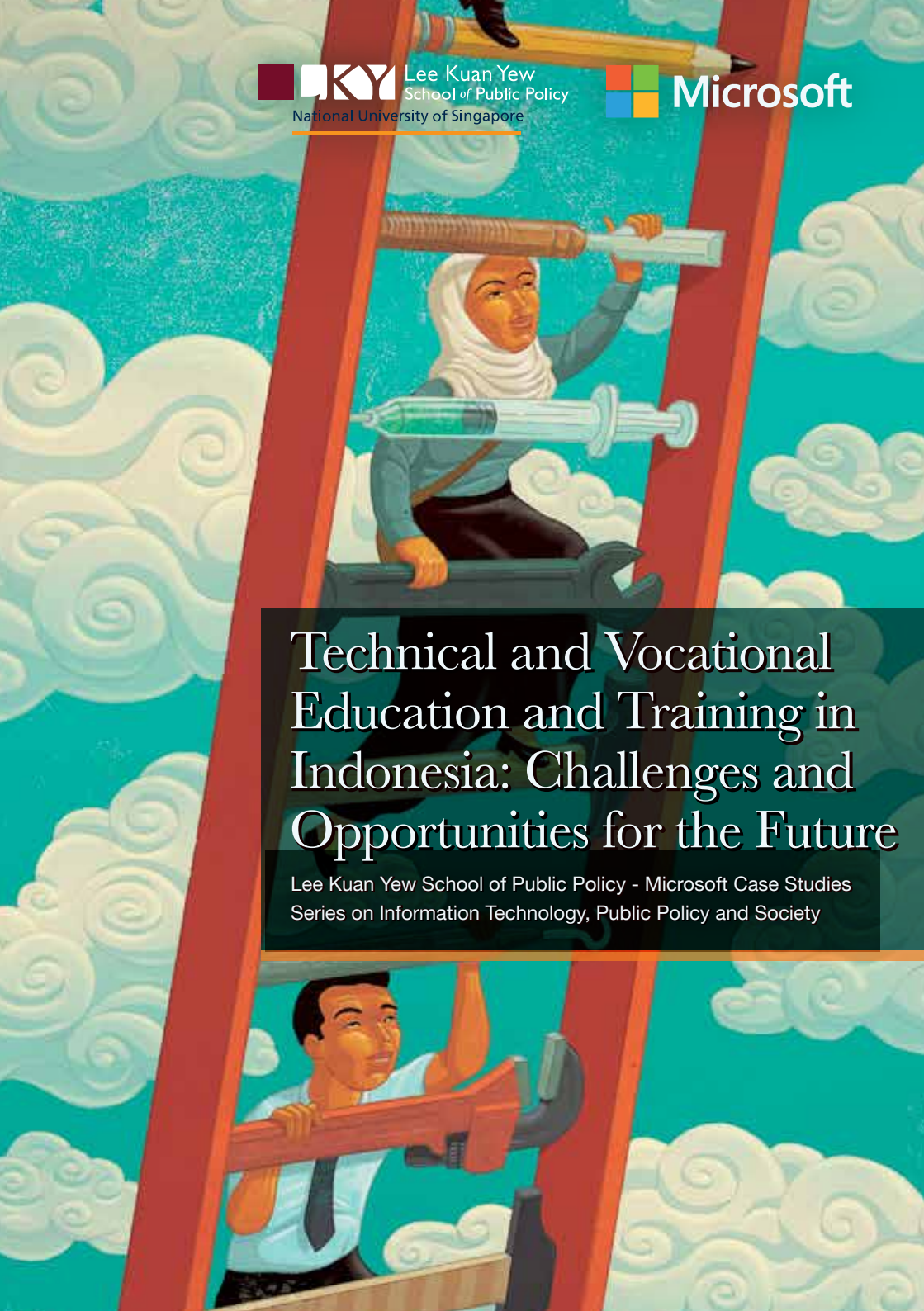

Technical and Vocational Education and Training in Indonesia: Challenges and Opportunities for the Future

Lee Kuan Yew School of Public Policy - Microsoft Case Studies
Series on Information Technology, Public Policy and Society

Lee Kuan Yew School of Public Policy – Microsoft Case Study Series on Technical and Vocational Education and Training

Case Title:
Technical and Vocational Education and Training in Indonesia: Challenges and Opportunities for the Future

Lee Kuan Yew School of Public Policy
National University of Singapore

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Authors and information about the case:
This case study was written by Dr. **Suzaina Kadir** together with Mr. **Nirwansyah** and Ms. **Bianca Ayasha Bachrul** from the Lee Kuan Yew School of Public Policy together. It is based on existing literature, in-person and email interviews with Mr. **Agung Budi Susanto** (Subsection Head, SMK Development, Ministry of Education & Culture), Mr. **Kokok Haksono** (Polytechnic Education Development Manager, Directorate General of Higher Education), Mrs. **Nunung Martina** (lecturer, Jakarta Public Polytechnic), Mr. **Rudy Djumali** (Senior Advisor, GIZ GmbH), Mr. **Dadang Kurnia** (Advisor, GIZ GmbH), Ms. **Meby Damayanti** (Advisor, GIZ GmbH) and Mr. **Fikri Kurniakiki** (Subsection Head, International Cooperation, Ministry of Manpower).

Date:
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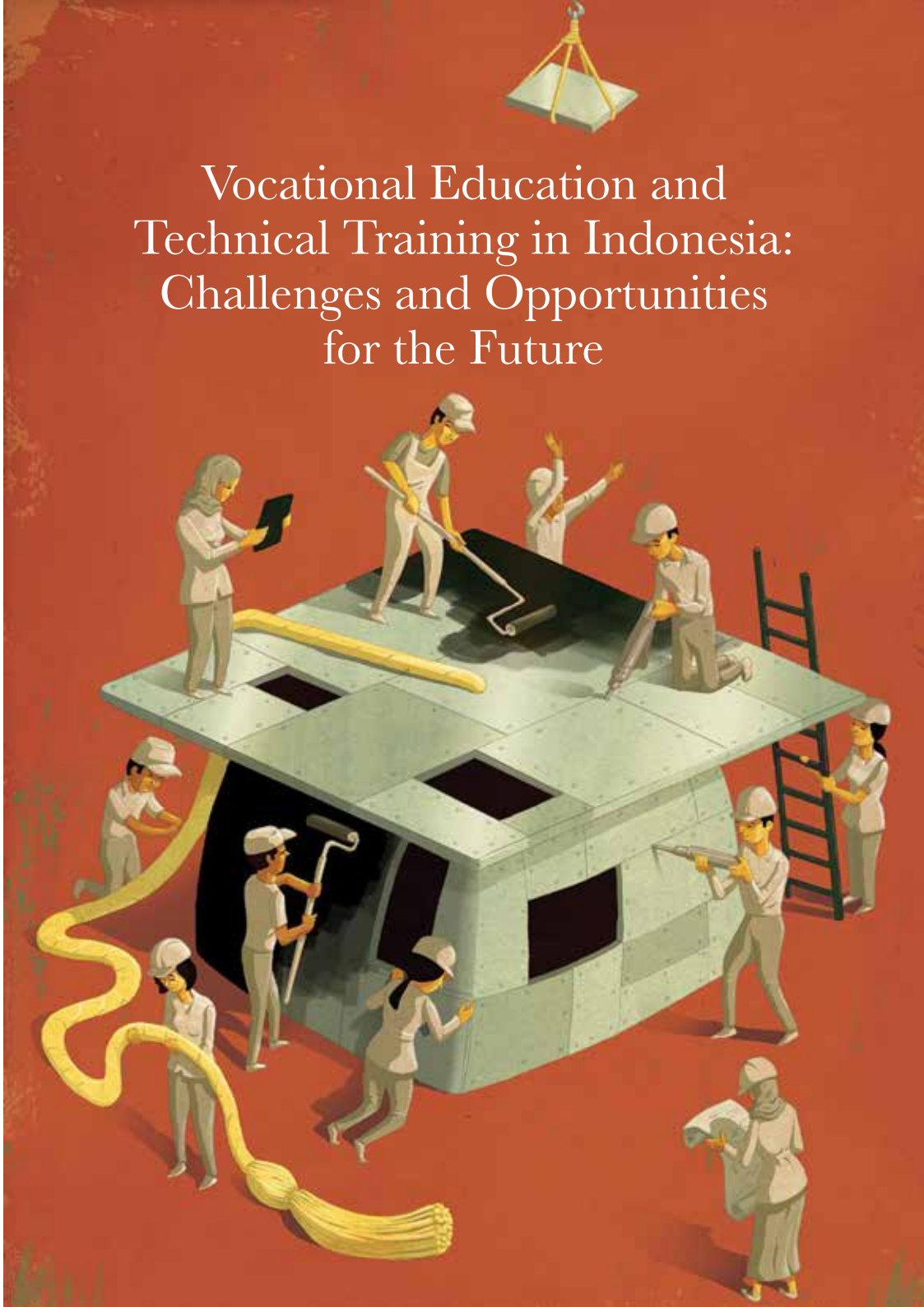
Credits:
Layout by **James Lee**
Front Illustration by **Paul Lachine**

Vocational Education and Technical Training in Indonesia: Challenges and Opportunities for the Future



"Do not ever underestimate vocational education. The Higher Education Act puts equal importance between academic education and vocational education in terms of organizational and workforce structure. For example, a polytechnic lecturer must now at least hold a masters degree. Therefore, vocational education should no longer be discriminated against academic education. Similarly, there should be no discrimination between vocational lecturers and academic lecturers."

Former Minister of Education & Culture Mohammad Nuh
Inauguration ceremony of Madiun Public Polytechnic,
East Java, 11 May 2013

Abbreviations

Annual SMK Expo	Annual SMK Expo of Competency Products and Job Fairs for SMK Students
CPSC	Colombo Plan Staff College
CTICE	Center of Technology Information and Communication for Education
DGHE	Directorate General of Higher Education
Higher Education Act	Law No. 12 of 2012 on Higher Education
IT	Information Technology
ICT	Information and Communications Technology
IQF	Indonesian Qualifications Framework
MENC	Ministry of Education and Culture
MOF	Ministry of Finance
MOM	Ministry of Manpower
MORA	Ministry of Religious Affairs
MORTHE	Ministry of Research, Technology and Higher Education
MP3EI	Masterplan for Acceleration and Expansion of Indonesia Economic Development, 2011-2025 *(Masterplan Percepatan dan Perluasan Pembangunan Ekonomi Indonesia)*
National Education System Act	Law No. 20 of 2003 on the National Education System Act
NPCB	National Professional Certification Body *(Badan Nasional Sertifikasi Profesi)*
PPP	Public-Private Partnerships
RPL	Recognition of Prior Learning
SMA	General Senior Secondary Schools
SMK	Vocational Senior Secondary Schools
TESDA	Technical Education and Skills Development Authority
TVET	Technical Education and Vocational Training
WTLS	Web-Based Teaching and Learning System

1. Introduction

Indonesia is an emerging force to be reckoned with. According to the McKinsey Global Institute, Indonesia is the 16th largest economy in the world with potential to climb to the 7th position by 2030 (Oberman et al. 2012). Indeed, Indonesia's current success can be attributed to the nation-state's political stability and economic resilience. Indonesia is also one of the most decentralized countries in the world, where the Central Government's authority is limited to issues of defense, security, religion, international affairs and laws, fiscal and monetary policies thereby giving the provinces substantial say in local governance. Additionally, Indonesia has made significant improvements in its macroeconomic policy in the aftermath of the 1997 Asian Financial Crisis. The World Economic Forum ranked Indonesia 34th on macroeconomic stability in 2014, a considerable jump from the 87th place in 2007.

Likewise, such optimism for Indonesia's future is reflected in the National Long-Term Development Plan for 2005-2025, which highlights the country's ambition to become the 12th largest economy worldwide by 2025, and the 8th by 2045. However, Indonesia's ambitions may be constrained by the low productivity of its labor force. In 2010, 50.4% of the labor force obtained primary school degree, among which only 7.6% graduated with a degree from a tertiary education institution (Susanto 2012). Labor productivity is further hampered by the wide skills gap between the skills attained through formal education and those needed at the workplace. In fact, Indonesia's labor productivity lags behind that of Malaysia, Thailand, the Philippines and China (World Bank 2014). As such, Indonesia's Ministry of Education & Culture (MENC), the Directorate General of Higher Education (DGHE) and the Ministry of Manpower (MOM) has decided to focus extensively on improving technical education and vocational training (TVET) to narrow the skills gap.

