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The academic, technical, and employability skills three-year and four-year vocational high school programme graduates

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Abstract.

Vocational high schools in Indonesia, which run under either the three-year or four-year programme, constitute a formal education system that prepares future skilled workers ready to work. The focus of this study was to capture the skills and competencies of three-year and four-year vocational high school programme graduates. This study employed a qualitative multi-site study approach through the constant comparative method, and necessary data were gathered through in-depth interviews and observations. Research results revealed that four-year vocational high school programme graduates had higher competencies and vocational maturity compared to three-year vocational high school programme graduates in terms of academic skills, basic technical skills, as well as technical and employability skills. Therefore, four-year vocational high school programme graduates qualify to fill up operator 3 positions and are equivalent to Diploma 1 holders.

Keyword: three-year programme, four-year programme, academic skills, technical skills, employability skills, vocational education

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BACKGROUND

The education system in Indonesia is similar to the education systems in other developing countries; these education systems are generally divided into two main types of education, namely, general education and vocational education. However, the fashion in which Indonesia classifies vocational education is somewhat different from how other developing countries do. Article 15 of the Law of the Republic of Indonesia Number 20 of 2003 on the National Education System (NES) reads “The education offered to citizens are of general, work-related, academic, professional, vocational, religious, and special types”. It is stated in the essence of the vocational education curricular structure that “the duration of administering vocational high school education is three years or a maximum of four years depending on the expertise demand” (Regulation of the Minister of National Education of the Republic of Indonesia Number 22 of 2006). Vocational high schools, known in Indonesian as Sekolah Menengah Kejuruan (SMK), are formal education to prepare graduates who are skilled and ready to work in the professional world.

The four-year vocational high school programme in Indonesia has a long history, dating back to 1856 when the first carpentry school was established in Batavia (i.e., Ambachts School) with a study period of two years, which was later extended into three years and further into four years in 1894. In 1971, the four-year Secondary Engineering Education System was established under the Pioneering Middle School of Technology, known in Indonesian as Perintis Sekolah Teknologi Menengah (Jokosumbogo B., 2002, Siregar K. S. in Supriadi D., 2002). The three-year and four-year vocational high school programmes have become the hallmark of vocational high school education in Indonesia in producing skilled, ready-to-work workers and creating jobs. The presence of these two programmes is well received by the community and the industrial world, as evidenced by public and industrial interest.

The curricula of both types of VHS have been designed based on the goals of vocational education and clearly demonstrated the application of learning in industry (Misbah et al., 2020; Rahdiyanta et al., 2019). However, the four-year VHS is intended to train professional staff and technicians, resulting in the graduated students of both programme possess different levels of competence in terms of skills and vocational maturity (Syaharuddin & Susanto, 2019). The four-year VHS system in Indonesia today is quite similar to that of several countries, such as Germany, Latvia, Albania, Russia, the Netherlands, Philippines and other various countries implementing a dual system. The dual system includes all types of course programme of skill that offers vocational education with a highly structured formal system program from 1-four-years in length. The Dual system divides the the learning time of students into practical and theoretical by learning in the industry and in school evenly. The dual system in the two VHSs produced different achievements in terms of competencies, especially skills and vocational maturity (Rashtriya, 2005).

The dual system in Germany generally uses a 2-four-year duration system, with learning methods in industry for 3-4 days a week and 1-2 days a week in schools for theoretical aspect and specialized work skills for three-years making industry play a dominant role in helping develop graduate skills (Eichhorst et al., 2013). The VET system in Sweden applies a four-year pattern, which suggests that they employ vocational education and training for four-years in duration (Kuczera & Jeon, 2019). In this four-years programme, students may develop an extensive hard and soft skills.

The main objective of building dual VHS system is to equip students and graduates with various competencies to develop the adaptive capacity of graduates in finding and maintaining jobs, work demand, become entrepreneurial, pursue work, and constant improvement on work skills (employability skills) to develop career and business (Triyono & Mateeke Moses, 2019). During 4 years of study, students in four-years programme will achieve regular vocational programme in the first 3 years plus one year of industrial internship (Triyono & Mateeke Moses, 2019). This is done to deepen the skills of VHS students directly in the industry. In fact, there are no significant differences between four-year and three-year VHSs that can be measured in terms of competency, graduate absorption and career paths in the Business and Industrial World, as well as recognition in continuing to higher education.

Since there are two programmes on vocational school, the comparison between two programmes should be done to evaluate them. The evaluation of these two programmes show that students in four-year programme has more skills than those in three-year programme (Soenarto, Amin, et al., 2017). They are also more ready to work and employed more than those in three-year programme (Pratama et al., 2019). However, both studies do not address the comparison of academic, technical, and employability skills between students in both programmes. The current research aims to compare academic, technical, and employability skills between the two programmes.

