet Nam pointed out (1) tourism and hospitality management diploma of vocational college, and (2) food crops processing diploma of vocational college. They developed the TVET curriculum based on the strong regulation from MOLISA in order to guarantee the quality of programme, and they want that many business representatives and experts from the field would be involved at the school level with diverse activities.

From the analysis, we have witnessed that although, in the same sector each country encounters different issues of mismatch, depending on the skill type and skill level of the manpower the country is targeting to train.

2.1.3. TVET Curriculum Development: Products and Implementations

ASEAN member states are developing skills standards, qualifications, and TVET curriculums based on job analysis techniques or their own development models, which are as follows.

Table 4.3 TVET curriculum development methods of AMS and participating institutions

Countries	Development methods/stages	Major features
Brunei Darussalam	• Initial: DACUM process • BNOSS development model (six steps)	• On-the-job field placement: 3-6 months • Theory: Practice = 30: 70 • Best practice: EICF model of IBTE • Quality control: PDEC (serves as committee) • Secondary education (Level 1-4), higher education (Level 5-8)
Cambodia	• CBT program (two steps)	• Developed in collaboration with ADB in 2011 • Developed GMAC apparel/textile sector program in alignment with foreign cases (2016) • CGTI in the private sector (operation) • Developed and operated curriculums reflecting 32 skill standards in six domains of the tourism sector • Established and operated SSC in four main sectors (construction, electrical, automotive, manufacturing) (2018) • No SSC in apparel/tourism • Secondary education (Level 1-4), higher education (Level 5-8): Apparel (3-5), tourism (1-8)

Countries	Development methods/stages	Major features
Indonesia	• Has systemized curriculum development procedures based on SWOT analysis and tracer study	• General curriculum: Specialized curriculum = 40:60 • Cooperative relations through specialized councils (construction, electrical, machinery, construction) that are not ISS • SKKNI is M. of Manpower
Lao PDR	• Developed curriculums using the DACUM process	• Curriculums are developed with 40% vocational education institutions, 30% academia, 20% users and labor unions, and 10% national researchers • General curriculum: Basic subjects of major: Specialized curriculum=7-10:33-33:57-63, thereby suitable for training skilled human resources
Malaysia	• Developed four-step (Plan, Develop, Implement, Evaluate) procedures	• Electrical and electronic sector (26%) and chemical sector (26.3%) • TVET is operated based on COPAPA standards acknowledged by MQA • Qualification-based TVET curriculums are required modules, key modules, and field placement (4-6 months)
Myanmar	• Developed NOCS	• NOCS is developed by NSSA·○ NSQF is set at Levels 1-4 • Metal and Engineering Sector (36%), Hotel and Tourism Sector (19%), Construction Sector (14%), Manufacturing Sector (14%), Agriculture Sector (5%), Electrical Sector (2.5%), Commercial and Business Service Sector (2.5%)
Philippines	• Developed according to the 10-step development procedures	• TESDA Board certifies NTESDP (standard) and announces on newspapers and official gazettes • Qualifications and curriculums are developed and operated according to the six domains presented in the ASEAN standards in the tourism sector • PCA and TESDA in the construction sector train chief construction officers and field managers through the 'Build, Build, Build Program' • Alignment with PQF is carried out in the process of (1) organizing a functional map, (2) developing based on TR, and (3) arranging Phil. QF and developing qualifications
Singapore	• four-step development procedures (Plan, Do, Check, Act)	• ATO is certified by SSG • ATO provides WSQ and N-WSQ
Thailand	• six-step development procedures	• Theory: Practice in the food and tourism sector = 40:60 (total 80-90 credits) • Theory: Practice in the automotive sector = 20:80 (total 100-110 credits)
Viet Nam	• Preparation-Development-Approval steps	• General subjects: Vocational Modules = 20:80 (total 2190 hrs) in Tourism and Hospitality management Diploma • General subjects: Vocational Modules : Elective Modules = 14:64:22 (total 3200 hrs) in Food crops processing management Diploma

The first issue is how to develop and operate NCS-based curriculums. The figure 4.1 below shows the process the skill standards are developed in linkage to the Korean Qualification Framework (KQF) in most industries in South Korea since 2000.
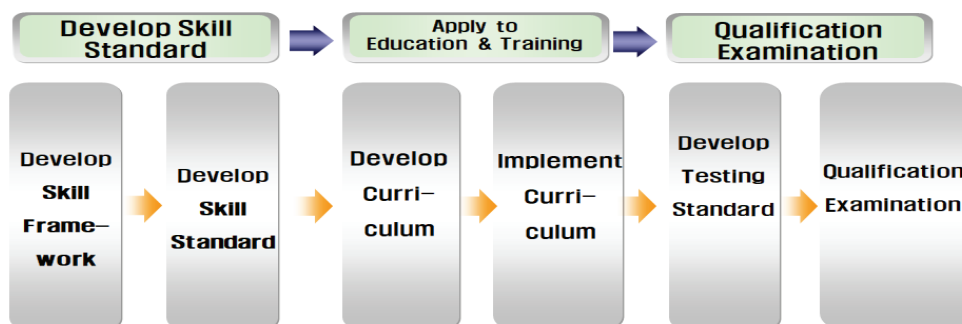
Figure 4.1 Diagram of NCS-based TVET curriculum development and utilization procedures

The second issue is related to how to cope with the TVET Divide. TVET Divide refers to a "phenomenon in which there are no opportunities for everyone hoping for lifelong vocational education to institutionally complete vocational education." More specifically, it is a situation where middle school students and parents avoid choosing or participating in secondary vocational education due to the society's occupational biases, where there are insufficient opportunities for SME workers and owner-operators to participate in upgrade training, and where TVET for those who want to change jobs or vocational education for the middle-aged and elderly is not institutionally guaranteed (KRIVET, 2019).

Does the TVET Divide also occur in individual ASEAN member states? It seems they have a situation similar to South Korea.

There is the issue of whether all students or adolescents desiring secondary vocational education are receiving the vocational education they want. In South Korea, there are situations where middle school students are avoiding or hesitating to choose secondary vocational education due to the social prejudice against vocational education. Some students who choose specialized high schools end up taking majors or departments they do not want, and students who want to change their career paths in school or dropouts from school cannot complete vocational education focused on qualifications (jobs).

To resolve this issue, a plan needs to be established to flexibly operate the academic system of vocational high schools. There are some examples that can be introduced as successful vocational education policies in South Korea. They are Meister Schools and Industry-Academic Integral Apprentice Schools. The policy to develop Meister schools based on the need to enhance the competitiveness of secondary vocational education and develop leading models has been constantly expanding its scope, starting with 21 schools opened in 2010. As of 2021, 54 schools have been selected with a focus on national and regional strategic industries such as machinery and metal and electrical and electronics, 52 of which are currently in operation and two are preparing to open after 2022. Since producing the first graduates in 2013, these schools had been consistently showing high employment rates of 80-90% until 2019.

Recently, new Meister schools have been designated in industries generating new manpower demand such as software, games, fire prevention, and smart factories, thus showing new potential for secondary vocational education.

The second case involves Industry-Academic Integral Apprentice Schools, which had begun recruitment in September 2014 and now involve 70 project groups and boards, 184 programs, and 152 schools nationwide, as of 2020. More specifically, the project groups are categorized into single schools (19.0%), base schools (67.4%), joint training centers (9.2%), and industry-led types (4.3%), and the apprenticeship education period was one year (6.5%), 1.5 years (41.8%), and two years (51.7%). Most schools were based on machinery (69 schools), followed by electrical/electronics (58), business/accounting/office work (16), information and communications (12), and food service (8). The Industry-Academic Integral Apprentice School policy is producing excellent results, such as high employment rates of participating students as well as high satisfaction among students and companies. Despite the excellent performance, various issues are raised due to the recent COVID-19 pandemic and the changes in the industrial and occupational structures.

Among the AMS, there are various governmental departments involved in vocational education policies, but the issue is the insufficient policy integration among those departments or between the central and local governments.

Therefore, it is necessary to establish collaborative governance in which central and local governments, NGOs, and formal and informal learning institutions implement policies in collaboration, despite the emphasis on the roles of local governments. In particular, there are limitations in seeking collaborative governance with just a few departments and local governments, such as the Ministry of Education and the Ministry of Employment and Labor. Thus, it is important to establish and operate a national-level organizational system for participants to collaborate and form a consensus.

Additionally, there must be a social consensus on the NQF as a mutual recognition system for work-study-qualification along with an application plan. The NQF, which is the standard for mutual recognition of work-study-qualification, supports individuals to manage their careers and develop competencies throughout their lives in various ways, such as work-study balance, lifelong learning, vocational training, and hands-on experience. It also contributes greatly to managing the quality of TVET by focusing on competency and performance. Furthermore, it can promote manpower mobility based on various career experiences after entering the labor market, and even encourage domestic human resources to get jobs overseas in alignment with the NQF in other countries. With these positive policy effects, efforts need to be made to form a social consensus among the stakeholders, such as the government, businesses, labor unions, and schools. Therefore, there must be a social consensus over the NQF to build an ecosystem of work-study-qualification-life alignment and preparation for the future.

2.2. Teachers and Trainers, Infrastructure for VET Provision

Development of Teaching and Learning Materials

Teaching and learning materials are developed to achieve the learning outcomes anticipated in the process of education and training. They must reflect the contents and conditions of capabilities demanded by society and provide information that teachers and trainees can refer to in actually developing those capabilities. Materials serve as an important mediator for delivering the contents of teaching and learning for VET.

For successful teaching and learning, it is necessary to plan methods that inspire and motivate trainees to show interest in learning and choose the most efficient way to meet their levels. Moreover, teaching and learning must be provided by exploring the individual characteristics of trainees and identifying their different levels of achievement and possibilities.

In ASEAN member states, teaching and learning materials are mostly not developed according to specific or precise procedures, and their quality is also not properly managed due to a lack of monitoring. Moreover, these materials are not developed based on competency-based curriculums. Some countries are developing the materials according to the development process. Viet Nam is regularly reviewing and updating the teaching and learning materials at VET institutions to deliver VET curriculums. In addition, since industry engagement is important in developing such materials, teachers are developing these materials in collaboration with industry experts.

There are limitations in direct engagement in VET due to social or economic issues from the COVID-19 pandemic or personal reasons. In particular, social distancing applied to practical training courses makes it even more difficult. To overcome these limitations, many ASEAN member states are developing and providing various online teaching and learning methods for VET students. For instance, to deal with the COVID-19 pandemic, TESDA in the Philippines is providing online learning using computers or mobile devices with internet access, blended learning that combined face-to-face learning and e-learning, and distance learning where students can study outside the institutions. The MLVT's TVET office in Cambodia has been seeking opportunities in distance learning for teachers and trainees of TVET institutions via Zoom, Google Meet, and Google Classroom.

Specialized high schools in South Korea are allowing the selection and use of NCS learning modules, which are materials to use the NCS unit of competency in VET, as authorized books without a separate application process. NCS learning modules have a system that can faithfully reflect various sub-factors organized for each NCS unit of competency. In particular, the elements and performance criteria for each unit of competency mostly apply the contents described in NCS to form the system of the learning modules.

The South Korean Ministry of Education has applied distance learning due to COVID-19 in 2020 and established the "Framework Act on Promotion of Digital-based Distance Education (Distance Education Act)."[25]

Industry-Academic Integral Apprentice Schools have also replaced face-to-face education with distance learning, accrediting non-face-to-face training in off-the-job education and training and increasing flexibility.

The Smart Training Education Platform (STEP) operated by KOREATECH Online Lifelong Education Institute is providing VET content that meets the demands of industrial settings. With the growing demand for non-face-to-face VET due to the prolonged COVID-19 pandemic, more and more people are studying online using the online lecture rooms of STEP.

Since VET is vulnerable to poor on-site conditions and focused on experiments and practical training, the Ministry of Education must provide teaching and learning materials for learners to acquire knowledge and skills necessary for the successful performance of tasks. In addition, education and training institutions must be given the autonomy to select the materials provided by the Ministry of Education according to the demands of trainees. To nurture talent with basic knowledge and practical skills, the Ministry of Education must request education and training institutions and teachers to review materials in the process of developing and managing the materials and collect feedback for improvement to ensure their quality.

In the era of the Fourth Industrial Revolution and knowledge information, there must be digital-based teaching and learning materials that are customized for the changing technologies, knowledge, and interests of trainees. These materials can help trainees with self-directed learning.

With the recent development of the digital textbook platform, teachers who intend to use digital textbooks must design adequate customized teaching and learning activities after identifying the self-regulated learning skills of trainees for digital textbooks. Online-based teaching and learning content must be provided for VET teaching and learning that meet the demands of industrial settings without the time and space constraints of VET.

It is necessary to develop a teaching and learning model for two-way education and training beyond the one-way system in which the teacher merely delivers information or knowledge.

To develop trainees' self-directed learning skills, education and training institutions must innovate the teaching and learning methods. Various measures must be established to guarantee the rights of VET students to participate in practical training in the COVID-19 pandemic.

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25 Basic Act to Vitalize Digital-Based Distance Education (Law No. 18459, September, 24, 2021) https://www.law.go. kr/lsSc.do?section=&menuId=1&subMenuId=15&tabMenuId=81&eventGubun=060101&query=%EB%94%94% EC%A7%80%ED%84%B8%EA%B8%B0%EB%B0%98%EC%9D%98%EC%9B%90%EA%B2%A9%EA%B5 %90%EC%9C%A1%ED%99%9C%EC%84%B1%ED%99%94%EA%B8%B0%EB%B3%B8%EB%B2%95#und efined

2.3. Infrastructure for VET Provision

Supply of facilities, equipment, and materials to provide quality VET

VET requires facilities, equipment, and materials. These must be determined according to the relevant education and training program so that they meet the contents of education and training as well as the needs of industrial settings.

Most ASEAN member states need to update VET facilities, equipment, and materials.

There is not enough to cover all the trainees, depriving them of the chance to use adequate facilities, equipment, and materials for experiments and practical training. In particular, VET institutions are failing to keep pace with the rapid technological development in new industries, thereby not meeting the minimum requirements for VET programs.

Due to a lack of ability to own advanced equipment, construction companies in the Philippines were forming partnerships with large construction companies.

To substantialize VET, it is necessary to establish the latest facilities, equipment, and materials. These can be shared depending on the circumstances of VET institutions. This raises the need to operate a joint training center for education focused on practical training so that the aforementioned can be shared. Moreover, there must be a budget for VET institutions to secure the latest facilities, equipment, and materials for talent development.

2.4. Certifying VET Students

TVET Teachers and Trainers

Education is generally comprised of students, teachers, and educational content. Teachers are the ones leading the interactions among these components. People often say that "the quality of education cannot surpass the quality of teachers," which implies how important teachers are in education.

In general, teachers' expertise is determined by their qualifications, training, selection, and competency development. To guarantee the quality of education and training, teachers must have the expertise and specialized competencies in their jobs.

Most ASEAN member states have difficulties securing teachers with adequate qualifications. As the number of VET institutions constantly increases, not enough teachers are secured compared to the growing number of trainees, which brings difficulties to VET. This is especially true for teachers for practical training, which is a major part of VET. Some countries are also showing an increase in teachers along with trainees, but there are still many issues in terms of quality. Practical skills are important since VET courses are operated mostly around industrial settings, but there are not enough teachers with such practical skills. There are also insufficient institutions to train VET teachers with practical skills in industrial settings, as well as inadequate systems and standards for training VET teachers.

Furthermore, the quality of VET courses for teachers is not managed, and there are not enough programs for competency development and support of teachers.

It is necessary to set the requirements for teachers so that they are employed based on job competencies and select those with practical competencies to train talent that can do their job immediately in industrial settings. Moreover, there must be a training system for competent teachers to improve the quality of VET.