This case study is about the development of, and future for, vocational education in Indonesia. Section 2 provides an overview of Indonesia's education system and the impact of decentralization on the education structure. Section 3 explores Indonesia's TVET system, focusing on vocational education and technical training. Section 4 discusses the Indonesian Qualifications Framework (IQF/*Kerangka Kerja Nasional Indonesia*) and its implications for vocational education. Section 5 examines the integration of Information and Communications Technology (ICT) in vocational education. Finally, sections 6 and 7 analyze the challenges and opportunities for vocational education in Indonesia.

2. Education in Indonesia

Education is a basic right of every Indonesian citizen. Since 1994, a top priority for the MENC is to ensure every child attends nine years of mandatory basic education, comprising six years of primary school education and three years of junior secondary school education. The mandatory basic education program has successfully increased junior secondary school enrollment (for students aged 13 to 15) from 79.21% in 2002 to 86.11% in 2010 (Central Statistical Agency 2015a). In 2012, the MENC introduced the Universal Senior Secondary Education Program, which is a twelve-year mandatory education program aimed at increasing senior secondary school enrollment rate (Wedhaswary 2011). Full implementation of the program was launched in June 2015 (Galih 2015).

2.1 Decentralized Governance and the Education Sector

Prior to democratization in 1999, Indonesia's education system was highly centralized, with regulations, policies and procedures determined by the MENC. Religious schools were similarly centralized under the charge of the Ministry of Religious Affairs' (MORA). The Provincial Governments, District/Municipal Governments and schools thus had very little decision-making authority. Funds for the education sector came solely from the National Budget, distributed by the Ministry of Finance (MOF) to the Provincial and District/Municipal Governments in the form of block grants. These grants could only be spent on purposes specified by the MOF.[1]

The decentralization laws passed in 1999, namely Laws No. 22 and 25 (of 1999), limited the Central Government's powers to defense, security, religion, international affairs and laws, fiscal and monetary policies only. The education sector was therefore decentralized. Law No. 20 of 2003 on the National Education System Act placed the management of education and its delivery under the charge of District/Municipal Governments, retaining close cooperation with the MENC.[2]

The MENC would continue to oversee the national curriculum and standards of competencies. It also retained authority over matters of accreditation, certification and evaluation in the education sector. On the other hand, the District/Municipal Governments were now free to decide on operational and technical matters pertaining to primary, junior secondary and senior secondary schools. The National Education System Act also increased public involvement in school management by requiring every school to establish a school committee comprising community members, teachers and parents.

With the 2003 National Education System Act, the Provincial Government plays two main roles in the education. Firstly, it serves as an extension of the MENC at the regional level, executing various tasks such as quality control, evaluation, program monitoring, accreditation, certification and capacity building. Second, the Provincial Government functions as coordinator, resolving issues arising among the districts/municipals within its jurisdiction, including the transfer of civil servants/teachers[3] and management of education facilities shared among district/municipal residents.[4]

Currently, funding for the education sector is the shared responsibility of the Central, Provincial, and District/Municipality Governments, and the community. Each level of government must allocate 20% of its annual budget towards education. However, while the MOF has consistently earmarked more than 20% of the annual National Budget towards education (see Table 2), the provinces do not contribute to the funds equally. For instance, in 2012 Jakarta and Central Kalimantan provinces allocated 22.51%, and 20% of their respective budgets towards education while North Maluku contributed just 4.7% (Jawa Pos 2012).

The MENC and DGHE also welcome external financial assistance towards Indonesia's education sector. Besides government funds, schools and tertiary education institutions may generate additional funds through student fees, and individual or corporate donations.

Table 1. Share of the National Budget for Education (in trillion Rupiah)

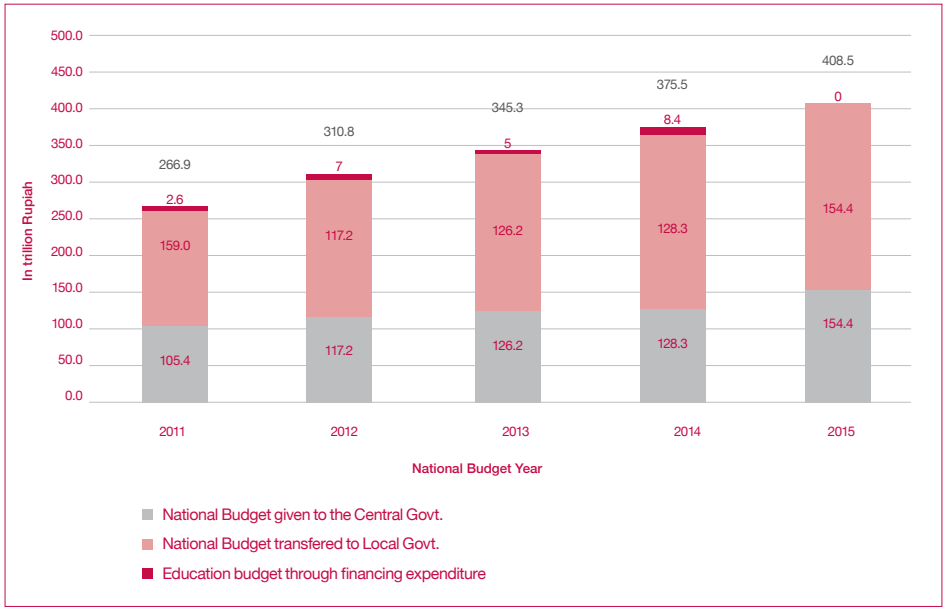
ITEM	2011	2012	2013	2014	2015
Education Budget	266.9	310.8	345.3	375.5	408.5
Total National Budget	1,320.8	1,548.3	1,726.2	1,876,9	1,984.1
Ratio of the Education Budget	20.2%	20.1%	20.0%	20.0%	20.6%

Source: MOF (2015)

The MOF transfers the bulk of the National Budget for education to the Local Governments (Figure 1), and the latter determines the amount to be spent on different aspects of the education sector. Local Governments can utilize these funds to implement tasks delegated by the MENC, as well as obtain additional income to fund education through local economic activities and natural resources extraction.

Beginning in 2005, the Central Government introduced an additional operational assistance fund to support the mandatory basic education program and the universal senior secondary education program. This has increased the Central Government's financial responsibilities towards the education sector substantially. In the recent years, Provincial Governments have also been authorized to manage the operational assistance funds for education, on top of their roles as the coordinator and executor of education policies.

Figure 1. National Budget for Education Year 2011-2015



Source: MOF (2015)

2.2 Decentralization's Mixed Results

Decentralization has produced mixed results in the education sector. On the positive side, Indonesia has achieved near-universal primary school enrollment. Enrollment rates in junior and senior secondary have also increased significantly. Children from the poorest families have been the largest beneficiaries of financial assistance programs. District/Municipal Governments have the autonomy to recruit local teachers and volunteer teachers, as well as to cooperate with private companies for training and capacity building programs. The content and quality of textbooks have also improved significantly.

On the negative side, the quality of education varies widely across the districts/municipalities resulting from the differences in capabilities and ability to utilize educational resources effectively. On the whole, inadequacies in teacher qualifications, remuneration, instructional hours and education infrastructure persist across Indonesia. This has been compounded by the fact that District/Municipal Governments often adopt protectionist policy that limits the transfer of civil servant teachers due to fear of not getting quality replacement.

Law No. 23 of 2014 on Local Governance attempts to address the shortcomings of decentralization in the education sector. By redistributing the responsibilities between the MENC, and the Provincial and District/Municipal Governments, the regulations aims to improve inter-agency communication and coordination between the Central and Local Governments. This new arrangement, to be implemented on 1 January 2017, mandates that the District/Municipal Governments will only be responsible for early childhood education, non-formal education, and primary and junior secondary schools. The Provincial Governments will be responsible for SMAs, SMKs and special needs schools. The MENC, as the representative of the Central Government, will oversee both academic and vocational tertiary education institutions. It will also be responsible for national education standards, and the accreditation and allocation of civil servants teachers, lecturers and teaching staff across Indonesia.

2.3 Technical Education within the Formal Education System

Vocational education belongs to the domain of formal education, which is one of the three recognized streams of education in Indonesia alongside non-formal and informal education. Formal education comprises a tiered education obtained through enrollment in schools from the primary level until the tertiary level. The formal education system can be further differentiated into the academic and the vocational tracks. Within the academic track, the general schools teach secular academic subjects while the religious schools teach a mixture of academic and religious subjects.[5] Within the vocational track, the vocational schools offer secular academic subjects as well as subjects which focus on technical skills.

Vocational education is first introduced at the senior secondary level. Students in their 10th grade who opt for the vocational track will enter the Vocational Senior Secondary Schools (SMK) while students who choose the general academic track will proceed to the General Senior Secondary Schools (SMA) (see Exhibit 2 for details). In accordance with the Higher Education Act, vocational programs are offered by the varieties of tertiary institutions which consist of community academies, academies, polytechnics, advanced schools, institutes and universities. In contrast, academic programs are offered only in the advanced schools, institutes or universities (Table 2; see also Exhibit 3).

Various governmental agencies oversee the vocational schools. The Directorate General of Secondary Education of the MENC supervises vocational senior secondary schools (SMK) throughout Indonesia while the Directorate General of Higher Education (DGHE) oversees all tertiary institutions. The DGHE subsequently merged with the Ministry of Research, Technology & Higher Education (MORTHE) in 2014, and the latter is now responsible for the tertiary institutions.

Table 2. Summary of Tertiary Education Programs in Indonesia.

Form of Tertiary Education Institutions	Programs Offered										
	Academic			Vocational							
	Bachelor	Masters	Doctorate	D1	D2	D3	D4	Voc. Masters	Voc. Doctorate	PR*	SP**
Community Academies	-	-	-	✓	✓	-	-	-	-	-	-
Academies	-	-	-	✓	✓	✓	-	-	-	-	-
Polytechnics	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓
Advanced Schools	✓	✓	✓	-	-	✓	✓	✓	✓	✓	✓
Institutes	✓	✓	✓	-	-	✓	✓	✓	✓	✓	✓
Universities	✓	✓	✓	-	-	✓	✓	✓	✓	✓	✓

Source: Higher Education Act (2012)
Note: * PR = professional programs ** SP = specialist programs

3. Technical Vocational Education and Training in Indonesia

Indonesia's TVET system comprises of vocational education and vocational training, both of which are regulated separately. The former is regulated by the National Education System Act and is under the charge of the MENC and the DGHE. The latter forms part of the National Training for Work System is regulated by Law No. 13 of 2003 on Manpower Act and Government Regulation on National Training for Work System/*Sistem Pelatihan Kerja Nasional* (Government Regulation No. 31 of 2006). Overall, vocational experience can be obtained by enrolling in formal vocational education, receiving vocational training, or a combination of both —as one pursues vocational training to improve his technical skills upon graduation from a vocational school.

3.1 History of Vocational Education

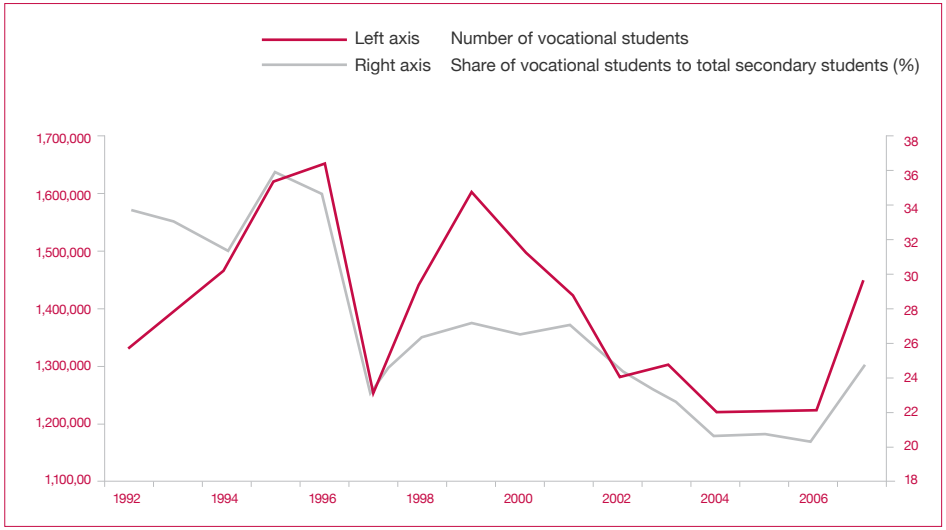
The emergence of vocational education in Indonesia can be traced to Dutch colonial rule, when various types of specialist schools were introduced for the lower and middle class Dutch nationals in Indonesia. Towards the end of Dutch rule (1942-1945), there were 88 vocational schools in Indonesia with 13,230 students enrolled (Supriadi 2002). The vocational schools still remain in Indonesia today, albeit with changes to their names and curricula (Abubakar 2014).

Recognizing the importance of vocational education in grooming employment-ready students, the Government of Indonesia rapidly increased the number of vocational schools and tertiary vocational institutions available following independence. In 1973, the Swiss Mechanical Polytechnic – Bandung Technological Institute was established as the first polytechnic that offered D3 programs (Hadiwaratama 1994). Between 1982 and 1994, 25 polytechnics were built with financial assistance from the World Bank and the Asian Development Bank, and with technical assistance from Australia, Germany, Japan, New Zealand and Switzerland (Hadiwaratama 1994). By 1995, 700 public SMK and 3,000 private SMK had been established, with a total of 1.57 million students enrolled (Supriadi 2002).

3.2 Initial Low Demand

Despite the Indonesian government's efforts to increase the number of SMKs and tertiary vocational institutions, demand for vocational education initially remained weak (Figure 2). From 1997 to 2007, the share of SMK students accounted for only 20% to 27% of the total number of senior secondary students. Throughout the decade, demand for senior secondary vocational education in SMKs remained lower than that for senior secondary academic education in SMAs.

Figure 2. Share of SMK Students to the Total Number of Secondary Students, 1992-2007



Source: World Bank (2010)

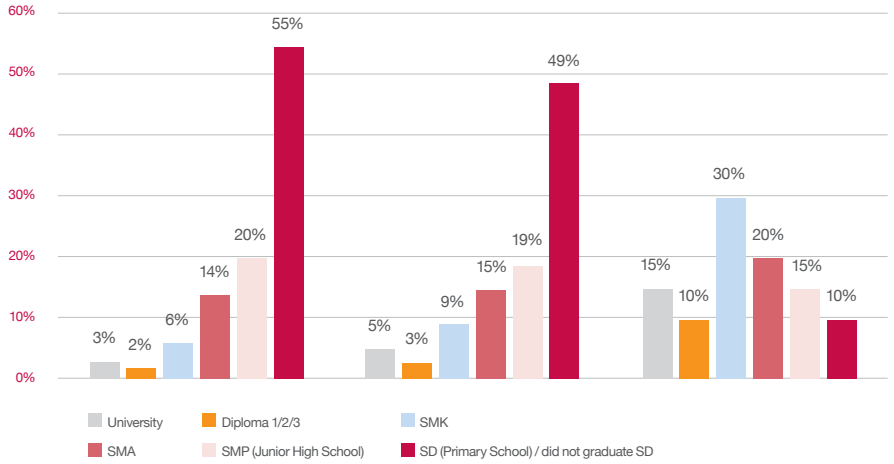
The low demand for vocational education can be attributed to the negative image of the TVET system. Parents in Indonesia typically regarded vocational school graduates negatively due to the low salaries, unclear career progression, and low academic capabilities compared to university graduates. Parents also opined that students with general academic education fared better socio-economically than those who pursued vocational education. Studies by Chen (2009) and Newhouse & Suryadharma (2009), which seemed to confirm the parents' fears, revealed that male graduates from SMAs received higher salaries compared to male SMK graduates. Moreover, the lower academic capabilities of both male and female SMK students compared to their SMA counterparts appear to have compromised their chances to pursue tertiary education. Indonesian parents thus preferred that their children pursue general academic qualifications which would culminate in university degrees.

Skills mismatch, referring to the gap between the skills learnt in schools and the skills needed in job markets, further weakened the demand for vocational education. Even as the focus of economic development shifted from agriculture to the manufacturing and the service sectors, business management SMKs remained the top choice among students, with some 49% of the total number of SMK students enrolled in the course (World Bank 2010). Consequently, there was a shortage of suitably skilled workers in the manufacturing and export-oriented sectors (Di Gropello, Kruse and Tandon 2011) with the industry unable to absorb the vocational school graduates.

3.3 Expansionary Policy for Vocational Education

Beginning in 2005, the MENC adopted expansionary goals to improve the quality of vocational education and to narrow the skills gap. The MENC aims to improve the ratio of SMA to SMK students from 60:40 in 2009 to 50:50 in 2015, and finally to 70:30 in 2025, with the expectation that graduates from SMKs and SMAs would account for 30% and 20% of Indonesia's labor force by 2025 respectively (Figure 3). As of February 2015, 55% of senior secondary students were enrolled in SMAs rather than SMKs (Susanto 2015).

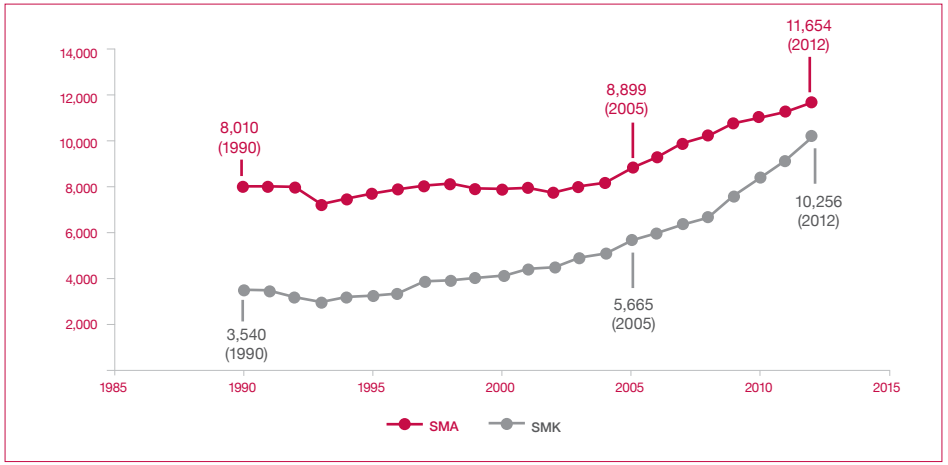
Figure 3. Education Level of Indonesia's Labor Force for 2003, 2013 & 2025



Source: Central Statistical Agency (2015c) & Directorate of SMK Development (2014)

To meet its target, the MENC has stopped building new SMAs. Instead, it is establishing new SMKs and converting existing SMAs into SMKs amid the increase in vocational schools at the senior secondary level. By 2012, the number of SMKs in Indonesia had doubled while of the number of new SMAs fell (Figure 4). In 2015, 200 new SMKs specializing in the agriculture, tourism, infrastructure and manufacturing industry were built (Saputri and Zuhri 2015).

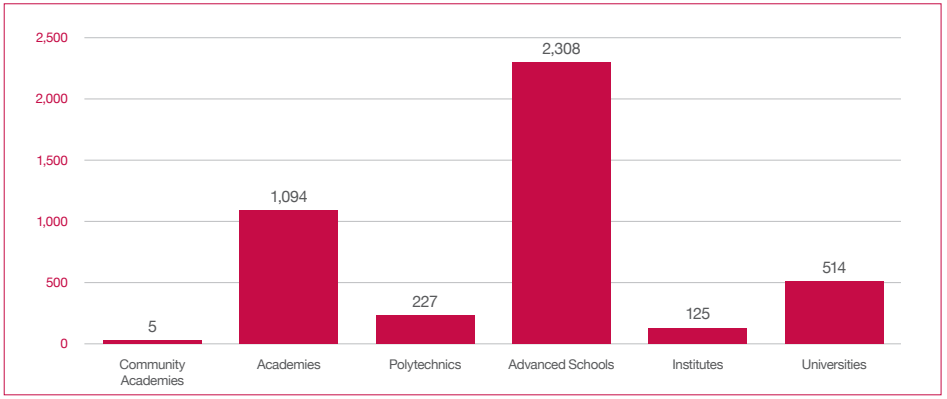
Figure 4. Number of SMAs and SMKs, 1990-2015



Source: Central Statistical Agency (2015b)

Figure 5 shows the current make-up of tertiary education institutions in Indonesia. However, as outlined in the MENC's strategic plan for 2010-2014, DGHE aims to increase the number of tertiary vocational institutions, with particular focus on the privately owned community academies and polytechnics (Table 3). In contrast, a moratorium has been placed on the establishment of academic programs by private tertiary education institutions from 1 September 2012 to 31 August 2014 (Sundari et al. 2012), with further extensions to the moratorium thereafter until further notice (MENC 2014).

Figure 5. Composition of Tertiary Education Institutions in Indonesia



Source: DGHE (2015)

Table 3. DGHE's Agenda for Expansion of Vocational Education

Action	Target	
	2015	2025
Student Capacity of Newly Built Community Academies	242,100	499,500
Number of Newly Built Community Academies	269	555
Student Capacity of Newly Built Polytechnics	215,000	442,000
Number of Newly Built Polytechnics	54	111
Number of Vocational Postgraduate Programs Offered in Polytechnics	10	20
Student Capacity of Newly Built Universities/Institutes	141,000	300,000
Number of Newly Built Universities/Institutes	14	30
Additional Lecturers at Tertiary Education Institutions	53.000	111.000
Additional Lecturers with a Doctorate Degree	15%	50%

Source: DGHE (2013a) & MENC (2013)

Currently, most tertiary vocational institutions only offer up to D4 programs, which is equivalent to a bachelor's degree program. Indeed, the vocational master's degree program in engineering technology offered by Public Electronics Polytechnic of Surabaya is the only such program available in Indonesia. Likewise, vocational doctorate programs are not available in Indonesia as yet (Susanto 2015). Tertiary institutions are currently in the process of establishing their own vocational master's and doctorate programs. But for the time being, D4 graduates keen to continue their studies can only do so abroad.

3.4 Capacity Building

In order to be sustainable, SMKs and tertiary vocational institutions require capacity building in the areas of monitoring and evaluation of the schools' progress and development, budget allocation, teaching practices, curriculum development, improving learning outcomes as well as resource mobilization. Due to resource limitations, the MENC and the DGHE often enlist the help of private companies and non-governmental organizations to conduct these capacity building programs.

In 2012, the Government of Indonesia received a US$75 million loan from the Asian Development Bank under the Polytechnic Education Development Project. The loan funded the capacity building programs of 13 polytechnics in areas such as training

programs for lecturers and administrators, facilities and equipment upgrading, as well as partnership development between polytechnics and industries to ensure quality curriculum (Asian Development Bank 2012).

With regards to the development of SMKs, the MENC is assisted by Germany through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), which coordinates the Indonesia-Germany cooperation program on vocational education known as the Sustainable Economic Development through Technical and Vocational Education and Training (SED-TVET). GIZ supports capacity building geared towards the enhancement of school management and school development. It has also supplied equipment to 22 SMKs across Central Java, West Java, Yogyakarta, South Sulawesi, East Kalimantan and North Sumatra. Additionally, it provides assistance in improving the management system of 10 SMKs and the local education agency *(Dinas Pendidikan & Kebudayaan)* in the cities of Aceh and Nias following 2004 tsunami. The other contributions of GIZ in Indonesia include improving the TVET's regulatory framework, facilitating exchange of labor market information between employers and vocational graduates, and supporting the implementation of the Indonesian Qualifications Framework (SED-TVET GIZ GmbH 2013).

In terms of capacity building for vocational teachers and lecturers, Law No. 14 of 2005 on Teacher and Lecturers welcomes degree holders from all disciplines to pursue a career in teaching. Academic and vocational bachelor degree holders are eligible to become teachers—defined as those who teach in early education, primary, junior secondary or senior secondary level schools. Meanwhile, academic and vocational master degree holders are eligible to teach vocational diploma (D1, D2, D3 and D4) and bachelor programs. Finally, only PhD holders are eligible to teach post-graduates academic and vocational programs.