Teachers must be able to develop their expertise in the field throughout their entire life and provide education in their specialties based on industry demands. To this end, they must build systematic and continuous cooperative relations with the industry.

Recently, teachers have faced difficulties in creating content for distance learning that has been implemented due to the COVID-19 pandemic. To overcome these difficulties, various training programs must be provided for teachers to use the distance learning platform and perform tasks from the perspective of learners.

For quality management and competency development of teachers, there must be an evaluation system for the teaching and learning process as well as a support system for teachers to participate in areas they need and constantly develop their competencies. Furthermore, it is necessary to provide more incentives for teachers who improved their competencies to further encourage them.

2.5. Apprenticeship and Traineeship

Apprenticeships, traineeships, and work-based training programs

Although there are industry-academia collaborations in the operation of TVET curriculums in most ASEAN member states, they are still not enough, and there is also an insufficient process of listening to the opinions of industry and stakeholders. In countries operating apprenticeship programs, learners are learning the theoretical knowledge about certain occupations and general education at VET institutions and practicing what they learned at companies.

In Myanmar, apprenticeship programs are nationally accredited for trainees, through which they can earn money and receive education at the same time.

Graduates that participated in apprenticeship programs are hired by the company where they received training, and companies that provided apprenticeship programs are given the benefit of income tax reduction or exemption.

Since VET is operated mostly in industrial settings, it is necessary to build a system for industry-academia collaboration between industry experts and TVET curriculum developers. Moreover, specific plans and methods must be established, along with programs to collaborate with companies to achieve the goals in education and training. Furthermore, there is a need for work-based education and training programs to nurture talented individuals demanded by the industrial settings. In particular, support measures must be provided for systematic industry-academia collaboration as well as active engagement of industry experts.

3. Major Implications

Most of the policy recommendations are already suggested above, and instead of reiterating the implication and recommendation derived from analysis of subfactors of TVET, this chapter intends to echo the importance of forming robust governance for training programmes by industry, which is the ultimate approach for TVET programmes to ensure the responsiveness to the labor market.

Governance is often defined as a governing system with common aim amongst stakeholders and close-knit participation amongst stakeholders with transparent decision making process. Applying this to the arena of TVET system, we need the 'governance' in every procedure to guarantee the responsiveness to the labor market, such as identifying training needs, developing, implementing and assessing training programmes. In the past, or even now for many countries, training in general is centered on training providers rather than consumers, central governments and providers being the leaders in training programmes market. However, as TVET policies become decentralized to keep pace with diversified industries and regionalization, it is natural to have decentralized TVET governance to correspond to this currency.

Nonetheless, just having decentralized TVET governance is insufficient, given that qualification system from national level is also significant with regard to coherent skill acknowledging system. Without robust qualification system, the TVET governance might be as good as a loose network that maintains a perfunctory relationship amongst the stakeholders, because there might be few criteria to conform to when making significant decision in TVET policy or implementation.

Therefore, it is important that a nation implements both coherent national qualification system as a necessary condition, and decentralized training governance system in regards to region and industry level. Most countries that we looked into have coherent NQF system, though a few countries are in the process of development. Many countries have some platform for TVET governance to respond to labor market regarding TVET programmes, but in many cases the involvement of industries is limited to some extent. Industry sector (or regional authorities) representatives in the governance should be engaged in the entire process of TVET, with more proactive and voluntary exercise by industries. To address this in a more radical manner, in more developed form of TVET governance, the role of the central government might as well be weakened, with more empowerment on the industries or local government themselves.

Chapter V. Analytical Framework IV: Identifying and Sharing Best Practices of TVET in the AMS

1. Introduction

This AF4 section analyses what best practices each nation has regarding TVET by closely looking into exemplary TVET programmes that can possibly be adopted in other ASEAN member states as well. Three cases from each nation have been elaborated, addressing what characteristics such as management, curricula, delivery methods etc. each case has in detail.

This chapter is comprised of four parts; 1) introduction, 2) summary of cases by nations, 3) implication from each country's cases, and 4) conclusion and recommendations. Descriptions of each case in detail can be found in each country's report.

The cases of best practices of TVET programs in AF IV of the project are selected by and large based upon the following eight criteria; Mission, Management, Finances, Curricula, Instructional Delivery, Instructional Personnel, Evaluation and Admission and Student Services.(cf. Table 5.1) Table below also show sub categories for each criteria with explanations on the major contents.

Table 5.1 Selection Criteria of Best Practices of TVET Programs in AF IV

Criteria	Sub-categories	Major Contents
1. Mission	• Mission • Objectives • Planning	General status, vision, and strategy of TVET institution and its program
2. Management	• Governance • Operation Management • Personnel Management • Record Management	Management plan of TVET institution and program
3. Finances	• Stability • Financial Support and Scholarship	Financial source, tuition fee and scholarship program
4. Curricula	• Purpose and Objectives of Education/Training • Program/Course Materials • Performance Evaluation • Review and Revision of Curriculum • Certifications and Licenses	Reflexivity of results of industrial demand research to program
5. Instructional Delivery	• Methods of Education/Training • Externship/Internship • Equipment • Materials • Tools and Facilities for learning	Objective and target of education, instructional delivery methods by degree of difficulty
6. Instructional Personnel	• Qualifications • Supervision • Orientation and Training	Management plan of teachers and instructors and students (enrolled and graduates)

Criteria	Sub-categories	Major Contents
7. Evaluation	• Academic Achievement • Attendance (Rate of Completion) • Student Satisfaction • Employer/Sponsor Satisfaction • School completion and Employment	Rate of acceptance of results of participant satisfaction survey, academic achievement evaluation, and evaluation results and qualification(certification) in industry
8. Admission and Student Services	• Enrolment • Admission • Exchange of Credit • Student Services	Admission evaluation system, pre-survey and pre-test for admission

Source: ACCET(1974). Document 2 - Standards for Accreditation (e in November 2010). pp.1~7.

We expect that this chapter provide the readers with more tangible insights by investigating actual best practices of TVET programme in each ASEAN member states. We have studied in previous parts about National TVET system, labor market information system and labor demand, responsiveness of TVET curriculum to the labor market in ASEAN countries. Those chapters contributed to a theoretical understanding of general characteristics of ASEAN TVET system and programme for the readers, whilst this chapter aims at identifying and sharing exemplary TVET case in more practical manner.

2. Major Characteristics of Best Practices among the AMS

In table 5.2 below, major characteristics of the best practices of TVET programs are presented as follows;

Table 5.2 Summary Table of Three BP Cases for each AMS

Countries	Sector	Title	Main strength or characteristics
Brunei Darussalam	Energy and other sectors for job seekers	Demand-based Industry: driven skills training by centre for capacity building by PPK/L3C	• Training programmes are designed with 20% theory and 80% practices • Training programmes, the curricula, and the number of trainees is based on the industry requirements and demand • Job placement is in collaboration with private sector, with employment as high as 96%
	Energy	Energy Industry Competency Framework. 'A whole of Nation' Approach to Local Workforce Development	• Training programmes are designed with 30% theory and 70% practical and hands on skills • Draws the local enrolment through a 'conditional offer of employment'. Employment rate of first cohort was 93.2%.
	Health Services	The School of Health Sciences, Politeknik Brunei's Competency-Based Training, Nursing Community	• Active involvement from relevant industries and community • Methods of teaching and learning include; modified lectures, guided study, independent reading, group discussion and presentation. • Internship or industrial attachment including clinical placement being a core part of the programme structure

Countries	Sector	Title	Main strength or characteristics
		Opportunities in Brunei Darussalam	
Cambodia	Garment	Cambodian Garment Training Institute	• Intensive training programmes to local garment workers since 2016 • Applies very strict assessement system of the intensive profession programmes with guaranteed 12 months employment contract
	Construction	NPIA(National Polytechnic Institute of Angkor)	• NPIA has developed strong network by working with Sector Skill Council • NPIA adopted instruction to perform distance teaching and learning activities by using various online communications platforms
	Tourism	École Paul Dubrule	• Developed a Learning Management System, created a blended Recognition of Prior Learning(RPL) assessment package, facilitated e-pedagogy training
Indonesia	Industrial Electronics Engineering and others	State Vocational High School3, Wonosari Gunung Kidul Regency	• Shortage of teaching aids, technology updates, competencies and job opportunities could be overcome due to collaboration with companies and industrial partners • Public Relations Division plays a pivotal role in forming a strong network amongst the industrial partners
	Textile	Surakarta Textile and Textile Product Industry Community College	• School Quality Assurance Team plays an important role in operations management. • Curriculum changes, especially courses, are made based on needs or input from the industry
	Chemical Engineering	Vocational High School-Chemistry Analyst Bogor	• Builds communication with industry, government and research. Also connects with development institution both domestic and international and university
Lao PDR	Hospitality	Pakpasak Technical College	• Curriculum has been developed with technical assistance from Luxembourg and Switzerland. The curriculum is reviewed by external assessors every five years to assure the quality • Assessment is based on the practicality by using in-house facilities as the model hotel.
	Medicine	Higher Diploma of Medicine Program	• The teachers are evaluated by the students in each subject after finishing the course, the evaluation results are analysed by each academic unit then reported to academic affairs division.
	Garment	Pattern making for female clothes	• The curriculum uses the competency-based approach and is split in several modules depending on the needs of training target groups • A mix of training methods is used such as lectures, hands-on activities, role-plays, assignments, and real-life case scenarios to develop and facilitate better learning and absorption
Malaysia	Electrical & Electronic	Electrical Engineering Technology (Industrial Power)	• Various teaching methods are used such as lecture, lab-practical, problem-based learning, experiential learning, simulation, computer-based training, action-based learning, industrial exposure and projects • Summative and formative assessment is used to determine students' performance in a various selection forms.

Countries	Sector	Title	Main strength or characteristics
	Oil & Gas	Chemical Engineering Technology (Process)	• Programme includes the contents which is the integration of the application of chemistry, physics and mathematics. • Teaching mathods and assessment process are similar to those in "Electrical Engineering Technology (Industrial Power)" mentioned above. • GHOCS system is established to record, recognize and reward students' achievements through their experience within years of study.
	Education	Vocational Training Officer	• Various teaching methods are used such as lecture, group discussion, e-learning self-paced, e-learning facilitate, case study, problem-based learning, self-paced learning, one-on-one tutorial, shop talk and seminar.
Myanmar	Hotel & Tourism	Hospitality Professional Course	• The Swiss Dual-training system has been applied • Designed to meet ASEAN and Myanmar skill standards with inputs from local entrepreneurs, business professionals, young people and students active in the sector • Large network of partner companies are also involved
	Manufacturing	Industrial Engineering Programme	• 3-year industrial engineering curriculum is based on the results of industrial data survey on skill demand • For Covid-19 pandemic situation, the institution is developing e-learning methods for academic subjects
	Manufacturing (Garment)	Sewing Machine Operator Course	• Offers livelihood programmes and support services to women migrant workers in order for them to go into a proper and secure profession • 97% of the trainees successfully applied and employed in a Garment Factory
Philippines	Construction and more	Talent Bridge Inc.	• Started as an in-house training unit for a firm, but the firm started offering its services to other companies that do not have the financial and technical ability to have the in-house training unit • Therefore, the programme has a good understanding of specific demands of the companies
	Construction	DMCI Technical Training Center	• Has access to the equipment used in actual construction sites, experts with long experience in the field, and the latest insights on emerging technologies and industry trends
	Green Technology	PTC-Rosario	• Updates its curriculum every two years or as needed. The institutes usually consult the industry partners • Started digitizing its learning materials even before the pandemic to limit the use of printed materials
Singapore	Food and Beverage Services	CoMAKER (Baking and Pastry)	• CoMAKER (Collaborative, Methodical, Agile, Kinesthetic, Empowering, Real-time) model is for remote training for hands-on skill-based courses such as baking • The programme can be fully delivered online. • Graduates of the programme can be invited to become coaches for future cohorts of learners.
	Information Technology	eduCLaaS	• The 2-year programme comprises 6 months of 'boot camp' and 18 months of remunerated on-the-job coaching • Blended learning delivery model(face-to-face or synchronised/asynchronised e-learning) is applied.
	For Elderly	Successful Aging	• The programme is offered by SACE, a non-profit entity under the Ministry of Education.

Countries	Sector	Title	Main strength or characteristics
			• SACE provides seniors with a safe and conducive environment for lifelong learning, fellowship building, opportunities to apply their skills and expertise in voluntary projects, participation in social activities and opportunities to make a career switch.
Thailand	Petrochemical	Technical Diploma Petrochemical Technology Program	• Uses the constructionism learning model focusing on learning to learn skills and creating new skills in order to fulfil industrial needs on active technicians • Provides fabrication lab and co-learning space for student-centered learning activities • An Intelligent Center has been established as a learning center involving students, teachers, in-company trainers and experts in the field
	Health	Certificate program in Health Business at Nakhon Ratchasima Vocational College	• Close relationships with industries involved in dual vocational training and various joint-working committees • Teamwork of students, Show & Share sessions and reflections with teachers and experts in the field help to motivate learning
	Agriculture	Certificate program in Agriculture, Suphanburi College of Agricultural and Technology	• Government offers additional subsidy for dormitory and food, as well as resolving fund for farming project • It serves needs of local community and economic development plan of the country
Viet Nam	Green Technology	Technical College Diploma on Drainage and Wastewater Treatment at HVCT	• Students can study and work directly with business, with modern facilities equipped based on German standards • The curriculum is practice-oriented and on-demand, equivalent to international standards, flexible in implementation and regularly updated
	Nursing	Competency-based Integrated Nursing College Training Programme at Thai Binh Medical College	• Innovative teaching methods such as Flipped Classroom, which supports learners and motivate them for learning and encourage participation • Built an assessment system according to output standards and accurately reflecting students' abilities
	Aquaculture	Aquaculture college training program at the Fisheries and Technical Economics College	• Close cooperation with business sector to ensure quality and practicality of training • Students participate in many extra-curricular activities organised by the Department of Aquaculture and the school

3. Discussions & Implications of the Best Practices for Each Country

3.1. Brunei Darussalam

All best practices demonstrate how TVET cooperates closely with stakeholders to meet the demand and supply in the labor market based on the HRD for the nation's economic and social development. All ASEAN countries have a governance structure for proper operation of TVET, such as Indonesia's and Malaysia's collaboration with international agencies, or appointment of directors in relevant committees as principals. Some other features include demand-based programs that provide training only when there is a job market, short-term training programs to accelerate supply, lecturers from the industry directly providing training, workshops with simulations of the actual working environment, 6-month internships, efforts to make continuous improvement through the After Action Review (AAR) session after the course, and employment support services.

To enhance Brunei Darussalam's competitiveness in TVET, it should create a digital education environment. Brunei Darussalam can consider face-to-face interaction, e-learning, and hybrid (combination of face-to-face interaction and e-learning) learning modes in CIAT's Vocational Training Officer Program from Malaysia; the use of various online communication platforms at NPI in Cambodia; and cases of practice-based distance education from Singapore. Moreover, Brunei Darussalam can refer to the HVCT best practices from Viet Nam, which help ensure curriculum quality and train qualified teachers by adopting advanced global programs, as well as the cases of Myanmar and Lao PDR who are customizing European programs according to their context.

3.2. Cambodia

TVET in Cambodia has been closely connected with industry since the foundation of training institutions. The country has gained pedagogical expertise by adopting advanced curricula, and sometimes even received financial support from other countries. Notably, training instructors have adopted well to the digital environment during the pandemic: they are providing distance education and conducting learning activities using various online communication platforms such as Zoom, Microsoft Team, and Telegram Group. This adaptation has been enabled by educating instructors via the government's e-learning platform and teaching them about how to use Zoom. After learning the theories online, all instructors are participating in programs in industrial settings, such as internships for workshop and industrial experience. All student data are registered into the government's TVET management information system, thereby strictly and effectively managing student registration, credit transfer, postponement, and completion.