Presently, there is a shortage of tertiary vocational institution lecturers with master and PhD degrees. Assuming that the number of new polytechnics grows at 4.5% annually, Indonesia would need 1,100 new vocational lecturers just to staff these polytechnics (Directorate General of Research Resources, Technology and Higher Education 2015). To complicate the problem, vocational masters and PhD programs are not yet available in Indonesia, with the exception of the Public Electronics Polytechnic of Surabaya (Susanto 2015). As a mitigating strategy, the DGHE has began to offer full scholarships in 2015 to young polytechnic lecturers with basic degree qualifications to pursue vocational master's degrees in Germany, Austria or Taiwan. Upon completion of their studies, the scholarship recipients are required to work at their previous polytechnics for five years. The effectiveness of the DGHE's scholarship program in addressing the shortage of tertiary vocational institution lecturers remains to be seen.

In terms of capacity building in information technology (IT), Intel and Microsoft have assisted the Center of Technology Information and Communications for Education (CTICE) within the MENC to conduct trainings on effective utilization of technology in schools. These workshops are focused on engaging IT to increase the transparency of the school's management system, as well as to harness IT as an instructional tool in class. A survey conducted by the Ministry of Communications & Information Technology with 801 primary schools, junior secondary schools, SMAs and SMKs revealed the low use of ICT among teachers (Ministry of Communications & Information Technology 2011). Another survey by Son, Robb and Charismiadji (2011) showed that while many teachers typically used word processing, e-mails, the internet and multimedia programs, they rarely used other applications such as online discussion groups or video conferencing programs in their teaching.

3.5 Linkage with Industries

Employers are the end users of the skills acquired by vocational school graduates. As such, a close partnership between the industries and vocational education institutions is fundamental in ensuring that new graduates are equipped with employment-relevant skills. All SMKs and tertiary vocational institutions are thus required by the MENC and the DGHE to work with an industry partner. Moreover, proposals to establish new SMKs or tertiary vocational institutions must be accompanied by a Memorandum of Understanding outlining the cooperation between a company and the prospective vocational school.

The MENC and the DGHE welcome various forms of industry involvement in vocational education. These initiatives include scholarships for students, financial and physical resources donations (such as facilities and equipment), as well as the secondment of industry experts to vocational education institutions as part-time instructors. Some companies also allow their employees to act as external assessors for the competency tests for vocational students. Additionally, companies host SMK and tertiary vocational students in mandatory student internship programs which span three to six months, as well as participate in the annual job fairs organized by the MENC (SED-TVET GIZ GmbH 2012).

To promote an industry-based vocational education model, the MENC pioneered the "Link and Match" policy for SMKs and tertiary vocational institutions. First initiated in 1989 and refined over the years, the policy adopts the form of a teaching factory, where theories learned in school are combined with production-based approach in an industrial facility, thereby synchronizing vocational education with the industries' demands and standards. According to Zainal Nur Arifin (2014), lecturer at the Jakarta Public Polytechnic, there are three known teaching factory models in Indonesia's vocational education system:

Model 1

The SMK or tertiary vocational institution provides space for its industry partner to build a teaching factory within the institution's premises. The teaching factory is thus a mini replica of an actual factory, where vocational students learn to assemble and produce goods for its industry partner, with the SMK or tertiary vocational institution in charge of the management of the teaching factory. Examples include Public SMK 2 Pangkalpinang, Public SMK 2 Cikarang, Public SMK 2 Depok (Sleman), Public SMK 1 Percut Sei Tuan (Medan) & Public SMK 5 Makassar, which have teaching factories to assemble notebooks for PT. Zyrexindo Mandiri Buana.

Model 2

The SMK or tertiary vocational institution builds a teaching factory jointly with its industry partner, with the teaching factory located either within or outside the school's premises. The teaching factory operates as a separate business unit from the SMK or tertiary vocational institutions, and the management of the teaching factory is different from that of the SMK or tertiary vocational institution. This particular model of teaching factory is heavily shaped by the needs of the vocational program. It is also more costly to build and operate compared to the previous model. The cooperation between ATMI Surakarta Polytechnic with PT. ATMI best illustrates the success of such a teaching factory model (see Box 1).

Model 3

The teaching factory takes the form of a special cooperation class between an industry partner and an SMK or tertiary vocational institution. As such, students practice their skills in two places — in laboratories owned by the SMK or tertiary vocational institution, and in the actual factories owned by the industry partner. The operational costs for this special cooperation class can be fully or partially paid from the industry partner's Corporate Social Responsibility (CSR) funds. The collaboration between Jakarta Public Polytechnic and its industry partners PT. Holcim Indonesia Tbk, PT. Badak LNG and LIGO Group of Companies, exemplifies such a teaching factory model which is fully funded by the industry partners (Arifin 2014).

Box 1. The Successful Case of ATMI Surakarta Polytechnic

ATMI Surakarta Polytechnic is one of the leading providers of vocational education in Indonesia. Located in Central Java Province, ATMI Surakarta Polytechnic is owned by the Karya Bakti Surakarta Foundation. It adopts production-based education and training, and has partnerships with more than 100 companies across Indonesia. Moreover, ATMI Surakarta Polytechnic has gain international recognition when it was awarded the ISO 9001:2008 for excellence in production and education.

ATMI Surakarta Polytechnic owns a business entity called PT. ATMI, which is also the teaching factory for the ATMI Surakarta Polytechnic's students and is located within the polytechnic's premises. From the very beginning of their studies, students are integrated into PT. ATMI's daily operations and are thus well-accustomed to positioning themselves within a professional setting. Students also learn under the close supervision of PT. ATMI's senior employees, with lecturer-student ratio in the range of 1:5 to 1:7.

At ATMI Surakarta Polytechnic, students are taught production planning, storage mechanism, calculation of costs, production techniques and packaging mechanism. Hospital equipment, school equipment, workshop equipment, single purpose machine, mouldings and precision tools are some of the products made by the students for both the domestic and international markets. Profits from the sale of such products are used to fund the operational costs of the polytechnic. This funding mechanism has led to more affordable tuition for students, with students paying just 30% of their actual tuition.

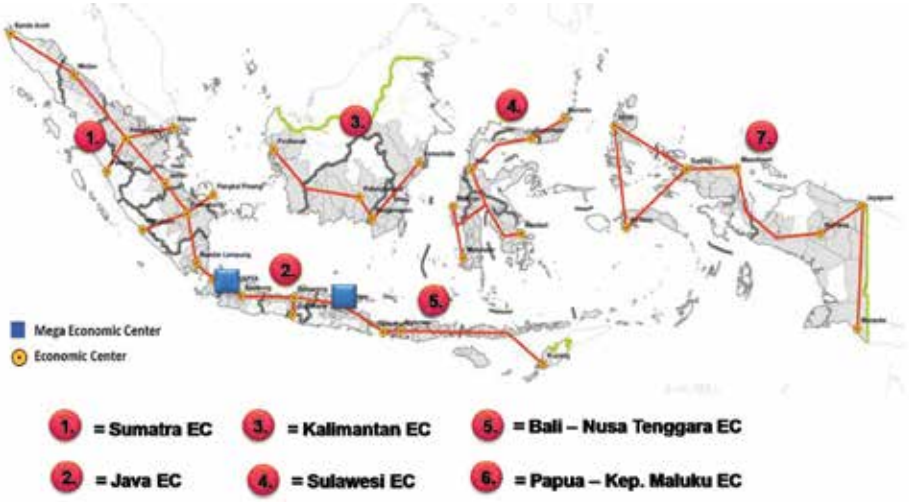
Graduates of ATMI Surakarta Polytechnic are employed as supervisors, heads of production or managers in various companies. As their skills are on par with industry standards, ATMI Surakarta Polytechnic's graduates typically earn 30% more than their counterparts from other tertiary vocational institutions.

Source: SED-TVET GIZ GmbH (2013)

3.6 Aligning Vocational Education with Economic Priorities

Indonesia's national economic policies are directed at the country's development as the 12th and the 8th largest economy in the world by 2025 and 2045 respectively. In particular, its Masterplan for Acceleration and Expansion of Indonesia Economic Development 2011-2025 (MP3EI), which coordinates existing medium and long term action plans, highlights six economic corridors as new centers of growth to boost the country's overall economic growth. Indeed, the MP3EI stresses the importance of developing regional economies by maximizing the utility of regional resources (Figure 6). Aligning the development of SMKs and tertiary vocational institutions with these policies and priorities is thus crucial to the country's planned economic development.

Figure 6. Indonesia's Economic Corridors according to the MP3EI

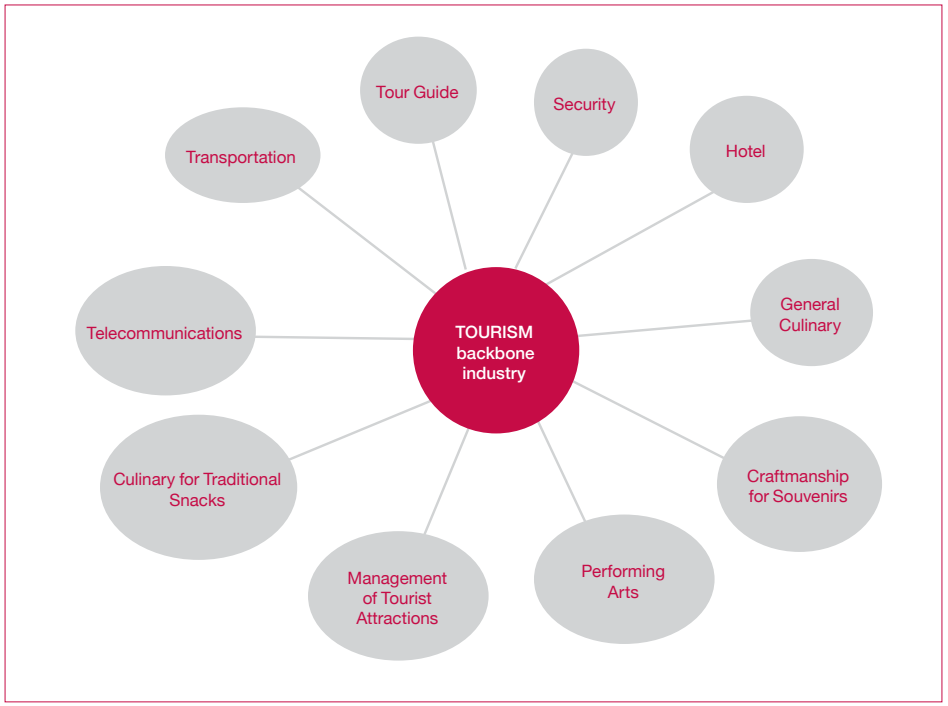


Sumatra	Java	Kalimantan	Sulawesi	Bali - NT	Papua - Kep. Maluku
"Center for Production and Processing of Natural Resources and as the Nation's Energy Reserves"	"Driver for National Industry and Service Provision"	"Center for Production and Processing of National Mining and Energy Reserves"	"Center for Production and Processing of National Agriculture, Plantation, Fishery, Oil & Gas, and Mining"	"Gateway for Tourism and National Food Support"	"Center for Development of Food, Fisheries, Energy and National Mining"

Source: KP3EI (2012) and KP3EI of the East Kalimantan Province (2012)

Indonesia's economic priority sectors may shift with time, depending on the decision of the country's leaders. This in turn necessitates timely adjustments to the national vocational education system in order to provide the best support to the country's overall economic goals. President Joko Widodo's administration has identified tourism as one of the priority sectors for economic growth. Likewise, the MENC aims to align the development of SMKs with the tourism sector as the core industry focus, alongside the creative arts, hospitality, maritime, agriculture, security and the telecommunications industries as the relevant sub-sectors (Figure 7).