To enhance Cambodia's competitiveness in TVET, the country should seek to address the issue of a lack of professors or qualified instructors by referring to Malaysia's Vocational Training Officer Program, which has been designed and developed by academic and industrial experts

within the TVET ecosystem. The number of training instructors can be increased by using various forms of online education in this program. Moreover, Cambodia can consider adopting learning methods such as teamwork, Show & Share sessions, and reflection based on the constructivist learning model from Thailand, which aims to improve thinking and problem-solving skills beyond acquiring skills in certain areas.

3.3. Indonesia

SMKN, which is a vocational high school, serves as a publicity department which is actively finding industrial partners for its work. It has a win-win structure through which schools can overcome their limitations with the help of industrial enterprises: on the one hand, enterprises provide industrial training and teacher apprenticeship programs in collaboration with the schools; on the other hand, enterprises can secure human resources that enable business continuity. Specifically, SMKN is an employment guarantee program in which the relevant industry is responsible for the student recruitment process, including initial interviews as freshmen, and is directly involved in the selection process. It is a dual education system comprising 3 months of classes and 3 months of factory experience per semester. Furthermore, instructors also participate in the internship with students. This provides facilities for employees to improve their skills or help those who must earn a degree, say in textile technology, to meet the company's requirements. General participants must return the educational expenses in case they drop out and work for at least 3 years after graduation, while industry participants must work for at least 5 years.

To enhance Indonesia's competitiveness in TVET, the key issue is securing competent teachers. Again, Indonesia can also refer to Malaysia's Vocational Training Officer Program. Moreover, as in Cambodia, Indonesia can consider adopting learning methods such as teamwork, Show & Share sessions, and reflection based on the constructivist learning model from Thailand.

3.4. Lao PDR

Lao PDR cooperates with Luxembourg, Switzerland, and Singapore to improve the quality of hospitality service at PSTC to the global level. The health program comprises theory, lab simulations, and practice. Practice requires trainees to intern at a general hospital from the second to fifth semester, and then at a local hospital or a health center in the sixth and last semester. The program also provides counseling services that deal with studies, possibilities of dropping out, social problems, and absence. Meanwhile, the country's apparel pattern making program provides short-term courses that last 15 to 60 days. Further, platforms such as Facebook or Google Form are used to collect feedback from students, alumni, and employers.

To enhance Lao PDR's competitiveness in TVET, the issue of an insufficient national platform can be resolved by referring to the aforementioned TVET student management system from Cambodia. Meanwhile, to secure competent teachers, Laos can also refer to the Malaysian

Vocational Training Officer Program. To resolve the issue about educational budget, Lao PDR can refer to Myanmar's hospitality program of the country being paid while students receive training during the apprenticeship, Brunei Darussalam's corporate demand-based programs with strengthened corporate networks, Indonesia's win-win model of AK Textile Solo that secures human resources, which in turn enables business continuity at industrial enterprises, and Singapore's model regarding the sales of goods by companies participating in TVET in order to strengthen the network with industrial enterprises.

3.5. Malaysia

Malaysia focuses on electric and electronic programs related to labor market demands, cultivating scientific methods, critical thinking, and creative and innovative problem solving and decision-making autonomy, while aiming to train engineers with specialized skills to meet the requirements of high-tech industries. Moreover, the country's goal is to cultivate promising global technological entrepreneurs by acquiring leadership and teamwork skills beyond communication, lifelong learning, and simple skills. Malaysia operates special study abroad programs through the Students' Mobility Program and Erasmus+ Scholarship Programme to improve global learning experience. Meanwhile, CIAT's Vocational Training Officer Program is a certification program for TVET instructors that supports new involvement in the TVET ecosystem. To train world-class instructors, it uses three platforms for program delivery, especially due to the pandemic: (1) face-to-face interaction, (2) e-learning, and (3) hybrid (combination of face-to-face interaction and e-learning).

To enhance Malaysia's competitiveness in TVET, Malaysia can review Singapore's industrial certification programs with a comprehensive TVET ecosystem to develop ICT talent that can cultivate the IT skills of students by acquiring global IT qualifications like Microsoft and SAP, in addition to fostering leaders in the high-tech industries of electric, electronic, and chemical engineering. Malaysia can also consider the flipped learning method that combines online learning and face-to-face education in training nurses.

3.6. Myanmar

CVT Myanmar applies the dual training and apprenticeship model of Switzerland with the hospitality training program, comprising 10 weeks of introductory course and 21 months of apprenticeship. Trainees receive training during the 21-month apprenticeship while also getting paid. Experts in this field are recruited and trained to become the program's instructors with the assistance of TVET experts from Switzerland. The instructor training comprises 3-month education and 4-week field placement. Meanwhile, the industrial engineering course improves interpersonal relations and leadership skills, while also giving the opportunity to promote social awareness and responsibility about serving society and improving the environment. Further, research grants are provided to reduce the dropout rates. Finally, clothing technology training

for the underprivileged is aligned with livelihood programs, support service, and employment so that female migrant workers can have safe and proper jobs. The digital learning management system (DLMS) is implemented in TVET institutions for full-time students to promote youth employment and continuous learning. A digital campus and IT infrastructure have been also built, which include reasonable access to computers/laptops and internet for teachers.

To enhance Myanmar's competitiveness in TVET, the country should find areas to improve by analyzing the advantages and disadvantages of Lao PDR's hospitality program, which has been developed with technical support from Europe. Moreover, Myanmar can consider adopting learning methods such as teamwork, Show & Share sessions, and reflection based on the constructivist learning model from Thailand.

3.7. Philippines

TBI is a private company in Philippines which provides customized corporate education programs; since the pandemic, its courses are being offered online. The curricula are based on the Training Regulations (TR) issued by TESDA; however, if a company requests a specific type of education, the company starts with an analysis of the educational needs. Since TBI offers education services outsourced by general companies, the dropout rates are very low. In addition, voluntary learners are more likely to be employed by TBI's client companies through the career advocacy program, such as writing resumes and preparing for interviews. Meanwhile, the DMCI Technical Training Center also provides services for the public in addition to in-house employee training for its parent company. It offers blended learning that combines online and face-to-face education, and provides technical education as well as management and leadership education for the construction business. Services are also offered for general learners to find jobs. Due to the nature of its parent company, learners can always have access to the latest technologies, equipment, and knowledge, along with programs that enable income generation. The programs also cover green jobs/technologies, green policies, green competency standards/educational regulations, green culture, and green community components.

To enhance Philippines's competitiveness in TVET, its digital learning environment should be considered. Today, in many courses where trainees receive technical training, they practice using actual equipment to learn and acquire skills. When experimenting and exploring methods to flexibly (combination of online and face-to-face) provide education without quality deterioration, Philippines can refer partially to Singapore's case of distance education for baking practice-based courses. Regarding green jobs, it can also refer to Viet Nam's drainage and wastewater disposal programs aligned with green TVET.

3.8. Singapore

In Singapore, Xprienz developed the CoMAKER (Collaborative, Methodical, Agile, Kinesthetic, Empowering, Real-time) model of distance education for practice-based courses such as baking. This model pursues upskilling and reskilling while embracing the concept of lifelong learning without employment support. Simultaneously, it provides benefits, such as goods sales, for the participating confectionary and baking companies. Lithan's program for digital technology and talent development provides blended learning experiences with the EASE (E-contents, Activity, Support and Evaluation) model, and gives the opportunity to obtain industrial certifications such as those by Microsoft and SAP. Besides the intensive boot camp and paid in-service training, distance labs and AR/VR functions have been developed to provide new courses such as AI, smart systems, and robotics. In particular, the learning and revenue models are integrated. The case of continuing education capably demonstrates the efforts to change TVET in an aging society. For example, courses are provided for adults of all ages, and curricula are provided for not only the aging issues of the elderly but also well-being.

To enhance Singapore's competitiveness in TVET, the country should consider adopting learning methods such as teamwork, Show & Share sessions, and reflection based on the constructivist learning model from Thailand. Singapore can also consider Malaysia's flipped learning method which combines online learning and face-to-face education in training nurses.

3.9. Thailand

Thailand has various TVET programs. The petrochemical technology program, run by the Thai government along with its industry partners, develops skills as well as thinking and problem-solving abilities of learners through various learning methods, including project-based learning grounded on the constructivist learning model, beyond merely acquiring certain skills. Further, training instructors must gain at least 2-4 weeks of experience in an industrial enterprise. Meanwhile, a health business certification program focusing on teamwork, Show & Share sessions, and reflection with teachers and experts can not only motivate learning but also promote self-efficacy for learners to solve the problems they face. Finally, additional subsidies for agricultural project investments, in order to make TVET agricultural programs more attractive, can serve as an incentive and opportunity for farmers and the underprivileged. Besides work-based learning in farms, the program also helps develop soft skills such as teamwork, communication, thinking, and problem-solving skills.

To enhance Thailand's competitiveness in TVET, Singapore's distance education model can be a good case study on approaching the issue about digital technology and innovation. Regarding the number of teachers and expertise, Thailand can gain insight from Malaysia's Vocational Training Officer Program. TVET in Thailand can also be improved by comparing the flipped learning method of medical schools in Viet Nam and programs related to health business.

3.10. Viet Nam

Best practices in Viet Nam are based on active engagement with industrial enterprises and specialized agencies as well as international cooperation with advanced global agencies by customizing practices to better fit domestic conditions. For example, Viet Nam applied Germany's vocational training model, operated education programs with Germany and Japan, and conducted further studies in Germany. Some efforts are examples of green TVET that is aligned with the government's green growth strategy. Notably, the nurse training program, which encourages student engagement by motivating and supporting them through flipped learning, can serve as a benchmark. It gradually fulfills the mechanism of financial autonomy in generating revenues in the aquaculture industry.

To enhance Viet Nam's competitiveness in TVET, digital innovation in TVET is inevitable so that Viet Nam can promptly meet the labor market demands. This can be done by referring to Lithan's blended learning experience by applying EASE in Singapore while implementing online TVET, Xprienz's distance education model applied to practice-based baking training, online TBI programs as well as DMCI programs offering blended learning of online and face-to-face education in Philippines, and École Paul Dubrule's e-learning platform and Zoom training in Cambodia. Viet Nam can also refer to the framework of PTC-Rosario's green curriculum in Philippines. Meanwhile, Malaysia's special study abroad programs can show how to provide incentives for learners in TVET. Viet Nam can also find points of improvement by comparing its programs with Thailand's health business and nurse training programs.

4. Policy Recommendations

The 10 ASEAN member states are constantly improving their national policies, stakeholder collaboration, sound management of TVET institutions, high-quality program development, and information management systems for the post-pandemic world. Moreover, TVET forms a key strategy for national development to develop skilled human resources and promote employment for their economic development. All countries need to establish flexible TVET policies, strengthen networks between public institutions and industrial enterprises as well as international agencies, build a data collection and management system to balance the labor market demand and skills supply, create a digital learning environment that has become essential, and provide equal access to TVET for all physically or geographically disadvantaged people. Meanwhile, the speed of learning has failed to keep up with the speed of change in digital technologies and businesses of the Fourth Industrial Revolution within the global market competition. Hence, the following factors must be regarded in establishing TVET policies and developing programs: learner empowerment, higher-order thinking skills, and future-proof skills.

Measures for AMS to enhance the responsiveness of TVET and therefore to maximize the contributions of TVET to economic development are as the following :

- First, with regards to TVET programs, specifying the framework principles of government-led for these standardized procedures and methods have an advantage for training quality management but also certain disadvantages such as the concern over standardization of programs or the difficulty in specializing them for each region, industry, and program.

- Second, there is a need to develop plans and programs for international cooperation in the implementation of the vocational training strategy and the digitalization of vocational training. Also, providing only rough and general contents in the national guidelines while increasing autonomy of individual schools by expanding the scope of industry engagement in the detailed program design and operation of each school is recommended.

- Third, with regards to the labor market information system, development of new survey about working conditions such as wages, working hours and labor costs and implementation of future labor market forecast using statistical data and methodology should be considered. An integrated system of information (e.g. Training course information, Employment related information, Information about Training performance etc.) supporting demand and supply is essential in the future.

- Fourth, it is necessary to promote continuous learning of adult learners in TVET governance; there must be significant innovations in adult learning through, including but not limited to, on-the-job training, coaching and mentoring, on-line as well as blended/Flipped learning.

- Finally, AMS economies have been hit hard by the ongoing COVID-19 pandemic. A number of HRD and workforce policies have been formulated to upgrade digital skills, targeting labor markets in the post-pandemic new normal era, as well as dealing with population aging and labor migration among AMS, and improving greening economy. The government of AMS tries to narrow the gaps by gender and region at all levels of TVET, and has a plan to accelerate digital transformation in vocational education.

Chapter VI. Implications & Policy Recommendations

In previous chapters, implications of the analysis based upon the Analytical Frameworks are presented.

In this final chapter, we have put together major policy recommendations that are stated both explicitly and implicitly in previous chapters, thereby integrating them according to the major subjects and analytical frameworks.

1. TVET Development Models considering the National Socio-economic Settings

Analysis of the data collection results based upon the Analytical Framework I shows that the socio-economic conditions of the AMS is important as settings upon which to place the TVET system. Developmental stages of the AMS in terms of economic, demographic, and social environments are important factors to be considered in establishing the basic premise for the national TVET system. No matter how perfect the model adopted is, it would not work like the original model if the current conditions do not support the adopted model appropriately. That is why, often, a perfect TVET model adopted with less consideration of the national socio-economic settings does not function as well as expected. In that sense, the analysis of the TVET system of 10 AMS plays based upon AF I is expected to play an important role in establishing TVET model that suits the socio-economic and policy settings for the TVET system.
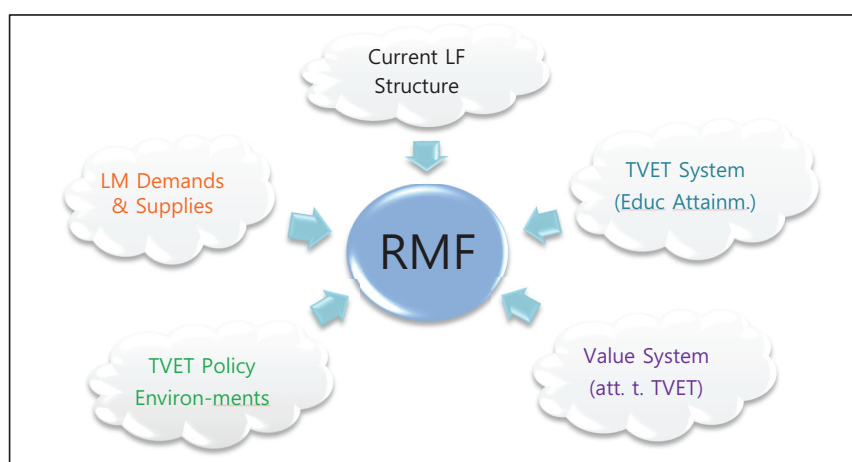
Figure 6.1 Resource Mobilization Framework (RMF) & Considering socio-economic settings in establishing TVET Models for the AMS

Therefore it is important to consider diverse socio-economic factors of the country in order to find the best model for the country, such as following:

Human Resources Structure;
Labor Market demands and supplies;
Current TVET system;
TVET policy environments (i.e. societal perceptions towards TVET & TVET Policy goals.

2. Establishment & Utilization of Labour Market Information System

Analysis of the national LMI is a prerequisite in order to improve the TVET responsiveness to the Labor Markets. The results presented in Chapter III of the report suggests that the national awareness needs to be enhanced with regard to the needs for information on LM demands and supply in the country. Whether such information is readily available is an important criterion for telling the responsiveness of the TVET system to the labor markets. Additionally, how effectively such information is analyzed and transferred to the TVET process is another important criterion for responsiveness of the TVET system.

Industry involvement in the TVET process is important for effective LMIS, since such information can be readily collected by active co-operation of the industry and employers. Therefore strengthening employer engagements in the TVET process is important for collecting LM information. In many countries, sector councils play an important role in producing, managing, and even analyzing such information.

3. TVET Responsiveness to the Labour Market: Issues of TVET Delivery System

In chapter IV, TVET responsiveness to the labor markets is analyzed through the process of designing and implementing the TVET curriculum in the AMS. The process of designing and implementing the TVET curriculum concerns mainly the process of TVET delivery.

In order to improve the process of designing and implementing the TVET curriculum, we have posed major recommendations, which are mostly related to the issues of TVET delivery.

3.1. Reinforcing TVET Governance & Facilitating Co-ordination among the Stakeholders

In delivery of TVET and in the process of TVET curriculum development and its implementation, co-ordination of the stakeholders, such as TVET practitioners, industry experts, and governmental people, and their organic co-operation is important to produce effective outputs. Therefore, establishing close co-operation system among the stakeholders is very important for successful delivery of TVET. The governmental agency overseeing the process should be able to mobilize such co-operation among the stakeholders. Stakeholders

involved in the TVET process such as TVET teachers & trainers, TVET experts, industry people, and the regulating body need to work closely together in order to achieve the governance needed to pursue TVET effectively and efficiently.

Furthermore, for successful delivery of TVET, co-operation among the ministries involved in TVET and HRD is critical. A TVET governance systems that are functioning well have in common close co-operation among the related governmental departments. In particular, there is a focal point of such co-operation where a single governing agency co-ordinates for such co-operation and that coordination is based upon strong consensus of the involved parties and ministries.

3.2. Industry Involvement in TVET

Industry involvement is probably the most important and most aspired ingredient required to make a TVET system responsive to the labor markets. It is also most desired by all the participants in the TVET curriculum. However, obtaining full-fledged level industry co-operation is not so easy, nor simple. The role of the state is very important in drawing active participation of the employers in the process. Instilling the importance of skills development in the minds of the industry is a long and enduring process. In modern states, the government should play a focal role to get the industry involved in the TVET process in general, in the process of designing and implementing TVET curricular in particular.

Providing the industry with incentives to participate in the process could be a way to encourage their industry participation. Tax exemptions for industries participating, introducing training levy system can provide incentives for industries. Supporting, financially and administratively, organization of sector councils could provide conditions favorable for industry participations. Sector councils are found to play a very important role in industry involvement in the TVET process.

One of the common features of the best practice TVET programs described in Chapter V is that the programs are closely related to industries. Therefore, the trainees have opportunities to benefit from the up-to-date programs and also more chances to obtain employment upon graduation.

One way or another, TVET programs should be able to secure involvement of industries in the process of TVET delivery.

3.3. Importance of Establishing NQF and NCS

While the importance of establishing TVET governance is stated above, the national qualifications framework is important in that it can serve to strengthen such governance. In fact, NQF is an important part of the governance.

Developing national competency standards(NCS) based upon the industry demands is important for functioning of national qualifications frameworks. Developing the competency standards based upon the industry demands can be achieved with participation and representation of industry in the process of developing TVET curriculum.

Therefore, functioning of NQF can be said to be related to functioning of NCS, and to participation of industry in the process.

For the NQF established to be able to play its role, co-operation among the ministries involved in HRD is critical. While in most of the AMS the NQFs are established, the functioning of the NQFs varies from state to state. This largely depends on the degree of coordination among the related ministries involved in HRD. On the other hands, working NQF can play the role of strengthening the ties that already exist among the ministries and stakeholders participating in TVET.

3.4. Strengthening the TVET Delivery System

Throughout the process of TVET, it is very important to strengthen the TVET delivery system.

First, enhancing vocational education and training institutions is critical to improve TVET delivery and quality of TVET. Providing quality TVET programs through well-established vocational educational institutions such as technical and vocational high schools and polytechnic colleges is important. In particular, strengthening the function of training centers is found to be important in many AMS. Training centers are not fully developed in many AMS, while such training centers can provide the leaners with more training options and diverse pathways for lifelong learning. This is especially so when the vocational educational institutions and formal TVET are not able to serve all those in need due to their current limited capacity. Therefore providing more quality training centers will be important to improve TVET delivery.

Second, strengthening TVET institutions is very important to improve TVET delivery because under the current TVET system of AMS, where the TVET delivery is not firm-based but mostly school (and institution) based, the quality of TVET institutions determine the quality of TVET. This point is particularly important when most of the AMS are trying to adopt competency-based training (CBT) system.

Third, vocational training can be an option to diversify the pathways of lifelong learning for many AMS. Therefore, there is a need to strengthen vocational training system as a pathway for TVET delivery.

Fourth, diversifying the fields of TVET programs provided needs to be made in most of the AMS. While there exist strong TVET programs identified in the AMS, there is a limitation when it comes to the diversity in the fields of training offered through the programs. This could be due to the limited financial resources, where the funding is not sufficient enough to support

diverse programs. Or, it could be because the fields of programs are not based upon the analysis of the labor market demands, analysis of the LM demands for all the industries.

4. Towards Regional Co-operation to Improve TVET

One of the major objectives of this project is strengthening co-operation among the AMS to improve competitiveness of their HRs through TVET. Therefore, we'd like to devote the final part of this report to the possibilities of co-operation among the AMS at the regional level.

Table 6.1 Major implications & policy recommendations of the project

Cat.	Subject		Remarks
1	TVET Development Models considering the National Socio-economic Settings		RMF theory can be applied in setting up the national TVET Model.
2	Establishing & Utilizing Labor Market Information System		• Importance of setting up LMIS • Importance of utilizing the LMI available
3	TVET Responsiveness to the Labor Markets: Issues of TVET delivery System		Recommendation based on AF III results: Delivery of TVET
	3-1	Reinforcing TVET Governance System	• governance among line ministries • governance among major stakeholders of TVET
	3-2	Encouraging Industry Involvement in TVET	Main question remains: How can we encourage industry engagement?
	3-3	Importance of establishing NQF and NCS	Establishing and settling down the NQF and the NCS is critical step toward TVET responsiveness to LMs
	3-4	Strengthening TVET Institutions for TVET delivery	Quality of TVET institutions determines the quality of TVET delivered.
4	Promoting ASEAN-wide Co-operation in key areas of TVET		Most important implication drawn from the project
	4-1	Identifying Demands for Migrant Workers	Identifying mutual LM demands & applying it to domestic skills development strategy
	4-2	Systematic Data Collection for the AMS as a Basis for Co-operation in TVET	The current project(C1) can be a starting point for such data collection.
	4-3	Conducting Co-projects at the Regional Level	In areas such as: • TVET curriculum development • Co-research on Teacher Training • Conducting survey on selected topics • Exchange programs based on best practices of TVET programs
	4-4	Promoting Utilization of Qualifications System at the Regional Level	AQRF can be utilized as such a ref. point.(needs to build on current AQRF)

4.1. Identifying Demands for Migrant Workers

With increasing mobility of labor among the AMS, the need arises to systematically analyze the demands in the overseas labor markets, particularly in the labor markets in the other AMS. While there have been individual attempts to analyze the trends of labor mobility between some of the AMS, more systematic analysis is needed based upon the data collected regularly. For co-operation in TVET among the AMS, identifying the LM demands at the receiving countries is needed.

If the LM analysis can be made with respect to the demands for migrant workers for each AMS and for the field of industry (or occupation), more systematic co-operation can be made among the AMS.

After identifying mutual LM demands, skills development plan at each AMS can be established. Also, exchange of labor-force (workers) between and among the AMS can provide platform for co-operation at the regional level.

4.2. Needs for Systematic Data Collection for the AMS as a basis for Co-operation

To achieve co-operation in TVET among the AMS, information about the TVET system and LM demands in the AMS needs to be analyzed and shared among the AMS. This will provide conditions for the AMS to start systematic co-operation. For this purpose, the TEAM Component 1, 2, and 3 projects can be the starting points in that the results of these projects are to provide such shared information for the 10 AMS.

The current project accumulated data on variety of topics in TVET, based upon the 4 analytical frameworks, AF I to AF IV, ranging from TVET system & LMIS, to LM responsiveness of the curriculum, and best practices of TVET programs. This can be utilized as information to promote further co-operation in TVET, on more detailed level of topics

By collecting the information and sharing the information, the AMS can together move towards systematic co-operation.

4.3. Conducting Co-projects at the Regional Level

Another way to achieve regional level co-operation is for two or more AMS to conduct a project together. The topic should be selected based on the regional needs and as a result of consensus among the AMS. By working together, the AMS can accumulate on the knowledge and experiences that can be shared and fed for next-level co-operation.

Experiences of conducting co-projects together can contribute to raising the needs for further co-operation

Experiences of conducting co-projects together can contribute to raising the needs for further co-operation. It is also recommended that the process of conducting co-projects is widely supported and quality-controlled by the ASEAN community. (i.e. use of correct data, checking-up with data, involvement of actual stakeholders in the process)

Topics and areas for co-projects are, but not limited to:

Co-project on Curriculum Development (i.e. developing learning materials together);

Co-research on Teacher Training Systems;

Conducting Surveys (including LM surveys) and Research together on selected topics;

Developing exchange programs based best practice TVET programs;

Exchanging information on functioning of Sector-councils.

4.4. Strengthening the Qualifications System at the Regional Level

To promote co-operation in TVET among the AMS, establishing and strengthening the regional-level qualification system is important.

Having common tools to exchange learners and workers is important for co-operation among the AMS. Each AMS has either a working NQF or in the process of establishing one.

ASEAN-wide qualifications system can serve as a reference point to utilize the labor from other countries and to build up skills on top of already acquired skills.(i.e. use of correct data, checking-up with data, involvement of actual stakeholders in the process)

AQRF can be utilized as such a reference point.

Currently, the ASEAN Qualification Reference Framework (AQRF) is building up to work as such a reference point. To settle down the AQRF as early as possible, active participation and strong supports of the governing agencies related to NQF in each AMS can be helpful.

Also, accumulating hand-on experiences regarding utilization of the AQRF through conducting co-projects can validate the AQRF, and speed-up the proper functioning of AQRF.

Also, if the AQRF can be utilized in labor mobility among the AMS and exchanges of TVET students and teachers among the AMS, it can raise the validity of the AQRF. Therefore, the regional level qualification frameworks can strengthen the co-operation in TVET among the AMS and vice versa.

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Appendix

Table A2.1 Literacy rate – Population 15+ years, Population 15-24 years

Country	Gender	Population 15+ years old				Population 15-24 years old			
		2015	2016	2017	2018	2015	2016	2017	2018
Brunei Darussalam	Total	..	..	..	97.2	..	..	..	99.7
	Female	..	..	..	96.3	..	..	..	99.6
	Male	..	..	..	98.1	..	..	..	99.8
Cambodia	Total	80.5	..	..	..	92.2	..	..	..
	Female	75.0	..	..	..	91.9	..	..	..
	Male	86.5	..	..	..	92.6	..	..	..
Indonesia	Total	95.2	95.4	..	95.7	99.7	99.7	..	99.7
	Female	93.3	93.6	..	94.0	99.7	99.7	..	99.7
	Male	97.1	97.2	..	97.3	99.6	99.7	..	99.7
Lao PDR	Total	84.7	..	..	..	92.5	..	..	..
	Female	79.4	..	..	..	94.4	..	..	..
	Male	90.0	..	..	..	90.5	..	..	..
Malaysia	Total	..	94.9	95.1	94.9	..	97.6	97.3	96.9
	Female	..	93.4	93.6	93.5	..	97.4	97.1	96.7
	Male	..	96.3	96.5	96.1	..	97.9	97.4	97.0
Myanmar	Total	..	75.6	..	..	..	84.8	..	..
	Female	..	71.8	..	..	..	85.1	..	..
	Male	..	80.0	..	..	..	84.4	..	..
Philippines	Total	98.2	..	..	..	99.1	..	..	..
	Female	98.2	..	..	..	98.9	..	..	..
	Male	98.1	..	..	..	99.3	..	..	..
Singapore	Total	96.8	97.0	97.2	97.3	99.8	99.9	99.9	99.9
	Female	95.2	95.4	95.7	95.9	99.7	99.9	99.9	99.9
	Male	98.6	98.7	98.8	98.9	99.8	99.9	99.9	99.9
Thailand	Total	92.9	..	..	93.8	98.1	..	..	98.1
	Female	91.2	..	..	92.4	98.0	..	..	97.7
	Male	94.7	..	..	95.2	98.3	..	..	98.6
Viet Nam	Total	..	..	..	95.0	..	..	..	98.4
	Female	..	..	..	93.6	..	..	..	98.5
	Male	..	..	..	96.5	..	..	..	98.4

Source: The World Bank DataBank - Education Statistics, https://databank.worldbank.org/source/education-statistics
(extracted on August 27, 2021)

Table A2.2 Net Enrolment Rate – Primary, lower secondary, upper secondary

Country	Gender	Primary					Lower Secondary					Upper Secondary				
		2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Brunei Darussalam	Total	99.3	99.8	99.6	99.2	99.4	..	..	..	99.7	96.9	80.8	81.4	82.3	81.7	82.3
	Female	98.6	100.0	100.0	100.0	100.0	..	..	..	..	..	83.6	83.6	84.9	83.7	83.9
	Male	100.0	99.7	99.3	98.5	98.9	..	..	..	..	..	78.3	79.3	79.9	79.7	80.8
Cambodia	Total	95.6	93.0	90.8	90.7	90.6	86.7	..	..	..	..	..	..	..	..	..
	Female	96.9	93.0	90.6	90.6	90.6	85.9	..	..	..	..	..	..	..	..	..
	Male	94.3	93.0	91.0	90.7	90.7	87.5	..	..	..	..	..	..	..	..	..
Indonesia	Total	..	93.6	94.9	94.4	..	..	..	..	83.7	..	73.2	71.4	76.1	77.5	..
	Female	..	91.4	92.8	92.0	..	..	..	..	86.5	..	70.8	71.2	76.0	77.8	..
	Male	..	95.8	97.0	96.6	..	..	..	..	81.0	..	75.5	71.6	76.2	77.2	..
Lao PDR	Total	94.9	94.0	92.5	91.5	91.6	81.4	77.0	77.8	75.0	72.4	55.9	62.7	61.7	60.0	56.2
	Female	94.0	92.9	91.7	90.7	90.7	80.0	76.2	77.0	74.5	72.2	52.2	59.2	58.5	57.3	53.9
	Male	95.7	95.0	93.2	92.3	92.4	82.7	77.8	78.5	75.5	72.6	59.6	66.2	64.8	62.8	58.4
Malaysia	Total	99.5	99.8	99.6	..	..	87.5	86.2	86.9	..	..	..	62.9	63.2	..	..
	Female	100.0	100.0	100.0	..	..	89.7	87.9	88.4	..	..	..	68.1	67.9	..	..
	Male	99.1	99.7	99.3	..	..	85.5	84.6	85.4	..	..	..	58.0	58.8	..	..
Myanmar	Total	..	..	97.7	98.1	..	..	..	76.3	79.0	..	..	48.9	53.6	57.3	..
	Female	..	..	95.3	96.1	..	..	..	77.2	80.2	..	..	52.6	57.3	61.6	..
	Male	..	..	100.0	100.0	..	..	..	75.4	77.9	..	..	45.2	49.9	53.1	..
Philippines	Total	97.2	96.7	96.8	96.2	..	93.3	92.0	..	89.3	..	79.5	..	..	..	..
	Female	97.6	96.9	96.6	95.9	..	95.5	94.1	..	92.4	..	82.9	..	..	..	..
	Male	96.7	96.5	96.9	96.5	..	91.3	89.9	..	86.5	..	76.3	..	..	..	..
Singapore	Total	..	100.0	100.0	99.8	..	..	99.9	99.9	99.4	..	..	99.9	99.9	99.9	..
	Female	..	100.0	100.0	99.9	..	..	..	..	99.1	..	..	..	..	..	..
	Male	..	100.0	99.9	99.7	..	..	..	..	99.8	..	..	..	..	..	..
Thailand	Total	..	..	..	..	..	..	..	..	..	..	79.1	..	..	..	..
	Female	..	..	..	..	..	..	..	..	..	..	79.0	..	..	..	..
	Male	..	..	..	..	..	..	..	..	..	..	79.1	..	..	..	..
Viet Nam	Total	99.5	98.8	98.7	98.6	98.6	..	..	..	..	..	..	..	..	..	..
	Female	100.0	100.0	100.0	100.0	100.0	..	..	..	..	..	..	..	..	..	..
	Male	99.1	97.7	97.6	97.3	97.4	..	..	..	..	..	..	..	..	..	..