Figure 7. Blueprint for SMK's Future Development



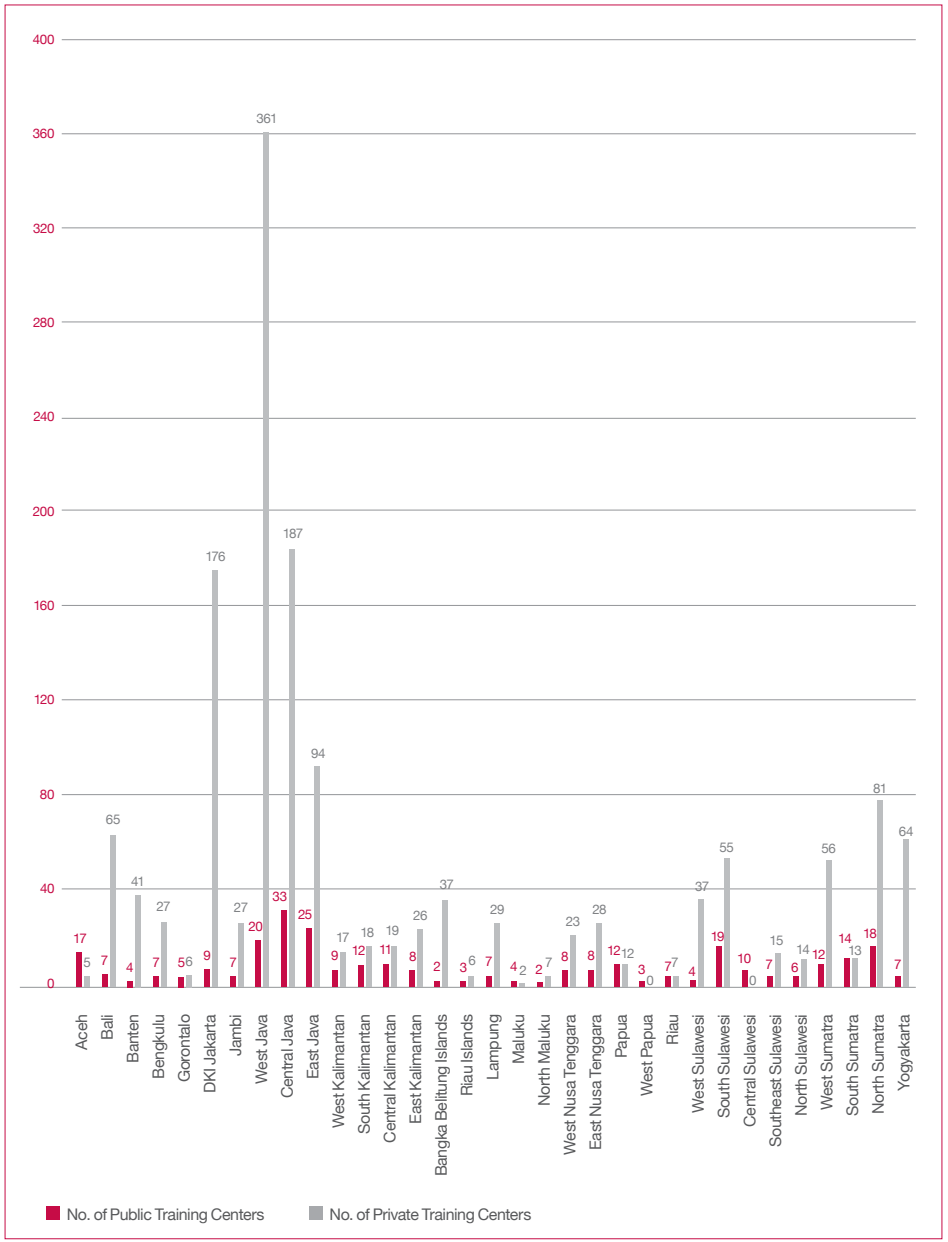
Source: Susanto (2015)

The DGHE however has yet to embark on a similar mapping process for the development of tertiary vocational institutions (Kurnia 2015). Instead, plans for establishment of new tertiary vocational institutions are still guided by the MP3EI's emphasis on developing human resources with skills that correspond to .the economic potential of the particular region. This means that the DGHE will reject plans for new tertiary vocational institutions which do not align with the prioritized activities in the specific region (Haksono 2015).

3.7 Lifelong Learning

Within the context of enhancing Indonesia's vocational education, lifelong learning entails exploring opportunities to continue skills upgrading through training outside the formal vocational education system. Vocational lifelong learning is the responsibility of the MOM, and is conducted in both public and private employment training centers.[6] In 2014, there were 1,555 private employment training centers in Indonesia–almost five times the number of public employment training centers (Figure 8).

Figure 8. Number of Public and Private Training Centers in Indonesia



Source: MOM (2014)

Vocational training is available for the following nine industry sectors: 1) processing; 2) services; 3) finance, real estate and business services; 4) construction; 5) electricity, gas and clean water; 6) transportation and communications; 7) trade, hotels and restaurants; 8) mining and excavations; and 9) agriculture, farming, fisheries and forestry. The MOM works closely with the industry partners to ensure that these training programs are demand-driven. As of 2015, the MOM has worked with 5,213 industry partners for the development of vocational training (MOM 2015).

3.8 Certification

Certification is highly beneficial for the various stakeholders in Indonesia's TVET system. For workers, certification signals the competencies workers possess. These certifications are recognized by the industry and related professional association, and are useful for career progression. Certification also allows Indonesian workers to work overseas, in countries which have concluded skills and qualifications recognition agreements with Indonesia. For the industries, employing certified workers helps to reduce the lengthy recruitment process, as well as boost labor productivity and ensure product quality. For the TVET providers, certification helps in assessing if the learning outcomes of their graduating students or trainees match industry standards.

The National Professional Certification Body (NPCB/*Badan Nasional Sertifikasi Profesi*) is the sole authority in Indonesia responsible for labor skills certification. As an independent body, the NPCB reports directly to the President, and is aided by 147 Professional Certification Agencies (NPCB 2015). These Agencies are accredited and authorized by the NPCB to conduct competency tests in their own facilities or at licensed assessment centers. The NPCB and the Professional Certification Agencies jointly issue the Certificate of Competency for individuals who have passed the skills certification tests (Figure 9).

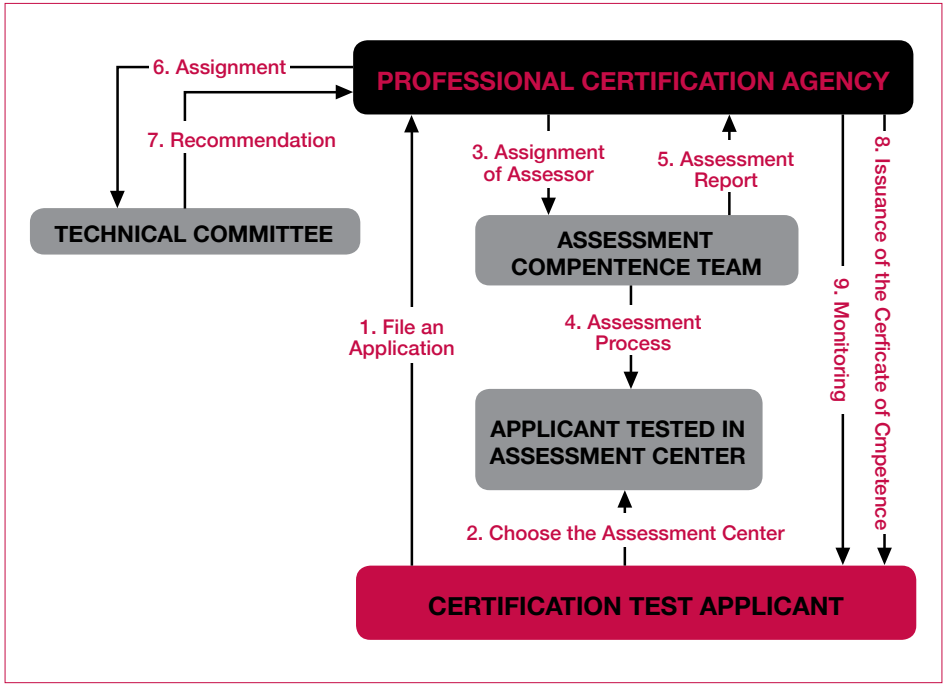
The NPCB recognizes three types of Professional Certification Agencies:

First Party Professional Certification Agencies are established either by companies to certify their employees, or by SMKs and tertiary vocational institutions to certify their students' learning outcomes;[7]

Second Party Professional Certification Agencies are established by companies to assess and certify suppliers in their production chain;

Third Party Professional Certification Agencies are established by industry or professional associations. Certification for competencies obtained in public or private training centers will be tested by the relevant Third Party Professional Certification Agency, depending on the skills being trained and test for. Training centers are not authorized to conduct certification tests.

Figure 9. Skills Certification Scheme

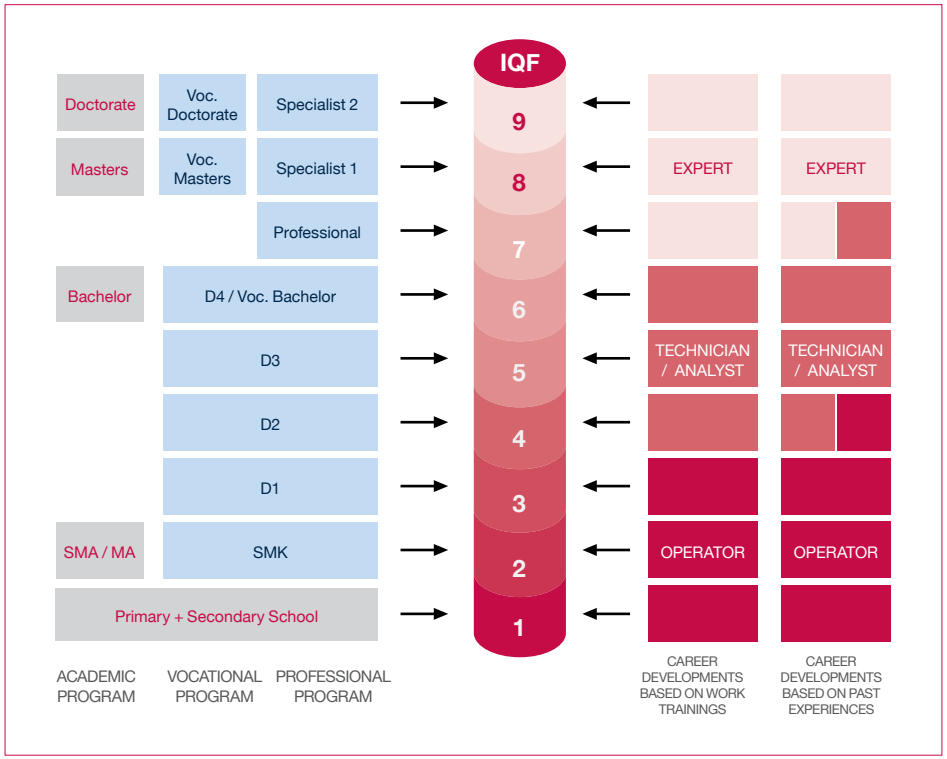


Source: Mulyanto (2008)

4. The Indonesian Qualifications Framework

The IQF was introduced to stratify the learning outcomes obtained through various pathways into nine qualification levels (Figure 10). The IQF thus ensures consistency in the learning outcomes obtained from formal education in SMK or tertiary vocational institutions, as well as from self-study, trainings, professional working experience and various professional certification schemes. The IQF also synchronizes one's learning outcomes with career development tracks (Figure 10).