Source: The World Bank DataBank - Education Statistics, https://databank.worldbank.org/source/education-statistics (extracted on August 27, 2021)

Table A2.3 Gross Enrolment Rate – Post-secondary & non-tertiary, tertiary

Countries	Gender	Post-secondary & Non-tertiary					Tertiary				
		2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Brunei Darussalam	Total	1.2 (2012)	..	..	..	..	31.3	31.9	33.6	31.2	31.5
	Female	1.3 (2012)	..	..	..	..	39.9	40.3	42.0	38.4	38.8
	Male	1.1 (2012)	..	..	..	..	23.4	24.3	25.9	24.7	24.9
Cambodia	Total	4.6 (2010)	..	..	..	..	13.1	..	13.1	13.7	14.7
	Female	3.5 (2010)	..	..	..	..	11.8	..	12.2	12.9	14.3
	Male	5.6 (2010)	..	..	..	..	14.4	..	14.1	14.4	15.2
Indonesia	Total	..	..	..	..	..	33.3	35.4	36.4	36.3	..
	Female	..	..	..	..	..	35.0	37.7	39.0	39.0	..
	Male	..	..	..	..	..	31.5	33.3	34.0	33.8	..
Lao PDR	Total	4.5	4.7	5.1	..	5.4	18.2	17.3	15.7	15.0	14.5
	Female	3.6	3.9	4.2	..	4.1	17.7	17.2	16.0	15.5	15.3
	Male	5.5	5.5	6.0	..	6.8	18.7	17.4	15.4	14.4	13.7
Malaysia	Total	..	..	..	..	..	45.6	46.8	43.7	45.1	43.1
	Female	..	..	..	..	..	51.7	50.6	47.1	49.9	48.7
	Male	..	..	..	..	..	39.8	43.2	40.5	40.7	37.7
Myanmar	Total	..	..	1.1	..	..	..	..	..	18.8	..
	Female	..	..	1.1	..	..	..	..	..	22.0	..
	Male	..	..	1.1	..	..	..	..	..	15.6	..
Philippines	Total	28.5	28.0	26.0	..	..	..	..	35.5	..	..
	Female	26.1	28.1	26.3	..	..	..	..	40.4	..	..
	Male	30.8	27.9	25.8	..	..	..	..	30.8	..	..
Singapore	Total	..	123.0	123.2	127.6	..	..	83.9	84.8	88.9	..
	Female	..	119.6	122.8	126.5	..	..	90.6	91.2	95.4	..
	Male	..	126.2	123.7	128.6	..	..	77.9	78.9	82.9	..
Thailand	Total	..	..	..	..	..	..	49.3	..	..	..
	Female	..	..	..	..	..	..	57.8	..	..	..
	Male	..	..	..	..	..	..	41.0	..	..	..
Viet Nam	Total	22.9	22.1	..	..	..	29.1	28.5	..	..	28.6
	Female	27.5	27.0	..	..	..	29.2	31.7	..	..	..
	Male	18.5	17.5	..	..	..	29.0	25.5	..	..	..

Summary Tables of Most Promising Sector of Job Creation for 10 ASEAN Countries

Table A3.1 Summary Table (sort by sector, in order of the most selected sectors)

Sector	Response Count	Country
10 - Manufacture of food products	31	**9 countries:** Brunei Darussalam, Malaysia, Myanmar, Philippines, Lao PDR, Thailand, Viet Nam, Cambodia, Indonesia
86 - Human health activities	23	**9 countries:** Malaysia, Singapore, Myanmar, Philippines, Lao PDR, Thailand, Viet Nam, Cambodia, Indonesia
41 - Construction of buildings	16	**7 countries:** Brunei Darussalam, Singapore, Myanmar, Philippines, Lao PDR, Thailand, Cambodia
62 - Computer programming, consultancy and related activities	16	**8 countries:** Brunei Darussalam, Malaysia, Singapore, Philippines, Viet Nam, Thailand, Cambodia, Indonesia
85 - Education	16	**9 countries:** Brunei Darussalam, Malaysia, Singapore, Myanmar, Philippines, Lao PDR, Thailand, Viet Nam, Indonesia
56 - Food and beverage service activities	15	**5 countries:** Brunei Darussalam, Philippines, Lao PDR, Thailand, Viet Nam
14 - Manufacture of wearing apparel	12	**5 countries:** Brunei Darussalam, Myanmar, Viet Nam, Cambodia, Indonesia
61 - Telecommunications	10	**7 countries:** Brunei Darussalam, Malaysia, Singapore, Philippines, Lao PDR, Thailand, Cambodia
52 - Warehousing and support activities for transportation	9	**5 countries:** Malaysia, Singapore, Philippines, Lao PDR, Indonesia
21 - Manufacture of pharmaceuticals, medicinal chemical and botanical products	8	**4 countries:** Malaysia, Singapore, Philippines, Indonesia
26 - Manufacture of computer, electronic and optical products	8	**6 countries:** Malaysia, Myanmar, Philippines, Lao PDR, Thailand, Viet Nam
43 - Specialized construction activities	8	**5 countries:** Malaysia, Singapore, Myanmar, Viet Nam, Cambodia
47 - Retail trade, except of motor vehicles and motorcycles	7	**4 countries:** Brunei Darussalam, Myanmar, Thailand, Indonesia

Sector	Response Count	Country
64 - Financial service activities, except insurance and pension funding	7	**6 countries:** Singapore, Myanmar, Thailand, Viet Nam, Cambodia, Indonesia
79 - Travel agency, tour operator, reservation service and related activities	7	**5 countries:** Myanmar, Philippines, Lao PDR, Cambodia, Indonesia
13 - Manufacture of textiles	6	**4 countries:** Myanmar, Lao PDR, Cambodia, Indonesia
35 - Electricity, gas, steam and air conditioning supply	6	**4 countries:** Malaysia, Lao PDR, Cambodia, Indonesia
11 - Manufacture of beverages	5	**3 countries:** Malaysia, Viet Nam, Indonesia
45 - Wholesale and retail trade and repair of motor vehicles and motorcycles	5	**4 countries:** Malaysia, Lao PDR, Thailand, Cambodia
15 - Manufacture of leather and related products	4	**2 countries:** Viet Nam, Indonesia
20 - Manufacture of chemicals and chemical products	3	**2 countries:** Brunei Darussalam, Malaysia
29 - Manufacture of motor vehicles, trailers and semi-trailers	3	**2 countries:** Thailand, Indonesia
32 - Other manufacturing	3	**3 countries:** Singapore, Myanmar, Thailand
33 - Repair and installation of machinery and equipment	3	**2 countries:** Lao PDR, Cambodia
42 - Civil engineering	3	**1 country:** Cambodia
46 - Wholesale trade, except of motor vehicles and motorcycles	3	**2 countries:** Thailand, Viet Nam
63 - Information service activities	3	**2 countries:** Singapore, Thailand
66 - Activities auxiliary to financial service and insurance activities	3	**2 countries:** Singapore, Myanmar
71 - Architectural and engineering activities; technical testing and analysis	3	**3 countries:** Brunei Darussalam, Singapore, Thailand
74 - Other professional, scientific and technical activities	3	**3 countries:** Malaysia, Lao PDR, Cambodia

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Sector	Response Count	Country
81 - Services to buildings and landscape activities	3	**1 country:** Cambodia
25 - Manufacture of fabricated metal products, except machinery and equipment	2	**2 countries:** Myanmar, Thailand
27 - Manufacture of electrical equipment	2	**2 countries:** Singapore, Myanmar
28 - Manufacture of machinery and equipment n.e.c.	2	**2 countries:** Malaysia, Philippines
38 - Waste collection, treatment and disposal activities; materials recovery	2	**1 country:** Malaysia
53 - Postal and courier activities	2	**2 countries:** Philippines, Indonesia
55 - Accommodation	2	**2 countries:** Philippines, Lao PDR
59 - Motion picture, video and television programme production, sound recording and music publishing activities	2	**2 countries:** Philippines, Lao PDR
68 - Real estate activities	2	**1 country:** Cambodia
69 - Legal and accounting activities	2	**2 countries:** Singapore, Cambodia
73 - Advertising and market research	2	**2 countries:** Lao PDR, Indonesia
82 - Office administrative, office support and other business support activities	2	**2 countries:** Myanmar, Philippines
90 - Creative, arts and entertainment activities	2	**2 countries:** Philippines, Indonesia
12 - Manufacture of tobacco products	1	**1 country:** Indonesia
19 - Manufacture of coke and refined petroleum products	1	**1 country:** Malaysia
22 - Manufacture of rubber and plastics products	1	**1 country:** Myanmar
23 - Manufacture of other non-metallic mineral products	1	**1 country:** Cambodia

Sector	Response Count	Country
31 - Manufacture of furniture	1	**1 country:** Lao PDR
36 - Water collection, treatment and supply	1	**1 country:** Malaysia
49 - Land transport and transport via pipelines	1	**1 country:** Indonesia
50 - Water transport	1	**1 country:** Singapore
60 - Programming and broadcasting activities	1	**1 country:** Cambodia
70 - Activities of head offices; management consultancy activities (Professional Services)	1	**1 country:** Thailand
87 - Residential care activities	1	**1 country:** Singapore

Table A3.2 Full Table

1. Brunei	
Sector 1	

10 – Manufacture of food products

- Based on the Delphi results:
- "Three out of 5 survey respondents indicated that the Manufacture of Food Products (ISIC 10) was the most promising area for job creation" (p. 67).
- "Three of the survey respondents also indicated that ISCO-75: Food Processing and Woodworking (including Halal Food Technologists, Food Services, Food and Beverage Services, and Construction) are also promising areas for future job creation" (p. 67).
- "A related occupation is ISCO-61: Market-oriented Skilled Agricultural Workers (including those in aquaculture, hydroponics, smart farming, and padi/rice planting) which two respondents indicated as promising for future job growth" (pp. 67-68).

- Assessment of the potential of labor supply to meet demand:
- The main labor supplier in food manufacturing is IBTE, AgroSciences Campus (p. 68)
- In 2019, the number of graduates was 234 (62 in Agrotechnology, 22 in Aquaculture, 40 in Professional Cookery and Culinary Services, 42 in Culinary Operations, 37 in Crop and Livestock Production, and 31 in Food Processing (p. 68)

- Assessment of the required future skills (p. 68)
- ISIC 56: 1) effective customer service, 2) sales, 3) receiving and handling guest concerns, 4) multi-taking, 5) serving, 6) working quickly, 7) observing workplace hygiene procedures, 8) performing computer operations, 9) performing workplace and safety practices, and 10) research and development

- ISCO 61: 1) using machinery, 2) managing environmental impacts, 3) understanding various technological and analytical methods, and 4) market research
- ISCO 75: 1) knowledge and ability to use tools,2) knowledge of materials and product handling, 3) health and safety, and 4) research and development
- Halal Food Production: 1) knowledge of the slaughtering process according to Quran rules, 2) knowledge of standard rules for the production, 3) manufacturing, 4) packaging of halal products, and 5) cleaning standards for an entire production facility

Sector 2

41 – Construction of buildings

• Based on the Delphi results:
- "Two of the 5 survey respondents indicated that the Construction of Buildings is an area that shows promise for future job creation. In 2019 this sector contributed to 8.7% of jobs (16,000 workers)" (p. 69)

• Relevant occupations are ISCO-74 (electrical workers), ISCO-75 (woodworking and other crafts), ISCO-81 (stationary plant and machine operators), and ISCO-83 (drivers and mobile plant operators) (p. 69)

• Occupations identified as critical occupations by MISC Construction: 1) resident technical officer, 2) clerk of works, 3) company site representative, 4) draughtsperson, 5) health safety and environment officer, 6) heavy goods vehicles driver, 7) carpenter, 8) scaffolder for construction, 9) building electrician, 10) air conditioning technician, 11) plumbing pipe fitter (p. 69)

• Information on the labor demand and supply (p. 69)
- In 2019, there were 57 graduates in construction, 43 scaffolders, 76 building craftsmen, 17 electrical technicians, 38 building services engineers, and 79 construction engineers

• Information on the required skills and current situation of TVET (p. 69)
- ISIC-71: 1) skills in systems and operational analysis, 2) creative services, 3) draughting services, building inspection services, surveying, and mapping, 4) problem-solving, and 5) artificial intelligence
- ISCO-74: 1) using tools, calibration equipment, and wires to build electrical systems, 2) teamwork, 3) testing existing wiring for safety and quality control, 4) knowledge of standards and regulations, 5) ability to assess electrical systems, 6) reading work plans, 7) maintenance and repair work, and 8) health and safety
- ISCO-75: 1) knowledge and ability to use tools, 2) knowledge of materials and product handling, 3) health and safety, 4) and research and development
- ISCO-81: 1) teamwork, 2) knowledge of calibration, standards, and regulations, 3) maintenance and repair work, and 4) health and safety hazards
- ISCO-83: 1) knowledge of calibration, standards, and regulations, and 2) health and safety hazards

Sector 3

20 – Manufacture of chemicals and chemical products

• Based on Delphi results:
- "Two of the five survey respondents indicated that the industry area shows promise for future job creation. In 2019 this sector contributed 0.2% of the employment share (400 workers). It was predicted that the Hengyi Project would boost employment, with more than 750 jobs expected in the first stage" (p. 69)

• Information on the labor demand and supply (p. 70)
- Politeknik Brunei: 22 petroleum engineers
- Universiti Brunei Darussalam: 13 chemical process engineers and 63 chemical engineers

- Information on the required skills and current situation of TVET
  - 1) chemical production and manufacturing, 2) safety hazards, 3) public health, 4) legislation and policy, 5) communication and education, 6) maintenance, and 7) training in the use of machinery

Sector 4

56 – Food and beverage service activities

- Based on Delphi results:
  - "Two of the five survey respondents indicated that the industry area … shows promise for future job creation. In 2019 this sector contributed to an 8.1% share of employment (14,900 workers)" (p. 71)
  - Relevant occupations: ISCO-51 – Personal service workers, ISCO-52 – Sales workers, and ISCO-75 – food processing and related trades workers (p. 71)
  - In 2019, 8,200 cooks and other personal services workers; 13,000 people employed in wholesale and retail trade and food services as cashiers and shop sales assistants, accounting for 7% share of total employment (p. 71)

- Information on the labor demand and supply (p. 71)
  - Laksamana College of Business (LCB): 4 graduates in cooking and food preparation, 42 in culinary operations, and 31 in food processing
  - IBTE: 40 graduates in hospitality operations and 39 in travel and tourism

- Information on the required skills and current situation of TVET (pp. 71)
  - Food and beverage services: 1) effective customer service, 2) sales, 3) receiving and handling of guest concerns, 4) multi-tasking, 5) serving, 6) working quickly, 7) observing workplace hygiene procedures, 8) performing computer operations, 9) performing workplace and safety practices, and 10) research and development
  - Food manufacturing: 1) food production, 2) manufacturing, 3) retail, 4) consumer and food safety, 5) foodborne hazards, 6) public health, 7) legislation and policy, 8) communication and education, 9) Halal industrial standards, and 10) research and development

Sector 5

61 – Telecommunications

- Based on Delphi results:
  - "Two out of five survey respondents indicated that the telecommunications industry showed promise for future job creation. In 2019 this sector contributed a 1.4% share of employment (2,600 workers)" (p. 72)
  - Relevant occupations: ISCO-25 – Information and Communications Technology Professionals, and ISCO-35 – Information and Communications Technicians (p. 72)
  - 1,000 (0.5%) developers and programmers employed under ISCO-25 and 2,400 (1.3%) employees in ICT/software applications and operating system under ISCO-35

- Information on the labor demand supply (p. 72)
  - 898 telecommunications graduates from post-secondary and tertiary educational institutions in industries such as IT, mobile technology, computer networking, electronics and media technology, computing, information systems, web development, computer science, internet computing, and information security.