Figure 10. The Indonesian Qualifications Framework

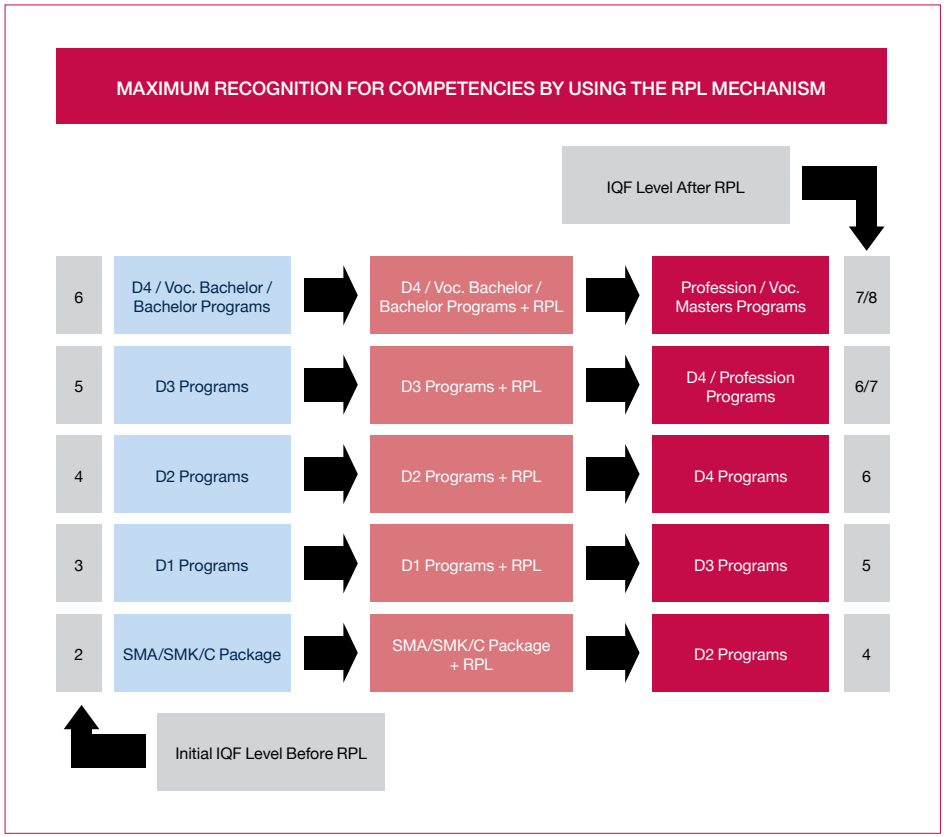


Source: DGHE (2012)

Under the IQF, learning outcomes are measured through the Recognition of Prior Learning (RPL) mechanism, to map an individual's learning and training outside formal education institutions with comparable outcomes obtained through the formal education system (Haksono 2015).

The RPL mechanism thus details the maximum recognition accorded to an individual's learning outcomes obtained through a combination of academic education, vocational education, vocational trainings and professional working experience. Experts with qualifications equivalent to master's or PhD degrees are equipped to teach at tertiary education institutions even if they do not hold these formal degrees. The RPL mechanism also allows students to accelerate their learning processes within the formal education system–students need not complete all the prescribed modules if they have already acquired comparable competencies elsewhere. Moreover, recognizing the competencies obtained outside of school allows such skills to be acknowledged on a higher level within the IQF. For instance, an SMK graduate who has attained vocational skills through work experience may continue his education directly into a D2 program (Figure 11).

Figure 11. Maximum Recognition for Competencies



Source: DGHE (2013b)

The IQF also forms the basis of the development of the National Competency Standard at Work (*Standar Kompetensi Kerja Nasional Indonesia*) which details the on-the-job requirements, knowledge, skills, expertise and work ethics relevant to perform tasks for a specific position.

At the national level, the MOM coordinates the formulation of the National Competency Standards at Work. As of 2013, the MOM has issued 295 National Competency Standards at Work for following sectors: 1) agriculture, plantation, fisheries and forestry; 2) electricity, mining and energy; 3) manufacturing industry; 4) transportation and communications; 5) arts and tourism; 6) health; 7) financial and banking; 8) construction; and 9) services, consultation and trade (MOM 2013).

Stakeholders such as Professional Certification Agencies, training centers, and industrial and professional associations could initiate the formulation of National Competency Standard at Work, with such standards varying according to the needs of different occupations within the same sector.

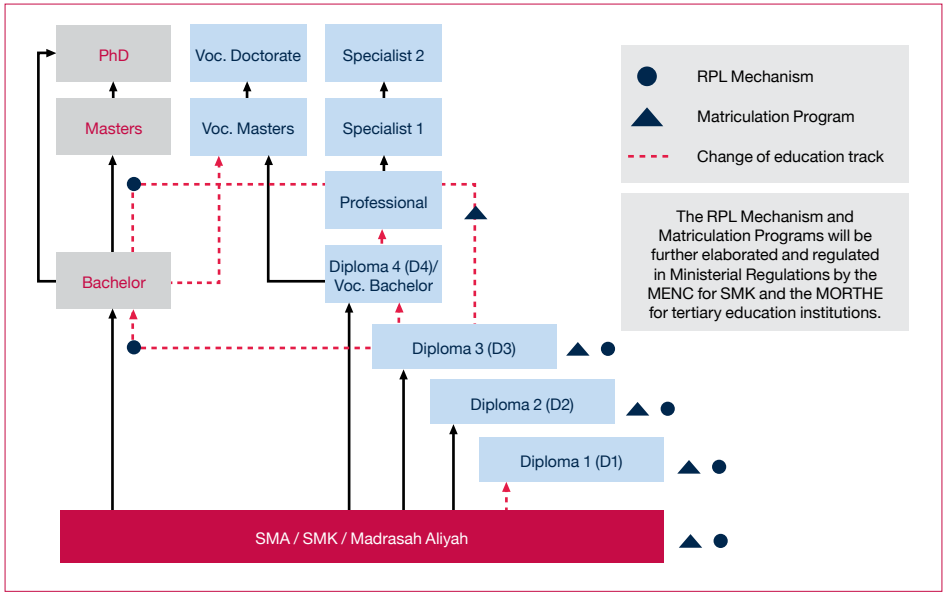
To bridge the gap between what is learned in schools and the actual standards demanded by the industries, curriculum development in SMK and tertiary vocational institutions must adhere to the National Competency Standards at Work meant for the courses offer. Exhibit 6 illustrates the development of the curriculum and learning outcomes in a D3 Accountancy Program, based on the guidelines stipulated in the IQF, the National Competency Standard at Work for an accountant, and the National Education Standards for Higher Education.

The IQF has far-reaching implications for the education sector and the job market alike. For the education sector, comparable learning outcomes allow an individual to switch between the academic education track and the vocational education track without penalty, in a system the MENC and the DGHE refer to as the "Multi Entry Multi, Exit System" (Figure 12). For instance, the IQF enables an SMA graduate to move across education tracks by enrolling in a D4 program (vocational bachelor program) instead of an S1 program (academic bachelor program). Students who intend to change education tracks but do not fulfill the minimum requirement have the option of attending a matriculation program to prepare them for entering the new education track. Indeed, the Multi Entry Multi Exit System increases an individual's mobility across the education system.

For the job market, the IQF is a useful tool which evaluates workers' competencies. With the establishment of the ASEAN Economic Community in December 2015, competencies of local and foreign workers in Indonesia would be assessed based

on the IQF. Mutual agreements between Indonesia and the other ASEAN member countries are in place for engineers, architects, accountants, land surveyors, and medical and tourism professionals (DGHE 2013b). As such, workers from ASEAN countries engaging in the aforementioned professions could work freely in Indonesia as long as their skills are deemed to be on par with those outlined in the IQF.

Figure 12. The Multi Entry, Multi Exit System



Source: DGHE (2012)

5. Integrating Information and Communications Technology in Education

ICT plays an important role in strengthening the TVET. The Asian Development Bank emphasized the importance of ICT in TVET in the enabling of a skilled, "ICT-capable" workforce, which is crucial for the transition a knowledge based economy (Asian Development Bank 2009). The flexibility and accessibility of ICT has created various opportunities such as Open Distance Leaning (ODL) and Open Universities, allowing students and working adults residing in remote areas to access classroom learning via communication devices. ODL addresses critical shortcomings of TVET such as the lack of qualified instructors in particular areas, the need to deliver skills training on a large scale and at an affordable rate, and the need to introduce simulations which the learners could apply to real-world situations.

Through encouraging the integration of ICT in the education sector, the MENC and DGHE support Indonesia's goal to become a knowledge-based economy by 2025. The MENC has identified three key objectives in the engagement of ICT in its National ICT implementation program (Table 4). First, ICT is used to develop long distance learning in order to improve access to and quality of education for Indonesians in rural and border areas. Next, ICT is harnessed to increase the efficiency and transparency of school management. Finally, ICT is used as an information sharing

Table 4. The MENC's ICT Implementation Program

INDICATORS	INITIAL YEAR (2009)	TARGET				
		2010	2011	2012	2013	2014
Number of educational institutions with internet connection	17,500	25,835	32,198	32,687	41,154	44,352
Number of educational institutions which conductne-learning with multimedia and the internet	8,825	11,752	17,984	22,182	26,500	30,950
Number of educational institutions which conduct e-learning with radio, audio-visuals, television and films	17,000	17,620	17,620	22,182	26,500	30,950
Number of educational institutions which implement e-administration	300	320	350	385	424	466

Source: MENC (2013)

tool for the education sector. Notably, with the curriculum reform in 2013, ICT is no longer a stand-alone subject but has since been merged with other subjects taught in traditional education and TVET.

The private sector, exemplified by Microsoft, plays a significant role in improving Indonesia's traditional vocational education sector through the use of ICT. Microsoft offered its cloud computing productivity suites Office 365 to Indonesian students and teachers for free, to enable multi-stakeholders to work and collaborate simultaneously (Hattari 2015). In September 2015, Microsoft provided the Office 365 free of charge to 3.5 million Indonesian teachers who are members of the National Teacher Association (Alam 2015). Additionally, Microsoft also developed a partnership program with *Yayasan Cinta Anak Bangsa* (YCAB) foundation, a local non-profit organization which provides counseling, vocational training, and youth entrepreneurship. YCAB has successfully distributed Microsoft's Office 365 to 500 marginalized youths to enable them to showcase their works as social entrepreneurs and also gain technology skills for future employment. In 2015, YCAB trained 1,116 vocational students and granted 1,004 skills certificates (YCAB Foundation 2012; YCAB 2014).

The use of ICT also benefited TVET and the higher education sector. Gadjah Mada University (UGM) offers courses in traditional curriculum and TVET, where all students must engage in two months of community services in rural environments. Students could utilize Office 365 and various Microsoft productivity tools to connect with regular classroom activities. Office365 and tools such as Lync Online or Skype (both are communication tool), OneDrive (a secure data storage) and OneNote (a digital note-taking program) were significant in enhancing the students' learning experiences. The instructors and students could upload lectures online, enable internet-based discussions, and deliver academic results. UGM also developed its own portal, known as eLisa, to support distant higher education across Indonesia. More than 60,000 students and 6,000 academic staff are estimated to benefit from the distance learning programs (Microsoft Customer Stories 2015).

However, efforts to integrate ICT in Indonesia's education sector remain slow due to lack of ICT infrastructure and low IT literacy. IT literacy is common only in urban areas. Likewise, access to electricity and technological hardware remain limited in rural areas, as the cost of establishing internet connections in rural areas four to five times higher than in urban areas (Santoso 2015). As such, the MENC earnestly encourages the private sector to assist in ICT infrastructure development.

6. Policy Challenges

Efforts to improve vocational education in Indonesia have intensified since 2005, with both the MENC and MORTHE focus on increasing the number of SMKs and tertiary vocational institutions while ensuring the quality of curriculum and achieved learning outcomes match with industry demands. The MENC and the MORTHE are also implementing policies to increase the number of industry professionals to teach at SMKs and tertiary vocational institutions. Nevertheless, a number of challenges to the future of vocational education in Indonesia remain.

6.1 Negative Stigmatization

With the introduction of the Multi Entry, Multi Exit System, which enables students to switch education tracks, more parents are beginning to view vocational education positively, rather than as obstacles to their children's career prospects or socio-economic status. However, vocational education graduates are still perceived negatively by employers, who tend to regard the competencies of vocational education graduates as below industry standards. Many employers still find that they need to retrain the vocational education graduates they hire.

6.2 Shortage of Funding

Vocational education costs more to fund than an academic education because of the smaller class sizes, and higher costs of materials for laboratory work, facilities, equipment and technological upgrading involved. On average, the operational costs of SMKs and tertiary vocational institutions are at least twice the amount spent by academic institutions (Asian Development Bank 2009). Government funding is one of the main funding sources for public SMKs and public tertiary vocational institutions. The bulk of the general funds transferred from the Central Government to the regions have been used by the Provincial and District/Municipal Governments as salaries government employees—including salaries for teachers, lecturers and school administrators. Only 10% of these grants set aside for education are spent on non-salary purposes (UNESCO 2006).