- Information on the required skills and current situation of TVET
  - 1) using tools, calibration equipment, and wires to build electrical systems, 2) teamwork, 3) testing existing wiring for safety and quality control, 3) knowledge of standards and regulations, 4) ability to assess electronic systems, 5) reading work plans, 6) maintenance and repair work, and 7) health and safety

| 2. Cambodia |
| Sector 1 |

Job Cluster A: Garment Manufacturing

- The garments manufacturing job cluster is among the most promising cluster of employment in Cambodia. According to the latest data from the National Institute for Statistics, the garment manufacturing industry contributed 17.8% to Cambodia's total gross domestic product (GDP). Latest data on future employment under the garment manufacturing job cluster is quite outdated (2017) and the forecast only covered up to 2019. However, based on ADB survey report (January 2021, page 17 on Skill Supply Trends) on Reaping the benefits of Industry 4.0 through skills development in Cambodia, it was found that:

  - *"additional demand for training will be required by workers in the garment manufacturing industry in Cambodia under 4IR technology adoption. This reflects the amount of training required to bring the industry's workforce from the skills required in 2018 to the level of skills required by 2030, driven only by 4IR technology adoption. Overall, there will need to be 13.5 million additional person trainings by 2030. The majority of the training requirements will likely come from on-the-job training, with the rest mostly coming from longer formal training, i.e., the technical and vocational education and training (TVET) sector."*

- Under this job cluster, various competencies that will be critical for the new jobs created include complex problem solving; technical and ICT knowledge; critical thinking and learning skill; and communication skill. Furthermore, based on the ADB survey report (January 2021, page 17 on Skill Supply Trends) on Reaping the benefits of Industry 4.0 through skills development in Cambodia, evaluation, judgment, and decision-making, and critical thinking skills are likely to see their relative importance increase by 2030. Furthermore, by 2030, and under 4IR technology adoption, workers will require at least basic skills in complex problem solving, computer literacy, and digital skills. Furthermore, communication and technical skills will need to be upgraded to intermediate level for almost the entire industry. Advanced skills are only likely to be required for numeracy (e.g., for measurements for customizations and alterations), and for evaluation, judgment, and decision-making.

| Sector 2 |

Job Cluster B: Tourism

- The tourism industry in Cambodia is also a major provider of employment in the country. According to the ILO, the industry employed 12.2% of the country's workers in 2016 and employment has grown by 4.3% on average each year since 2014. Hotels and restaurants contributed 4.9% to GDP with an annual growth of 6.1%. Despite the current challenges in the industry due to the current global COVID-19 pandemic, tourism is still very promising in Cambodia since the country is well endowed with many tourism assets. To add, the impact of 4IR technology on employment in the tourism industry in Cambodia is likely to be net positive.

- In terms of future skills requirement, the following are taken into consideration under the tourism job cluster, which also considers the conclusions in the January 2021 ADB Report:

  - Skill requirements in the tourism industry:

    Change in skills demand: According to employers, technical and ICT complex problem solving, and critical thinking skills will see the highest increases in importance over the next 5 years.

  - Overall skill importance:

    Communication and social skills will increase in their relative ranking under 4IR technology adoption. Communication is expected to become the most important skill in 2030, with management skills declining in relative importance significantly.

  - Changes in level of skills

    Overall, the industry will require significant upskilling as the demand for more intermediate and advanced skills is likely to increase.

- The main skills requiring advanced levels by 2030 under 4IR will be communication, social, and evaluation skills. More than half of workers in the industry will be expected to have intermediate technical and ICT as well as critical thinking skills.

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Sector 3

Job Cluster C: Healthcare, welfare, medicine

- In Cambodia, and in many other countries affected by the current COVID-19 pandemic, the Healthcare sector is expected to demand more jobs at least in the immediate future. The increased public demand in the sector due to heightened consciousness to maintain good health or hygienic working condition is expected to require increased production/creation of healthcare goods and services. In effect, more health workers will be needed and there will be more specialized clinics and hospital registered in the formal sector.

- In terms of future skills requirement, the following are taken into consideration under the healthcare job cluster:
  - Technical or practical skills
  - Problem solving skills
  - Plan and organizational skills
  - Office admin skills
  - Strategic management skills

Sector 4

Job Cluster D: Information and Communications Technology

- The current COVID-19 outbreak, coupled with the direction to adapt and adopt for Industry 4.0, leads to growing demand for workers under the information and communications technology (ICT). The ICT sector, which is expected to enable Cambodia's future digital economy, needs well trained and skilled workers in order to meet the gorwing demand in the sector. This is clearly depicted in the 2020 Cambodian ICT Master Plan, indicating the government's intention to shift towards a digital economy. The masterplan want to realize "Cambodia as an intelligent and comfortable nation with intelligent people, intelligent society and intelligent government by ICT."

- The pace of technology adoption is expected to grow year over year. However, there is a shortage of specialised workforce to propel the ICT sector, which will eventually become the engine for industrial growth. A report entitled "Cambodia Job Outlook" released by the Labor Ministry's National Employment Agency, with technical support of the Swedish International Development Cooperation Agency, revealed that IT professionals are becoming increasingly important in the labor market due to the rise of digitalization.

- Skills requirement in ICT job cluster include the following:
  - Foreign language skills
  - Written and communication skills
  - Customer handling skills
  - Advanced IT or software skills
  - Oral communication skills

Sector 5

Job Cluster E: Construction

- The construction sector also depicts promising job future. According to World Bank's April 2018 Cambodia Economic Update, while the Cambodian economy moves from heavy dependence on agriculture to industry and services, the now jobs created are largely (two-thirds) in construction, hospitality, and other services. Particular to the construction sector, the Ministry of Land Management Urban Planning and Construction (MLMUPC) in Cambodia reported in 2019 the continues growth in the sector, showing an increase in investment of more than 34% year-on-year to more than US$6 billion. Accordingly, between January to September 2019, the ministry already approved 3,433 construction projects valued at more than US$6.4 billion (a 34.73% increase) compared to the 2,541 projects valued at US$4.8 billion approved during the same period last year. Accordingly, over the 9-month reporting period, the sector has created between 147,450 and 150,000 jobs daily.

- Skill requirement in Construction job cluster include the following:
  - Oral communication skills
  - Teamwork skills
  - Problem solving skills
  - Strategic management skills
  - Office admin skills

3. Indonesia

Sector 1

Job Cluster A: Food Manufacturing/Processing

- In the Delphi survey, there are the following comments:
  - There are 3406.8 thousand people working in this sector.
  - Several types of positions/occupation, including Food Processor, Marketing Staff, Outlet Manager, and Logistic Driver/Delivery will continue to increase because of the demand.

- Of all the existing industrial sectors, the food processing industry is the industry that absorbs the most labor. Data from 2015-2021, respectively (2.89%, 3.23%, 3.63%, 3.67%, 3.74%, 3.75%, 26.97%) show that the percentage of absorption of labor continues to increase.

- The biggest increase occurred in 2021 when the pandemic spread, it is suspected that many laid-off workers entered this sector. The average increase in labor absorption in this sector is 0.172%, excluding the increase in 2021, it is estimated that for the next 5 years this increasing trend will continue with an estimate of 4.74%.

Sector 2

Job Cluster B: Beverage Industry

- In the Delphi survey, there are the following comments:
  - There are 210.8 thousand people working in this sector.
  - The second sector that many experts choose is the beverage sector.

- Data shows that since 2015-2021 the trend has also continued to increase, respectively 0.19%, 0.22%, 0.28%, 0.27% 0.30%, 0.30% and 2.26%. Similar to the food industry, a drastic increase also occurred in 2021. By excluding a number for the increase in employment absorption in 2021, this sector has an average increase of 0.02%. In the next five years, it is estimated that this sector will grow by 0.43%. Several types of positions/occupation continue to be in demand such as Beverage Processor, Marketing Staff, Outlet Manager, and Logistic Driver/Delivery, just to name a few.

Sector 3

Job Cluster C: Manufacture of Pharmaceuticals

• In the Delphi survey, there are the following comments:
- There are 160.9 thousand people working in pharmaceutical manufacturing, medicinal chemical and botanical products.
- Several types of positions/occupation were highlighted: including herbal medicine processor, pharmaceutical processor, pharmacist etc.

• Data shows that since 2015-2021 the trend has also continued to increase, respectively 0,12% 0,08% 0,11% 0,13% 0,22% and 1,00%. A significant increase also occurred in 2021 but not as much as the two previous industries. Perhaps this sector is more difficult to enter because it needs highly technical skills. This sector has an average increase of 0.15%. In the next five years, it is estimated that this sector will grow by 0.99%.

Sector 4

Job Cluster D: Textile Manufacturing

• In the Delphi survey, there are the following comments:
- There are 1292.5 thousand people working in Textile Manufacturing.
- There are several types of positions/occupation highlighted, including: machine operator, technician, marketing, production manager, plant manager, and logistic driver

• Data shows that since 2015-2021 the trend has also continued to increase, respectively 1,09%, 1,01%, 1,13%, 1,11%, 1,00%, 3,75%, and 5,80%. A significant increase occurs in 2020 and continue to 2021 (in pandemic era). This sector has an average increase of 0.79%. In the next five years, it is estimated that this sector will grow by 7.69%.

• Indonesia is among the top 10 textile-producing nations in the world. The country is also the 12th largest textile and apparel exporter, with major exporting destinations, including the United States, the European Union, and the Middle East. (Globalnewswire.com, 2021)

• However, it is important to note that the COVID-19 pandemic is causing a slowdown and its impacts on exporters of textiles and textile products are hitting developing countries hard. Unlike previous crises, COVID-19 is not only affecting the demand side of manufacturing, but also the supply side. Lockdowns and social distancing measures are significantly reducing global demand for clothing products and disrupting production and global value chains. There are also concerns about clusters of COVID-19 cases in garment factories. (Deasy Pane, 2020), furthermore, she added, *"in May 2020, Indonesia's textile and textile product exports dropped by a massive 52 per cent compared to the same month in 2019. This continues a worsening trend since March and April 2020 — when exports declined by 14.6 and 38.9 per cent respectively compared to the previous year. The largest export drop of 51 per cent is to the US market, the destination of 60 per cent of Indonesian garments."*

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Sector 5

Job Cluster E: Electricity Manufacturing

• In the Delphi survey, there are the following comments:

- There are 212.4 thousand people working electricity, gas, steam and air conditioning supply.

- Several types of positions/occupation were highlighted, including machine operator, technician, marketing, production manager, plant manager etc.

• Energy is crucial to Indonesia's economy, and sustainable and equitable development of the sector is key to growth of the country. Indonesia is rich in commodity resources, particularly coal, natural gas, metals, and other mining and agricultural products. In 2019, the country produced 616 million tons of coal, 2.8 million standard cubic feet of natural gas and 272 million barrels of oil.10 Indonesia is a net energy exporter, and the energy sector and overall economy has been built on natural resource extraction, with coal being Indonesia's principal export (11.2% of total energy export value) and palm oil second (8.76%). (ADB, 2020) Data shows that since 2015-2021 the trend has also a positive increase, respectively 0,15%, 0,12%, 0,14%, 0,13%, 0,17%, 0,19% and 1,08%. An increase also occurs in 2020 and continue to 2021 (in pandemic era). This sector has an average increase of 0.16%. In the next five years, it is estimated that this sector will grow by 1.13%.

4. Lao PDR

Sector 1

Job Cluster A: Hospitality including food and beverage

• From the Delphi survey: There is no mention of the hospitality sector as a whole but, 31.8 thousands people are working in the food and beverage sector.

• There is no information at the country level on the needs of the jobs in the sector but there is a high demand linked to the increase of tourism. This sector is mentioned in the TVET development plan: "The policy recommendations for the TVET Development Plan 2021-2025 lists sectors in high demand as construction, agriculture, machinery repair, hospitality, electricity, furniture and motor mechanics." The quick increase of Chinese tourists is planned to continue due to the future railway connections.

• A survey has been implemented under the LAO/029 Project. It covered the hospitality and tourism sector across 17 provinces and Vientiane Capital. The survey mentioned that the number of workers in the tourism and hospitality sectors is expected to reach 50,100 persons (65,000 if accelerated recovery) in 2023 from 42,260 in 2018. 82% of the tourism characteristic occupations are for restaurants. It mentions that the five main jobs are waiter, cook, receptionist, housekeeper, accounting.

Sector 2

Job Cluster B: Factory Technicians jobs (automation, electricity, mechanics)

• From the Delphi survey: 30 thousand people are Metal, machinery and related trades workers and 13.5 thousand are Electrical and electronic trades workers.

• There are no detailed needs analysis for these positions but they support the increase of the industries like food processing, garment industry and other industries.

• The jobs are essential to implement, maintain and control the machines and processes.

• They do not belong to a specific sector but can work transversally in many sectors.

Sector 3

Job Cluster C: Wholesale and retail trade and repair of motor vehicles and motorcycles

- From the Delphi survey: 30 thousand people are working in this sector which mixes many kinds of jobs (business and technical).

- There is not any number about the needs but these jobs will be needed linked to the continuing growth of Lao PDR, increase of cars and motorcycles sales.

- The overall retail sector will support industrial and tourism development.

- Presently, the automotive sector attracts students, it is among the five most popular courses in TVET public institutions.

- The repair of motor vehicles and motorcycles is mentioned in the policy recommendations for the TVET Development Plan 2021-2025 mentioning the sectors in high demands: "construction, agriculture, machinery repair, hospitality, electricity, furniture and motor mechanics."

- But there is an over supply of business and general retail.

Sector 4

Job Cluster D: Construction

- From the Delphi survey: 70.6 thousand people are working in this sector and 53.8 thousand are Building and related trades workers, excluding electricians.

- There is no national data about the needs but the jobs in the construction sector will be needed to support the overall requirements of infrastructure in relation with economic development, railway, tourism.

- The labor market report of the MoLSW 2019–2022 mentions the construction sector as being the main priority followed by agriculture and education sectors.

- This sector is a priority mentioned in the TVET Development plan: "The policy recommendations for the TVET Development Plan 2021-2025 lists sectors in high demand as construction, agriculture, machinery repair, hospitality, electricity, furniture and motor mechanics."

Sector 5

Job Cluster E: Market-oriented skilled agricultural workers and food processing

- From the Delphi survey: 10.5 thousand people are working in the food processing and 669.4 thousand are Market-oriented skilled agricultural workers.

- There is not any data about the needs but these jobs will be required to support the increase of productivity of agriculture (presently, a lot of food processed or not come from Thailand).

- This sector is a priority mentioned in the TVET Development plan: "The policy recommendations for the TVET Development Plan 2021-2025 lists sectors in high demand as construction, agriculture, machinery repair, hospitality, electricity, furniture and motor mechanics."

5. Malaysia
Sector 1

Information and Communication Technology (ICT)

- "Information and Communication Technology (ICT) has made a tremendous contribution to the Malaysian digital economy due to the increasing use of the computer and internet, including the general expansion of information and communication services and e-commerce. The contribution of Information and Communication Technology (ICT) in 2018 was RM289.2 billion and its expansion is reflected in the emergence of new technologies, not only in Malaysia but also across the globe" (p. 49).