6.3 Shortage of Quality Vocational Teachers and Lecturers

Indonesia is facing an acute shortage of vocational teachers and lecturers amidst the rapid increase in the number of SMKs and tertiary vocational institutions. The MENC estimates that Indonesia needs 12,000 new SMA and SMK teachers by June 2015 (Akuntono 2012), and 53,000 and 111,000 new lecturers by 2015 and 2025 respectively (MENC 2013). Indonesia does not have enough master and PhD holders to teach at tertiary education institutions and this has hampered the DGHE's target to

establish 269 community academies by 2015. Instead, there are only 5 community academies in 2015. The MENC is also likely to miss its expansionary target for SMKs if shortages of SMK teachers persist.

To mitigate these challenges, the Indonesian Government welcomes non-educational degree holders to pursue teaching careers. Graduates from pure academic programs are often recruited to teach at SMKs or tertiary vocational institutions right upon graduation. These new graduates have neither teaching experience nor industry training, and therefore lack pedagogical, didactical and occupational competencies. As such, some of these new graduates do not understand the goals of vocational education, and adopt a highly theoretical approach to teaching instead of equipping their students with work-ready skills (Kurnia 2015).

Since 2011, the MENC has provided pre-service training for non-educational degree holders prior to the start of their teaching careers. While these pre-service training programs are offered in certain universities with TVET teacher education programs, such programs are only available to academic and vocational bachelor degree holders in preparation for a teaching career in SMKs. Meanwhile, programs to prepare bachelor, masters and PhD holders from a non-education program to become lecturers at tertiary vocational institutions are not available for now.

6.4 Lack of Incentives for Industry Involvement

Many companies are discouraged from participating in vocational education design due to the lack of financial incentives. In general, companies fund activities related to the education sector from their CSR funds. CSR programs allow companies to give back to society and companies are legally obligated to demarcate CSR funds as part of their operational costs. For small and medium companies, the obligation to provide CSR funds on top of paying business taxes proves burdensome. Moreover, the MOF still imposes import tax and duties on machinery or goods donated to SMKs and tertiary vocational institutions, rather than allowing for tax breaks on these in kind donations.

6.5 Poor Inter-Agency Coordination

Developing Indonesia's vocational education system involves coordination across different layers of government and across various governmental agencies. District/Municipal Governments are involved with the development of SMK at the regional level. The MENC and MORTHE, as representative of the Central Government, are responsible for SMKs and tertiary vocational institutions. The NPCB is in charge of the certification of skills, and the accreditation of Professional Certification Agencies and Assessment Centers. The MOM, together with the Ministry of Industry and

industry associations, oversees the National Competency Standards at Work for the various occupations. Each of these levels of government and governmental agency wears a different agenda, and these are often not aligned with the MENC and DGHE's goal of improving Indonesia's vocational education system. The absence of a single coordinating body thus hinders inter-agency communications. It also creates unnecessary confusion for non-governmental stakeholders.

6.6 Indonesia's Geographical Features

As an archipelago with more than 17,000 islands, huge discrepancies exist in the availability and quality of education facilities between Indonesia's big cities and remote areas (CIA 2013). In the remote areas in the eastern part of Indonesia in particular, education facilities are non-existent or in abysmal condition. The long distances which students have to travel in order to reach their schools as well as the prevalence of teacher absenteeism pose additional challenges to the vocational education system (OECD/Asian Development Bank 2015).

Box 2. Inter-Agency Coordination within TESDA

Neighbouring Philippines' experience in streamlining the management of technical and vocational education training (TVET) offers invaluable insights for Indonesia.

In 1994, the Filipino Technical Education and Skills Development Authority (TESDA) was established as the lead agency in the TVET system. TESDA performs multiple, simultaneous roles, including that of regulator, manager and promoter. It is also responsible for the accreditation of TVET assessors and the National Assessment Boards. Importantly, TESDA bridges the TVET system and the private sector so as to foster industry participation.

Structurally, TESDA comprises the Secretariat and the Board. The Secretariat functions as TESDA's development and implementation arm, and is headed by a Director General who shares the same rank as a cabinet minister.

The Board is chaired by a representative from the Department of Labor and Employment, and comprises representatives from among employers, industry, labor, and private technical vocational institutions.

Importantly, the Board coordinates all interactions among the various governmental bodies involved in the TVET system. In fact, every governmental agency related to the TVET is represented in the Board, thereby ensuring efficient and effective inter-agency communications. Consequently, the development of the TVET system in the Philippines is more coordinated and less bureaucratic than that in Indonesia.

Source: Syjuco (2015) and IMF (2013)

7. Opportunities to develop Indonesia's Vocational Education System

Despite its long history, serious effort to improve the existing system only came with the implementation of the vocational education expansionary policy in 2005. Since then, the Indonesian Government has emphasized vocational education as one of the key strategies to boost the country's economic development. Between 2001 and 2010, the number of senior secondary students enrolled in SMKs increased by 158% (OECD/Asian Development Bank 2015). This section explores various opportunities for the Indonesian Government and other stakeholders to further improve the vocation education system as well as to increase the employability of graduates from vocational institutions.

7.1 Improving the Employability of Vocational Graduates

Information asymmetry in the job market, where employers have more information about the job market than job seekers, is particularly pervasive among new graduates, including vocational institution graduates. Indeed, Indonesia should emulate the efforts taken by the Anglo-Saxon and Continental European countries to address such information asymmetries by offering career guidance to their students as well by equipping them with invaluable internship experiences (World Bank 2010). The vocational education institutions in these countries also provide job assistance programs and career counseling in cooperation with the government, non-profit organizations, industry associations and private companies. Vocational graduates in these countries also have access to these services online or at the nearest local community and leisure sites (Company 2009).

In Indonesia, job assistance programs and career counseling are available, albeit sporadically. The MENC routinely organizes the Annual SMK Expo of Competency Products and Job Fairs for SMK Students (Annual SMK Expo). Some polytechnics also conduct job fairs for their students, alumni and the general public.

Furthermore, the MOM has established the National Labor Market Information Portal *(Informasi Pasar Kerja Nasional)*, an online job-matching portal where job seekers could apply directly to their desired employers. However, the portal remains underutilized among employers, vocational students and new graduates. As such, the MOM could consider cooperating with the MENC and DGHE to promote the portal more rigorously, possibly through the existing Annual SMK Expo and the polytechnic job fairs.

7.2 Building New SMKs and Tertiary Vocational Institutions

In line with the Universal Senior Secondary Education Program, the MENC estimates that the rough participation rate for students enrolled across SMAs, SMKs and Islamic senior high schools to reach 97% by 2020 (Directorate of SMK Development 2015). As such, the MENC aims to build 200 new SMKs from 2015 (Saputri and Zuhri 2015). Likewise, the DGHE also plans to increase the number of tertiary education institutions to meet the increased number of senior secondary school graduates. By 2025, 555 newly established polytechnics and 111 community academies would have been built (MENC 2013 and DGHE 2013a). Furthermore, the MENC and DGHE have promoted the establishment of private SMKs and tertiary vocational institutions, with special emphasis on polytechnics and community academies.

7.3 Cultivating Public-Private Partnerships

Due to limited financial and technical capabilities, the Indonesian Government could consider harnessing public-private partnerships (PPP) in the development of TVET. Indeed, there is strong demand for PPPs in vocational education in the areas of teacher/lecturer skills trainings, ICT trainings and the provision of educational facilities. Throughout their teaching careers, vocational teachers and lecturers need to upgrade their industry knowledge and skills continuously. As such, private companies could invite these teachers and lecturers to learn and train in their factories.

To promote the increased usage of ICT in daily teaching and classroom learning, vocational teachers and lecturers need to undergo relevant with ICT training. According to Mr. Suparman, an education observer from *Forum Edukasi,* many teachers aged 40 years old and above tend to score low on their teacher competency tests as they do not have the skills to operate the computer or utilize the internet (Wurinanda 2015).[8] Indeed, PPPs on ICT training could focus on topics such basic computer use, introduction to the operational system, and computer hardware and software, as well as on the effective use of internet for classroom teaching. The private sector could also consider assist SMKs and tertiary vocational institutions through the donation or loan of equipment such as computer hardware and software, internet connections facilities and screen projectors.

7.4 Incentivizing the Private Sector

Private sector involvement is essential to ensure that the industries' perspectives are incorporated into vocational education, and the skills gained by vocational students meet industry standards. Moreover, resource contributions from the private sector towards vocation education could also lighten the Government's financial responsibility. Indeed, the private sector could contribute through the donation of financial resources, student scholarships, and equipment and machinery. Furthermore,

the private sector could lend their staff to SMKs and tertiary vocational institutions as part-time teachers, and also provide internships for vocational education students and teachers.

The Indonesian Government could further motivate the private sector to contribute towards the development of vocational education. In particular, financial incentives such as tax exemptions could be offered to the private sector for expenses or resources and incurred for educational purposes.

7.5 Facilitating Long Distance Learning

With Indonesia's vast geographical area and the inadequacies of education facilities in the remote areas, the MENC and MORTHE should consider providing vocational long distance learning as an option in the non-formal education system. Currently, vocational education can only be accessed through the formal, classroom-based learning in SMKs or tertiary vocational institutions. Long distance learning would thus provide a flexible option for students interested in vocational education, especially for those who do not have access to SMKs and the tertiary vocational institutions.

Long distance learning leverages on the internet to deliver the vocational courses remotely, where instructional materials are shared as video-on-demand (VOD)/ lecture-on-demand (LOD) and web documents. Examinations and evaluation programs are also conducted online. Teachers/lecturers and students can also interact extensively online through on e-boards or discussion platforms. Indeed, there are vast opportunities for the stakeholders in Indonesia's vocational education system to support long distance learning. These include engaging teaching and ICT professionals in the development of web-based instructional. Private companies and startups are also welcome to develop online teaching and learning platforms for vocational education and training. Examples of established platforms include the Web-Based Teaching and Learning System (WTLS) and e-TESDA, which are developed by the Colombo Plan Staff College (CPSC)[9] and TESDA respectively.

Exhibits

Exhibit 1 General Information on Indonesia

Official name	The Republic of Indonesia
Political system	Multi-party democracy
Location	Southeast Asia, bordered by: - Malaysia and the Straits of Malacca in the north; - East Timor and the Indian Ocean in the south; - The Indian Ocean and the Andaman Sea in the west; and - Papua New Guinea and the Pacific Ocean in the east.
Land area	1,904,569 km^2
Population (2013)	248,800,000
Major cities by population (2010)	- Jakarta (9.61 million) - Surabaya (2.77 million) - Bandung (2.39 million)
Language	Bahasa Indonesia
GDP (2013)	US$ 910.5 billion
GDP per capita (2013)	US$ 3,475.25
Real GDP growth (2013)	5.6%
Exports value (2013)	US$ 182,552 million
Imports value (2013)	US$ 186,629 million

Source: CIA (2013), World Bank (2015) and WITS (2015)

Exhibit 2 SMK's Curriculum Structure

- SMK's curriculum (Table 5) can be clustered into three types of subject:
  1) Normative subjects emphasize the teaching of norms, customs, attitudes and behavior applicable in Indonesia. Normative subjects include Religious Education, Civic Education, and Education and Arts & Culture.
  2) Adaptive subjects equip students with basic principles and concepts of science and technology. Adaptive subjects include English, Mathematics, Natural Sciences, Social Sciences, Computers & Information Management Skills and Entrepreneurship.
  3) Productive subjects equip students with competencies on par with the Indonesian Qualifications Framework and in accordance with industry demands. Developing the productive subjects is the joint responsibility between the SMK and the industry partner. Productive subjects are thus specifically tailored to meet the different needs of each vocational program. Basic Vocational Competencies and Vocational Competencies are considered as productive subjects.
- Depending on the program, the duration of vocational education in SMK ranges from three to four years.
- SMKs apply a combination of learning methods, including face-to-face classroom interaction, laboratory practice in schools and internship in business enterprises.
- By the end of their final year, SMA and SMK students must pass two National Examinations:
  1) General National Examination only tests for Indonesian Language, English and Mathematics; and
  2) Productive National Examination assesses the students' competencies according the National Education Standard and the National Competency Standard at Work relevant to the vocational courses offered by the SMK.
- Both examinations are prepared by the MENC.
- The Productive National Examination involves internal and external assessors. Internal assessors refer to SMK teachers and external assessors refer to the SMKs' industry partners.
- Upon graduation, SMK students will receive:
  1) Certificate of graduation as proof of passing the General National Examination; and
  2) Certificate of competency as proof of passing the Productive National Examination.

Table 5. SMK's Curriculum Structure

COMPONENT	INSTRUCTIONAL HOURS
A. Subjects	
1. Religious Education	192
2. Civic Education	192
3. Bahasa Indonesia	192
4. English	440 a)
5. Mathematics	
5.1 Mathematics in SMK which specialize on Art, Tourism and Household Technology (Teknologi Kerumahtanggaan)	330 a)
5.2 Mathematics in SMK which specialize on Social Subjects, Office Administration and Accountancy	403 a)
5.3 Mathematics in SMK which specialize on Technology, Health and Agriculture	516 a)
6. Natural Sciences	
6.1 Natural Sciences	192 a)
6.2 Physics	
6.2.1 Physics in SMK which specialize on Agriculture	192 a)
6.2.2 Physics in SMK which specialize on Technology	276 a)
6.3 Chemistry	
6.3.1 Chemistry in SMK which specialize on Agriculture	192 a)
6.3.2 Chemistry in SMK which specialize on Technology and Health	192 a)
6.4 Biology	
6.4.1 Biology in SMK which specialize on Agriculture	192 a)
6.4.2 Biology in SMK which specialize on Health	192 a)
7. Social Sciences	128 a)
8. Arts & Culture	128 a)
9. Sports & Health Education	192
10. Vocational Subjects	
10.1 Computers & Information Management Skills	202
10.2 Entrepreneurship	192
10.3 Basic Vocational Competencies b)	140
10.4 Vocational Competencies b)	1,044 c)
B. Local Content Education d)	192
C. Self-Development e)	(192)

Note:

a) The hours set above are the minimum instructional hours required by the MENC. Each SMK has the authority to add more instructional hours for their students.

b) Consists of various vocational subjects, corresponding to the industry which the SMK decide to focus on.

c) The number of instructional hours is in line with the working standard competency applied in the professional world. Each SMK must ensure that the instructional hours allocated for Vocational Competencies subject must not be less than 1,044 hours.

d) Local Content Education is a stand-alone subject aimed at exploring each region's characteristics and prospective areas for development. Each SMK designs its particular Local Content Education curriculum.

e) Self-Development comprises extracurricular activities where students can pursue their personal interest and talents within the school environment. As a subject, Self-Development can be led by a teacher, a counselor or external professionals.

Exhibit 3 Education Structure in Indonesia

According to the Higher Education Act, the key differences between the varieties of tertiary institutions lie in the type of education track and the number of disciplines offered.

Academic programs are available only in advanced schools, institutes and universities; **vocational programs** are available in all tertiary institutions.

Universities may offer both academic and vocational programs, as well as professional programs.
Example: Jenderal Sudirman University offers degree programs in agriculture and food engineering, accountancy and management, and dentistry. It also offers vocational programs on industrial engineering, accountancy and secretarial services, as well as professional programs for accountants, doctors, dentists and nurses.

Institutes may offer academic and vocational programs from a limited range of disciplines.
Example: Bandung Technological Institute offers different academic programs ranging from agricultural engineering to urban planning–all of which stem from the disciplines of engineering and technology.

Advanced schools (sekolah tinggi) may only offer academic and vocational programs on one discipline.
Example: Al-Irsyad Advanced School of Health in Cilacap offers D3 and bachelor programs on nursing, pharmacy, physiotherapy–stemming from the discipline of medicine.

Polytechnics may offer vocational programs from across many disciplines.
Example: Jakarta Public Polytechnic offers various vocational programs from the disciplines of engineering, economics and business administration.

Academies (akademi komunitas) may offer vocational programs from a limited range of disciplines.
Examples: Jayakarta Nursing Academy and Fatmawati Nursing Academy offer only D3 vocational programs which focus on medicine, while all the classes offered by Darma Agung Tourism and Hotel Academy focus on hospitality.

Community academies (akademi komunitas) are unique as they offer the least number of courses among all tertiary education institutions. They may only offer D1 & D2 programs which correspond to their prioritized regional economic activities as laid out in the MP3EI.
Example: Nagekeo Public Community Academy only offers D2 vocational programs from the disciplines of chemical engineering and business administration.

Source: Higher Education Act (2012)

Exhibit 4 Levels of Knowledge Mastery based on the National Education Standards

Level of IQF Qualifications	Description of Knowledge Mastery	Program
9	Mastering the philosophy underlying a discipline; Mastering specific skills	Doctorate Program
8	Mastering theories and their application within a discipline	Masters Program
7	Mastering the application theories within a discipline; mastering specific skills to a profession	Professional Program
6	Mastering general theories and skills in a discipline; mastering a set of specific theoretical concepts and skills within a discipline	D4 / Bachelor / vocational Bachelor Program
5	Mastering some general theories and skills in a discipline	D3 Program
4	Mastering the basic principles, knowledge and skills in a discipline	D2 Program
3	Mastering basic concepts and have a complete understanding of the overall operations	D1 Program
2	Mastering basic concepts and have an understanding of basic operational skills	SMK

Source: The Ministry of National Education's Ministerial Decree No. 22 of 2006 on National Education Standards; The Ministry of National Education & Culture's Ministerial Decree No. 49 of 2014 on the National Education Standards in Higher Education Institutions.

Exhibit 5 Competencies at Work based on the Indonesian Qualifications Framework

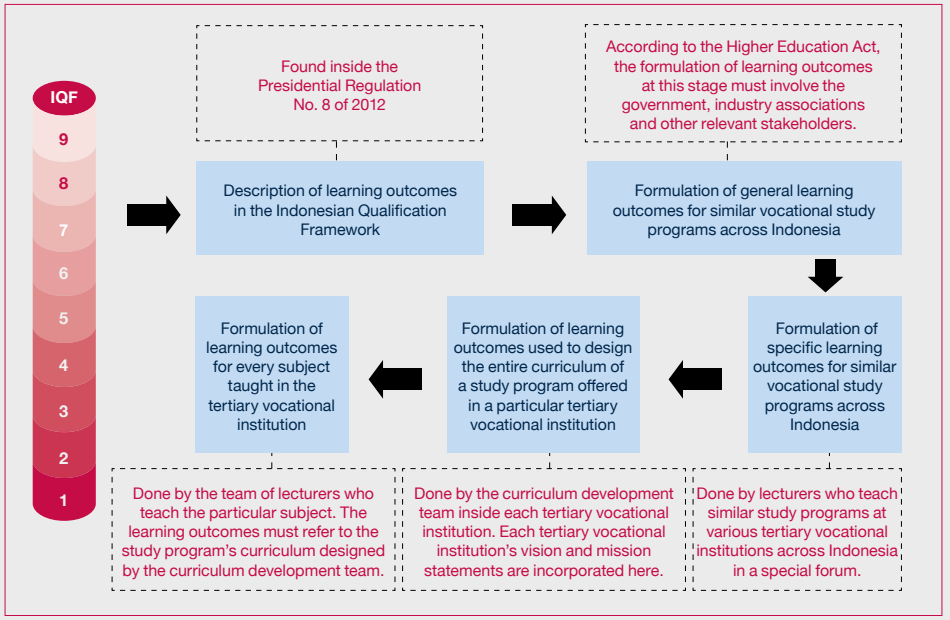
Level of IQF Qualifications	Description of Competencies at Work	Program
9	Ability to deepen and expand on knowledge and technology; Ability to conduct multi and trans-disciplinary research	Doctorate Program
8	Ability to expand on knowledge and technology through inter or multi-disciplinary research	Masters Program
7	Ability to manage subordinates; ability to apply minimum professional standards applicable in their line of work; Ability to design strategic development plans for their organization; Ability to conduct mono-disciplinary research	Professional Program
6	Ability to apply, review and create designs by using knowledge and technology	D4 / Bachelor / vocational Bachelor Program
5	Ability to finish work on general matters by using different methods	D3 Program
4	Ability to finish work on general matters and some specific cases by using different standardized methods	D2 Program
3	Ability to carry out a series of specific tasks	D1 Program
2	Ability to carry out one specific task under direct supervision of the supervisor	SMK

Source: Presidential Regulation No. 8 of 2012

Exhibit 6 Curriculum Development in Tertiary Vocational Institutions

* According to the National Education System Act and the Higher Education, tertiary education institutions are free to develop their own curriculum, as long as these adhere to the following:
  1) The Indonesian Qualifications Framework (IQF)
  2) The National Competency Standard at Work for the vocational programs
  3) The MENC's Ministerial Regulation No. 73 of 2013 on Implementation of the IQF in Higher Education
  4) The MENC's Ministerial Regulation No. 49 of 2014 on National Education Standards in Higher Education.
* The curriculum is developed as a set of learning outcomes, or specific competencies achieved by vocational students and graduates.
* Figure 13 provides an overview of curriculum development process in tertiary vocational institution based on the Indonesian Qualifications Framework.
* The flowchart in Figure 14 illustrates the curriculum development process for a D3 Vocational Program on Accountancy based on the IQF Level 5.

Figure 13. Overview of Curriculum Development in Tertiary Vocational Institutions



Source: DHGE (2013b)

Figure 14. Curriculum Development Process for D3 Vocational Program on Accountancy

Indonesian Qualifications Framework Level 5

The individual should be able to perform the following tasks:
- choose the appropriate method from multiple standardized and non-standardized methods which are available by analyzing data
- able to demonstrate performance to be appraised in qualitative and quantitative terms

Competencies Obtained by D3 Accountancy Program Graduates

Student with a degree from a D3 Accountancy program should be able to:
- perform the role of an accountant in a large scale and/or publicly traded business entity
- perform to the standards and principles accepted in the field of accountancy
- analyze financial data and select the appropriate method, supported by skills in management, ICT, and communications
- possess expertise in interpersonal relations.

Learning Outcomes for D3 Accountancy Program Students	Subjects Offered in a D3 Accountancy Program
Compile financial report according to standards and principles in the field of accountancy	• Introduction to Accountancy • Practicum for Introduction to Accountancy • Intermediate Financial Accountancy • Practicum for Intermediate Financial Accountancy
Calculate cost of goods and write financial report in manufacturing company	• Accountancy on Counting Costs • Practicum for Accountancy on Counting Costs
Present information on management accounting	• Management Accountancy
Audit financial report on compliance and auditing; create worksheet for audits	• Audit • Practicum for Audit

Source: Jati (2013)

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Footnotes

[1] These grants can only be used for the specified purpose of infrastructure spending and are intended as matching grants. For every project related to the construction or renovation of education infrastructure in the regions, 90% of the costs are paid using the specific grants and the remaining 10% is paid by the Local Governments.

[2] There are 34 Provincial Governments, 416 District Governments and 98 Municipal Governments in Indonesia (Ministry of Domestic Affairs 2015).

[3] The MENC does not have the authority to transfer private teachers from one school to another as private teachers are not hired by the Government of Indonesia.

[4] The cases of Genuk and Sayung municipalities in Central Java illustrate the Provincial Government's role in managing shared education facilities across municipalities. The education facilities in Genuk, which are in better condition that those on Sayung, serve 12% of Sayung's residences on a daily basis (Brahmantiyo 2007). The Provincial Government of Central Java needs to ensure that the residents of both municipalities receive education of the same quality despite differences in the quality of their facilities.

[5] Religion is one of the areas exempted from decentralization, and religious schools remain centrally managed by Ministry of Religious Affairs (MORA).

[7] The Ministry of Agriculture, Ministry of Industry and Ministry of Trade manage their own small-scale, public vocational training centers. Certification Agencies will be conducted jointly with Third Party Professional Certification Agencies.

[8] The teacher competency test is an online computer based test conducted by the MENC. The test results for 2012 and 2014 reveal that most Indonesian teachers do not meet the minimum national professional standard (Halmien 2014; Akuntono and Wahono 2012).

[9] CPSC is an international inter-governmental organization whose goal is to enhance the quality of TVET in Asia Pacific. CPSC provides training to professionals actively involved in the TVET sector in its member countries. CPSC member countries are Afghanistan, Bangladesh, Bhutan, Fiji, India, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Singapore, Sri Lanka and Thailand (Colombo Plan Staff College 2015).

Lee Kuan Yew
School of Public Policy
National University of Singapore

Microsoft