- 4 categories of ICT industry: 1) ICT manufacturing, 2) ICT services, 3) ICT trade, and 4) ICT content and media (p. 49)

- Prospect for job creation: in 2019, employment in ICT was 1.14 million (7.5%) people and is expected to grow since the launch of "National IR 4.0: Equitable Wealth Creation Game Changer" in July 2021
  - Specific skills required for Malaysia's TVET development are highlighted in National IR 4.0

- Assessment on the potential of labor supply to meet the demand
  - "National Occupational Skills Standard (NOSS) is one of the national skills documents controlled by the Department of Skills Development, in the Ministry of Human Resources, and is also used for the purpose of aligning TVET programs with industry requirement" (p. 50)

- Assessment on the required skills in the future
  - Refer to the documents published by National Technical Association of Malaysia or PIKOM, and NOSS under the Department of Skills Development, Ministry of Human Resources (p.50)
  - "More Malaysian experts are required in education and training programs to teach critical competencies such as cybersecurity, e-commerce, and business pivoting, to enable a thriving new [d]igital [e]conomy" (p.50)

Sector 2

Education – TVET

- The need for talented teachers and trainers in TVET is significantly high (p.50)

- "The number of people employed in the education sector has shown positive growth, as reported by Department of Statistics Malaysia (2021)" (p.50)

- "The need for TVET educators continues to increase, especially with the need to facilitate more reskilling and upskilling programmes to strengthen the employment momentum during the COVID-19 pandemic" (p. 50)

- Information on the labor demand and supply
  - "In 2020, the number of employed skilled people increased to 28.6% by skill category, according to the Labor Force Survey Report, Malaysia which provides the justification for the increase and sustainability of TVET programs in Malaysia. TVET providers and users in Malaysia have urged the government to establish a National MTVET council that aims to improve the TVET eco-system and ensure that TVET institutions are able to train students with competencies that meet industry needs" (p. 50)

- Information on the required skills and current situation of TVET
  - "More investment is needed to update the digital competence of TVET educators and trainers in relation to emerging technologies such as Artificial Intelligence (AI), machine learning, cybersecurity and skills related to IR 4.0 requirements" (p. 51)

Sector 3

Oil and Gas Industry

- "The national Oil and Gas Services and Equipment (OGSE) industry blueprint, 2021-30, was launched in 2021. The blueprint was created after the government forecast a fall in oil and gas revenues in 2021 as the COVID-19 pandemic continues to batter crude oil prices. The 10 year plan outlines key goals to increase the OGSE sector's export potential and diversification into related areas such as renewable energy and industry consolidation" (p. 51)

- The companies have reduced in size but some jobs are still in demand: there is a shortage of skilled workers including technicians, supervisors, foremen and others. Most of the critical jobs are technical and skill-based positions from levels 1 to 5 on the Malaysian qualifications framework (pp. 51-52)

- Information on the labor demand and supply (p. 52)
- Demand: there is a demand for offshore engineers
- Supply: there are over 3,500 oil and gas firms in Malaysia

- Information on the required skills and current situation of TVET (p. 52)
- Open-mindedness in gaining experiences in new fields that can fall outside existing areas of expertise
- 1) HSE (health, safety and environment) knowledge, 2) quality assurance, 3) project management skills and 4) regulatory compliance

Sector 4

Human Health

- "There has been a tremendous increase in employment numbers within the Malaysian health industry due to the COVID-19 pandemic" (p. 52)

- "Approximately RM30.6 billion was allocated in Malaysia's 2020 budget solely for healthcare development. A total of 2,586 health employees were hired to strengthen the existing public health system, but predictions show that the number of employees in the health sector will continue to increase if the COVID-19 pandemic continues" (p. 52)

- "Malaysia now offers one of the best medical tourism sectors in ASEAN and in the 2020 Medical Travel Awards it was cited as the 'Medical Travel Destination of the Year' by the International Medical Travel Journal (IMTJ) (p. 53)

- Information on the labor demand and supply (p. 53)
- Jobs related to COVID19: science officers, diagnostic radiologists, medical laboratory technologists, assistant environmental health officers, assistant medical officers and nurses, and contracted health workers → There is a need for training programs for health professionals
- Jobs related to medical tourism: the standards for accreditation Malaysia Healthcare Travel Council follows are set by the Joint Commission International Accreditation (JCA) (USA), the Malaysian Society for Quality in Health (MSQH), CHKS Accreditation Unit (UK), the Australian Council on Health Care Standards (ACHS), and Accreditation Canada

- Information on the required skills and current situation of TVET

- "Malaysian government continues to support health services sectors to increase the requirements for competencies for science officers, diagnostic radiologists, medical laboratory technologists, assistant environmental health officers, assistant medical officers and nurses, as well as contracted health workers" (p. 53)

Sector 5

Electrical and Electronics

• Major players in Malaysia's economic growth (p. 54)

• The largest Malaysian export earner for decades. In 2019, the export value of electrical and electronics was RM 372.67 billion (44.7% of all exported goods and 6.3% of Malaysia's GDP in 2019)

• Information on the labor demand and supply (p. 54)
- Nearly 560,000 job opportunities have been created in this sector and the number of jobs are predicted to increase in the near future
- Electrical, electronics and optical products sub-sectors account for 26% of Malaysia's economic activity

• Information on the required skills and current situation of TVET
- "The shortage of talented workers and the inability to attract and retain talent" (p. 54)
- "A shortage of human resources has led to the government being forced to reject an investment project due to the inability to supply a sufficient number of engineers. Slow technological advancement, the low number of scientists and engineers engaged in research and development (R&D), and the lack of investment in R&D, makes it nearly impossible to support the population" (p. 54)

6. Myanmar
Sector 1

Garment Cluster

• "In 2015, Myanmar Garment Manufacturers (MGMA) initiated a 10-year Strategy with support from ILO to create more jobs and increase potentials to become USD 10 Billion Industry with 1.5 million job opportunities for people in 2024" (p. 74)

• "Between 2021 and 2018, the value of garment exports rose by 500%, from around USD 900 million to USD 4.6 billion by 2018. In 2019, the Myanmar apparel industry exported US $5.7 billion worth of garments and a further US $1 billion of footwear and handbags. There was also an increase of 26% revenue in the previous year" (p. 74)

• "The high volume of FDI aimed at the garment export sector is creating many job opportunities for the Myanmar workforce. At the start of 2020, Myanmar Garment Sector employed approximately 1 million employees with expectation to employ up to 1.5 million employees in 2024" (p. 74)

• Assessment on the potential of labor supply to meet the demand (p. 74)
- Labor supply: 33 million people
- Labor training: 1) Japanese development organization HIDA through the MGMA training school, the Myanmar Garment Human Resources Development Center (MGHRDC) train 500 new sewing workers and 120 supervisors per year; 2) the Ministry of Border Affairs runs a sewing training course every three weeks graduating 120-140 trainees who move to Yangon area to work

• Assessment on the required skills in the future (p. 74)
- Basic skills: sewing and supervising
- Technical skills: 1) sewing quickly, and 2) maintenance and repair skills for automated garment machines and facilities
- Business skills: 1) languages, 2) communications, and 3) IT.

Sector 2

Manufacturing (Food Processing)

• "According to Myanmar Micro, Small, and Medium Enterprises Survey 2017 by Ministry of Finance, Planning and Industry, majority of Myanmar's MSMEs are involved in the food processing sector (63.51% of MSMEs)" (p. 75)

• Information on the labor demand and supply (p. 75)

- "Currently, Myanmar have very limited capacity to meet the increased labor demand especially for skilled labor sector in Manufacturing. TVET sector is still under development and mostly focusing on technical and engineering sectors. Although these skills are important for all manufacturing sectors, food processing sector will require certain specialized skills that is currently not available in Myanmar's TVET community yet"

• Information on the required skills and current situation of TVET (p. 75)

- Technical skills: 1) speeding up, 2) knowing how automation works (machine dexterity)
- Business skills: 1) language, 2) communication, and 3) IT

Sector 3

Construction

• Summary of job creation potential (p. 76)

- In 2018, the construction industry had a value of more than 9.5 billion USD, which is a share of around 16.5% of country's GDP
- Economic centers such as Yangon and Mandalay have a strong demand for middle-class condominiums
- Other infrastructure sectors like roads, railways, harbors, and airports require massive investments where international developers can get involved with joint venture operations or as a supplier

• Information on the labor demand and supply (p. 76)

- "For the infrastructure development projects estimated, the requirement of skilled labor as well as semi-skilled labor will be proportionately increased. Currently, Myanmar TVET sector (public training centers under MOE, MOLIP and other ministries, Private training schools and training programs by development partners) has training courses in metal works, welding, bricklaying, machine operating and maintenance, logistic operations, electrical installation and workplace safety trainings"

• Information on the required skills and current situation of TVET (p. 76)

- "To meet the skill requirements for the increasing demand, Myanmar needs to develop strategy to increase the supply of certified semi-skilled and skilled labor in metal works, welding, bricklaying, machine operating and maintenance, electrical installation, logistic operations, etc. For civil engineering courses, the total of 33 Government Technical institutes are providing three-year AGTI diploma courses"

Sector 4

Hotel and Tourism

- The summary of job creation potential (p. 77)
- "In 2016, the Union of Myanmar Tourism Association (UMTA) estimates that travel and tourism directly supported 804,000 jobs (or 2.7% of total employment). Including indirect employment, that figure rose to 1,662,000 jobs (5.7% of total employment). Over the next ten years, it is forecasted that direct employment from travel and tourism will increase by 4.8% annually and the indirect employment will also grow by 3.8%, totaling 1,296,000 and 2,387,000 jobs in 2027 respectively" as cited by WTTC (2017)

- Information on the labor demand and supply (p. 77)
- Since 1992, the Ministry of Hotels and Tourism's (MOHT) Tourism and Training School offers courses for tour guide training and tourism management.
- MOHT and the Ministry of Education implemented a four-year degree program in tourism beginning in the 2012/13 academic year at the National Management Degree College in Yangon and Mandalar Degree College in Mandalay, as well as collaborating on capacity building for Yangon University's tourism department
- With an ODA from Luxembourg, the Myanmar Tourism Federation opened a Hospitality Training School, which offers courses in front office, housekeeping, and food and beverage.

- Information on the required skills and current situation of TVET (p. 77)
- Relevant to customer contact experiences:
- 1) Language skills, 2) customer care/customer service skills, 3) public speaking skills, and 4) time management skills
- Relevant to the market, especially for tour guides:
- 1) cultural interpretation, 2) heritage and history, 3) trekking, and 4) cooking

Sector 5

ICT

- Job creation potential (p. 78)
- "Estimates as to the economic contribution of Myanmar's ICT sector are difficult to ascertain, but a 2013 McKinsey Global Institute report forecast that the sector would grow from $100m in 2010 to $6.4bn in 2030. World Bank estimates suggest the sector generated $1bn, or 1.5% of GDP in 2018, while the wider digital economy, including ICT, was worth around $1.2bn. Detail quantity of ICT workers requirement are difficult to estimate"

- Information on the labor demand and supply (p. 78)
- "In Myanmar, ICT skills are mainly provided by the 24 computer colleges and two universities with computer studies departments under the jurisdiction of the Ministry of Education. Private sector with over 90 computer training centers and schools (70 in Yangon), have also contributed to the increased number of ICT workers. Informal certification programs, such as the Japanese Information Technology Engineer Examination provides IT training opportunities to those who cannot afford to participate in formal education programs"
- "At the professional level, however, skilled ICT workers are in short supply. Although the number of training and research staff has steadily increased from 1995 to 2011, the number of enrollees and graduates in the computer courses in higher education institutes has declined from about 18,000 enrollees and 6,000 graduates in 2006-2007 to 10,000 enrollees and 4,000 graduates in 2010-2011. As this trend continues, the current supply of ICT skilled workers could cause disruptions to various ICT services"

- Information on the required skills and current situation of TVET (p. 78)
- 1) software development skills, 2) hardware knowledge, and 3) system integration skills

7. Philippines	
Sector 1	

Construction

- Job creation potential (p. 84)
- "The Philippine Construction Industry Roadmap 2020-2030 projects the country will need 4.4 million highly skilled workers by 2030. With only 1.6 million skilled workers in 2018, the construction industry will need to train 2.8 million skilled workers from 2019-2030. That means a demand of 233,000 skilled workers needed in construction per year"

- Potential of labor supply to meet the demand (p. 85)
- TVET sector produces a little more than 100,000 skilled workers for the construction industry. This is way below the need to produce 230,000 skilled workers annually.

- Required skills in the future (p. 86)
- 1) Eathmoving heavy equipment operation, specially for Mixer, Bulldozer, and Paver, 2) Crane Operation (including Mobile Cranes), 3) Sheet Filing Operation (for Bridges), and 4) Vibro Machine Operation
- Technologies related to 1) rubberized asphalt (asphalting), 2) solar energy, 3) mechatronic technology of the HE, 4) Skills for sea-based construction, 5) underwater fiber optic cables (installation), 6) tunneling (for subways), 7) AAC (autoclaved aerated concrete), 8) GFRC (glass fiber reinforce concrete), 9) electronics/programming for green technologies, 10) climate change resilient construction, and 11) green construction

| **Sector 2** | |

Tourism

- Job creation potential (p. 87)
- Philippines Tourism Human Capital Development Plan 2021-20205 indicates some reasonable expectations for growth
- "If not for the COVID-19 pandemic, according to WTTC, the Philippines tourism industry was growing at 8.6% GDP growth compared to the economy at 5.9%. This means the growth of jobs in this sector is also very impactful"
- "The target of 5.8 million employment from tourism was achievable. The actual jobs recorded in 2019 was 5.7 million people employed in the tourism industry"

- Potential of labor supply to meet the demand (p. 87)
- "Tourism is a popular course in TVET, which is probably producing too much than what the industry needs."

- Required skills in the future (p. 88)
- 1) Technology and digitalization in tourism, 2) future of tourism in the 4th Industrial Revolution, 3) tourism trends and forecasts, 4) Barrier Free Tourism (accessibility), 4) understanding Muslim travelers, 5) tourism data and statistics management, 6) multi-cultural awareness, 7) natural and cultural environmental planning, 8) crisis and risk management, and 9) e-commerce and social media marketing

Sector 3	
Sector 4	
Sector 5	

8. Singapore
Sector 1

Information and Communication

• Based on the Delphi results (p. 69)
- ICT vacancies have been increasing steadily
- There was an increase of 20% from the fourth quarter in 2020 to first quarter in 2021 (6000 vacancies, after adding 2900 jobs)
- Quarterly increases of 10-20% are expected (1500 to 3000 jobs)
- Singaporean government is planning to increase spending on ICT to S$3.8 billion

• Assessment on the potential of labor supply and meet demand (p. 70)
- The number of unfilled tech jobs across Singapore is estimated to be 19,000 each year when the number of students enrolled in ICT majors for 6 autonomous universities was 2,800 in 2019.
- Another 4,500 ICT students graduate from polytechnics and the Institute of Technical Education annually

• Assessment of future skill requirements (p. 70)
- Based on the Delphi survey, the 5 following skills are thought to be needed: 1) 5G technical skills, 2) Internet of Things, 3) Cloud Computing and Enterprise Software As A Service (SaaS), and 4) core ICT capabilities including software engineering, cybersecurity, data analytics

Sector 2

Manufacturing

• Based on the Delphi Survey results (p. 70-71)
- "Based on the past 4 years trend in quarterly employment changes, the manufacturing industries saw a huge decline at the start of the COVID19 pandemic but rebounded strongly within a year" (p. 71)
- Manufacturing consistently has the highest quarterly job vacancies numbers among the 5 clusters
- Jobs in manufacturing are expected to increase, given that the demand for consumer products recovers post-COVID19
- Manufacturing sector is conventionally more occupied by foreign workers but due to stricter immigrant regulations demand for domestic workers is expected to increase.

• Information on the labor demand and supply (p. 71)
- There always is a shortage in labor because manufacturing jobs are not preferred in Singapore due to low wages and working environment such as taking shifts
- The shortage in labor seems to arise from job-expectation mismatches

• Information on the required skills and current situation of TVET
- 1) advanced manufacturing (additive manufacturing, precision engineering), 2) biopharma manufacturing, 3) food manufacturing, and 4) electronics manufacturing (e.g. semi-conductor manufacturing)

Sector 3

Human Health and Social Work Activities

- Based on the Delphi Survey results (p. 71)
  - For the past 4 years, trend in quarterly employment has been steady and increasing
  - There is an increased demand for healthcare workers and there is a 10-20% increase in vacancies.
  - The health sector is conventionally more reliant on foreign workers but because of stricter immigration regulations and an outflow of workers from Philippines, the demand for domestic workers are expected to rise.

- Information on the labor demand and supply (p. 72)
  - Labor demand: two factors (an aging population and COVID 19) are expected to increase the demand for eldercare healthcare workers.
  - Labor supply: it is quite unlikely that the labor supply will meet labor demand as there has been a great leap in the demand

- Information on the required skills and current situation of TVET (p. 72)
  - Ministry of Health and SkillsFuture Singapore indicated three healthcare training areas: 1) aged care, 2) healthcare IT and data analytics, and 3) healthcare system design, organization and delivery

Sector 4

Financial and insurance activities

- Based on the Delphi Survey results (p. 72-73)
  - Based on the past 4 years, the trend in quarterly employment changes in the Financial and Insurance Sectors are steady and consistently positive
  - Even with COVID-19, there is an increased demand for financial workers (there was a 20-25% increase in the number of vacancies)
  - Recent political turmoil in Hong Kong has made Singapore a more desirable financial hub in Asia
  - The Monetary Authority of Singapore (MAS) has huge plans to make Singapore into the financial technology hub, which will lead to an increase in jobs.

- Information on the labor demand and supply (p. 73)
  - Labor Supply: jobs in this sector are highly favored by Singaporeans and therefore the supply of low skilled financial jobs will meet the demand but only 43% of high skilled jobs are filled locally

- Information on the required skills and current situation of TVET (p. 73)
  - Refer to the report "The Impact of Wider Integration of Data Analytics and Automation on Manpower in the Singapore Financial Services Sector"

Sector 5

Transportation and Storage

• Based on the Delphi Survey results (p. 73-74)
- Based on the 4-year-trend in quarterly employment changes, the transportation and storage sector mirrored manufacturing sector and saw a significant decline at the beginning of COVID19 but bounced back within a year
- With an increase in the demand for e-commerce, "last-mile delivery" will affect the demand of the transportation sector positively

• Information on the labor demand and supply (p. 74)
- The demand will be met largely by a transient or an ad hoc workforce due to a low entry barrier
- The challenge is with the senior positions such as regional sales manager, logistics system or solution specialists and e-commerce executives. Some programs try to redeploy labors from dislocated sectors like aviation, travel, and hospitality through an extended period of training.
- Some other challenges might be relevant to the increasing need for skills in Transportation ICT.

• Information on the required skills and current situation of TVET (p. 74-75)
- New capabilities in 1) artificial intelligence, 2) Internet of Things, and 3) robotics

9. Thailand

Sector 1

Job Cluster A: Food Manufacturing/Processing

• In the Delphi survey, there are the following comments:
- There are 1411.3 thousand people working in this sector.
- Thailand still has large land area of agriculture which can be changed from grain/mill products to a variety of fruits, vegetables, animal husbandry and other agricultural products that are required by both domestic and international markets. Food manufacture or processing will be strengthened and expanded through technology and innovation. Up-skills and re-skills of workers in these occupations are needed which is clearly identified by the national policies and plans. For example, in the Eastern Economic Corridor (EEC) Development Plan, food manufacture/processing is an important value chain of agriculture development identified as "food for future" that requires qualified manpower or "smart farmers" for cultivating and processing (9,428 workers in 2022 to increase to 21,404 workers in 2027 from http://library2 paliament.go.th).
- Automation in food manufacture/process would certainly reduce the number of jobs, however, manual labor and blue-collar workers will be needed to be re-skilled and up-skilled in order to be able to carry out intensive farming, safety and hygienic farming, bio-fertilizer farming, as well as harvesting and other manual workers.
- Food manufacture/process do need quality agriculture products that require quality farmers and workers.

• Thailand has been an agricultural base country with 12.5 million out of 37.9 million workers of this sector in 2020 (NSO, Thailand Labor Force Survey, 2020). In order to increase the value of agricultural products, food manufacturing/processing has become one out of ten key industries in the national development plan. Workers involved in this sector numbered 1.45 million in 2017 and increased to 1.65 million in 2020 and is expected to increase to 1.71 in 2021 (eng.rmutsv.ac.th). According to the study of the Ministry of Labor, food industry will require 17,016 new workers (laborers, technicians, engineers) by 2027. Not only large-scale food manufacturing/processing needs workforce, at local or community level, community enterprises and entrepreneurship are also promoted. Therefore, new technology and innovation in food processing will require qualified workers like technicians in automation, mechatronics and process control. However, a large number of those who work in the farm also need to be trained on safety food products or raw materials as well. This sector of jobs includes market-oriented skilled agriculture workers, market-oriented skilled fishing, and subsistence farmers and fishers….

Sector 2

Job Cluster B: Retail Trade

• In the Delphi survey: it is mentioned that there are 4,188 thousand people working in this sector.

• According to the study of the National Statistical Office (nso.go.th), during 2017-2021, the demand of workers in retail trade would be 4.87 million including local retail trader, community enterprises, and self-employed retail which is the second group after agricultural related occupations. However, this growth rate may be changed due to the change of habits during the Covid19 pandemic. At present, large-scale modern retail traders in Thailand include 2-3 multinational companies and 3-5 operators. The five types of retail trade include department store, discount/super center, supermarket, convenience stores, and specialty store. Growth of tourism sector (35.36 million tourists in 2017 to 39.92 million in 2019) has resulted in expansion of retail trade stores during the past few years.

Sector 3

Job Cluster C: Computer Programming and Related Digital Technology Activities

• In the Delphi survey, there are the following comments:

- There are 43.8 thousand people working in Computer programming, consultancy and related activities, 73.4 thousand working as Information and communications technology professionals.

- Under the current strategy, Thailand is transforming its economy into Thailand 4.0 – growth via innovation. Several new technologies will be disruptive and will have a widespread impact on the industry. These are as followed. (1) IoT: will manage the supply chains of smart factories and industries that are technologically-intensive, such as automobiles, electronics, retail stock management and even tracking patient health in new, connected hospitals. The IoT will use 5G wireless technology to support massive machine-to-machine communication links. (2) Cloud: Low-cost option for corporations to be competitive in the digital era. (3) 3D Printing: rapidly design and produce goods at lower costs, may find a role in the supply chains of some industries, for example in fashion, auto parts, electronics, and machinery & equipment. (4) Automation of Knowledge: replicate skilled human work. (5) Robotic Process Automation: to assist with repetitive work or manage algorithmic big data collection and analysis. (6) Blockchain: allow data to be portioned out to users across a network by controlling access, making the data storage highly secure.

- As COVID-19 forces executive to make difficult choices and accelerate their digital transformation, consultants with the cutting-edge skills to help companies weather the storm will continue to be in high demand. Professional services firms are pushing to deliver new technology solutions beyond their traditional scope (e.g. designing and developing apps, prototypes, and intelligent systems).

- Software and applications developers and analysts: Jobs in this field include application analysts – professionals responsible for the administration, monitoring and maintenance of software infrastructures and applications. Meanwhile, software developers create the applications that enable us to perform specific tasks on devices like computers, while an applications developer makes computers perform specific tasks based on client specifications.

• Computer programming occupation is closely related to information services activities, and telecommunication identifies in Thailand as "Digital Technology" which is one out of ten development targets of the country. According to the forecast of Industrial Economic Office, the demand of workers in this sector would be 217,368 workers during 2020-2024. Demand is increasing by enhancing the use of innovation and technology in industries and service sectors to reach Thailand 4.0 goal. New normal situation caused by Covid19 pandemic, has made more demand in using workers who can use digital technology for performing and controlling production or service processes. While every school and education and training institutions concentrate on e-learning programs, e-learning media, and e- assessment, qualified workers are needed.

Sector 4

Job Cluster D: Vehicle Manufacturing

• In the Delphi survey, there are the following comments:

- There are 384.4 thousand people working in Manufacture of motor vehicles, trailers and semi-trailers.

- Thailand is moving away from being a cheap labor hub for high-volume, labor-intensive production to a more advanced manufacturing path. Many companies view Thailand as their Southeast Asian manufacturing hub, and have both factory capacity available and empty land to build new factories on when demand warrants. Executives receive inquiries from customers about relocating operations — or at least diversifying away — from a China hub, and there is a general sentiment that investment from the electronics and automotive sectors will continue to grow in the next couple of years.

• Vehicle or automotive industry in Thailand produces 5.8 percent of GDP. This sector is also considered as one out of ten key industries in the national development target. In 2019, there were 550,000 workers involved in production process, 50,000 workers in parts production, and 100,000 workers in service activities. The study on manpower in this sector for EEC showed that those numbers of workers may decline if automation expands with the new generation vehicle. However, it was forecasted that there will be an increase in the production of at least 300,000 new generation vehicles per year by 2023. This plan requires 9,555 technicians and 35,553 operators by 2023. These jobs are related to jobs in manufacture of machinery and equipment, other transport equipments.

Sector 5

Job Cluster E: Food and Beverage Services Activities

• The food and beverage services activities are very much connected to the overall hospitality and tourism sector.

• In the Delphi survey there are the following comments:

- There are 384.4 thousand people working in food and beverage service activities.

- The focus is to preserve the nations' world-class tourist attractions and increase the proportion of high-quality tourists in the following tourism sectors, (1) creative and cultural tourism; (2) business tourism; (3) health, beauty and traditional Thai medicine tourism; (4) maritime tourism; and (5) regional cross-border tourism.

- Tourism sector is one of the main development guidelines in the National Strategy (2018-2037).

- Related sectors that link closely with tourism and focus in national growth engine strategy include agriculture and food related industry for good quality tourism, medical and wellness for tourists, as well as aviation and logistics. Demand for new workers in those areas during 2019-2023, will be high, for example, 16,920 workers for health tourism, and 11,412 for medical tourism.

- According to the study of the National Statistical Office (eng.rmutsv.ac.th), job in food and beverage service activities during 2017-2021 shared the highest proportion of increasing workers or increased from 3.48 hundred thousand in 2017 to 5.86 hundred thousand in 2021. Hopefully, this sector should grow after Covid19 pandemic because it mainly relies on both foreign and domestic tourists as well as the lifestyle of workers in the big cities who tend to cook less. For Thailand, food and beverage service activities are closely linked to tourism and hospitality, retail trade, health and wellness tourism. All these sectors are expanding.

• According to the study of the National Statistical office, food and beverage services has become the largest occupation that would require 5.86 hundred thousand workers during 2017- 2021 with an increase of 68.34 percent from 3.48 thousand workers in 2016 (http://www.nso.go.th).

10. Viet Nam

Sector 1

Job Cluster A: Manufacture of food products

- From the Delphi survey: there are 878.3 thousand of people working in this sector.

- To promote the development of agricultural mechanization and agro-processing industry together with supporting industries and logistics services are important solutions for the rural development of Viet Nam period 2021–2025. This strategy creates great opportunities for the enhancement and expansion of many types of jobs in this field such as processing and preserving seafood and aquatic products; manufacture of food meals, ready-to-eat foods, process and preserving seafood and manufacturing of meals, post-harvest technology, fruit trees products processing.

- Labor and employment survey data and forecasts of the National Center for Employment Services on employment trends in 2020 indicate that the labor force in the overall processing and manufacturing industry has increased from 10,312 thousand people by 2020 to 12,085 thousand people by 2025 and increase to 13,654 by 2030. But there is no specific data for food processing.

Sector 2

Job Cluster B: Manufacture of wearing apparel, garment, textile, clothes

- From the Delphi survey, they are 1,962 million people working in the wearing apparel business (3.9% of the workforce).

- Manufacture of wearing apparel is becoming one of the key export-oriented industries to meet the high demands of consumers; create more jobs for workers and attract foreign investment in Viet Nam. According to the Ministry of Planning and Investment, foreign direct investment (FDI) is increasing and especially for garment enterprises. It is estimated that Viet Nam this year will have over 3,000 garment companies, of which 25% are FDI companies. Foreign businesses tend to choose Viet Nam as a good destination, especially after the TPP Agreement was signed. Exports to TPP member countries are expected to triple.

- The textile and garment industry currently employs approximately 3 million workers, accounting for >10% of the country's industrial workforce. The annual labor growth rate averaged over 10%, higher than the average of all processing and manufacturing industries.

- Expected jobs are technicians on Fiber technology, Textile technology, Fashion apparel, Weave technology, Fashion design.

Sector 3

Job Cluster C: Hospitality including food and beverage service activities

- Food and beverages are directly connected to hospitality and tourism sector.

- Promoting tourism as a key economic sector is identified in the strategy of Viet Nam's tourism development to 2030.   In terms of employment goals, Viet Nam's tourism strategy is determined to create about 5.5 - 6 million jobs within 2025, of which about 2 million are direct jobs, and about 8 5 million jobs by 2030, of which about 3 million are direct jobs in the hospitality industry.

- The 2021 Employment Trends Report forecasts that in the period of 2020-2030, the hotel and restaurant industry will have the second largest increase of workers after the processing and manufacturing industry. Accordingly, the number of employees in the service and accommodation industry in 2020 is 3,172 thousand people (accounting for 5.7% of the labor force); planned to be 4,439 thousand people (accounting for 7.6% of the labor force) in 2025 and 5,897 thousand people (accounting for 9.6% of the labor force) in 2030.

- More specifically, from the Delphi survey: there are 1871 thousand people working in food and beverage service activities which include food service, restaurant services, hotel services, food delivery services.

Sector 4

Job Cluster D: Human health activities

- The 2021 Employment Trends Report forecasts a significant need of the workforce on healthcare and social support, including caretaking, nursing, health care, elderly care, health counseling. The number of employees in this field in 2020 is 631 thousand people (accounting for 1.1% of the labor force); the plan for 2025 is 736 thousand people (accounting for 1.3% of the labor force); and in 2030, 842 thousand people (accounting for 1.4% of the labor force). Human resources working in the public health system also increased year by year, specifically the number were 470,535 for 2017 and 472,558 for 2018.

Sector 5

Job Cluster E: Market-oriented skilled agricultural and fishery workers

- Viet Nam is determined to develop agriculture towards a comprehensive, modern, large and sustainable production. Rural development supports the process of industrialization and urbanization of the country, can increase the income and fundamentally improve living conditions of rural residents, while protecting the environment.   The fisheries sector is considered an important economic sector of the country. The goal is that by 2030, the fisheries sector will create jobs for over 3.5 million workers, with an income per fishery worker equivalent to the average income of the whole country.

- Labor in agriculture and fisheries accounts for a high proportion of the labor force. The 2021 employment trends report forecasts that in the period 2020-2030, the number of employees in the agriculture, forestry and fishery industry will be 20,001 thousand people (accounting for 36% of the labor force); 2025 is planned to have 17,416 thousand people (accounting for 30% of the labor force); and in 2030 14,863 thousand people (accounting for 24.8% of the labor force).

- From the Delphi survey, growing food crops and technical agricultural workers will be needed.

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