RESEARCH METHOD

This study employed a qualitative approach with descriptive data collection. It used inductive thinking, and emphasized understanding of the informants' point of view with interpretative and naturalistic approaches to the subject of the study (Denzin & Lincoln, 2011; Taylor et al., 2015). The multi-site approach was utilized in conjunction with the constant comparative method and research design aiming to develop theories based on several similar research backgrounds (Jenkins et al., 2018). The authors selected this method in response to the existence of these two vocational high school programmes in Indonesia which share similarities in various aspects, such as the competencies of the graduates who are generally equal in career in the industry and in college.

The selection of the research locations was based on the needs of the research. The three-year vocational high school programme is more commonly implemented in the education system in Indonesia. As representatives of this vocational high school programme, two sites were selected as research objects, namely, SMK Negeri 1 and SMK Kartika Wirabuana XX-1 of Makassar, South Sulawesi, Indonesia. On the other flip of the coin, four-year vocational high schools are relatively miniscule in number compared to the other vocational high school programme, with only eight vocational high schools belonging to this category in Indonesia. To represent this programme, SMK Negeri 5 of Makassar, South Sulawesi, and SMK Negeri 5 of Surabaya, East Java, Indonesia, were chosen as research sites. Internal sources of data consisted of the Principals of Vocational High School, Vice Principals of Vocational High School for Curricular Affairs, Vice Principals of Vocational High School for Industrial Relations, heads of study programmes, teachers, and students of the research sites selected. The purposive sampling method was employed to select competent and relevant informants who possessed an in-depth mastery of the problem under study and were reliable in providing data objectively. The informants participated in this study voluntarily. There were a total of 20 different informants from the four selected sites recruited in this study (details are provided in Table 1).

Table 1

Demographic Information of Informant

Informant (symbol)	Age ranges	Educational background	Current positions	Site
"AX1"	50s	Masters Degree	Head of VHS	I
"AX2"	50s	Bachelor Degree	Deputy Head of VHS for Curriculum	I
"AX3"	50s	Masters Degree	Deputy Head of VHS for Industrial Relations	I
"AX4"	40s	Bachelor Degree	Head of Mechanical Engineering Study Program	I
"AX5"	50s	Bachelor Degree	Teacher	I
"BX1"	50s	Masters Degree	Head of VHS	II
"BX2"	50s	Masters Degree	Deputy Head of VHS for Curriculum	II
"BX3"	50s	Masters Daegree	Deputy Head of VHS for Industrial Relations	II
"BX4"	40s	Bachelor Degree	Head of Mechanical Engineering Study Program	II
"BX5"	50s	Bachelor Degree	Teacher	II
"CX1"	40s	Masters Degree	Head of VHS	III

"CX2"	50s	4 Masters Degree	Deputy Head of VHS for Curriculum	III
"CX3"	50s	Masters Degree	Deputy Head of VHS for Industrial Relations	III
"CX4"	50s	Bachelor Degree	Head of Mechanical Engineering Study Program	III
"CX5"	50s	Bachelor Degree	Teacher	III
"DX1"	50s	Masters Degree	Head of VHS	IV
"DX2"	50s	Masters Degree	Deputy Head of VHS for Curriculum	IV
"DX3"	50s	Masters Degree	Deputy Head of VHS for Industrial Relations	IV
"DX4"	50s	Bachelor Degree	Head of Mechanical Engineering Study Program	IV
"DX5"	50s	Masters Degree	Teacher	IV

As displayed in Table 1, the informants recruited in this study included educators or stakeholders from different three- and four-year vocational high schools. This variety of informants was involved with the aim to uncover some of the problems faced by vocational educators.

Data collection instruments

The data in this study were obtained using two data collection techniques, namely, (1) in-depth interview and (2) participant observation (Barnes, 2017; Creswell & Poth, 2016; Morrell & Carroll, 2010). Semi-structured in-depth interviews in this study were used to explore various information about three-year and four-year vocational high school programme graduates to ultimately extract specific information, as well as to directly observe the informants' feelings, thoughts, behaviours, situations, and goals as primary data to meet the objectives of the study (Morrell & Carroll, 2010; Patton, 2014). The descriptive observation was intended to directly check events, places, objects, recordings, and images with the researchers' direct involvement to observe how the research subjects went about their activities (Taylor et al., 2015).

Data analysis

This study employed the constant comparative analysis technique involving multiple sites of two types of vocational high school programmes. Afterwards, data analysis was carried out using the within-case analysis and cross-case analysis to generate theoretical findings.

1. Within-Case Analysis

A within-case analysis was carried out at the sites that represented the three-year and four-years vocational high school programmes. The emergence of large amounts of data is one of the challenges in multi-site studies due to data management. As noted by Merriam & Tisdell (2015), researchers must find ways to overcome this challenge without becoming overwhelmed. Therefore, to overcome the large amount of data obtained, the researchers selected and sorted the data to derive research findings.

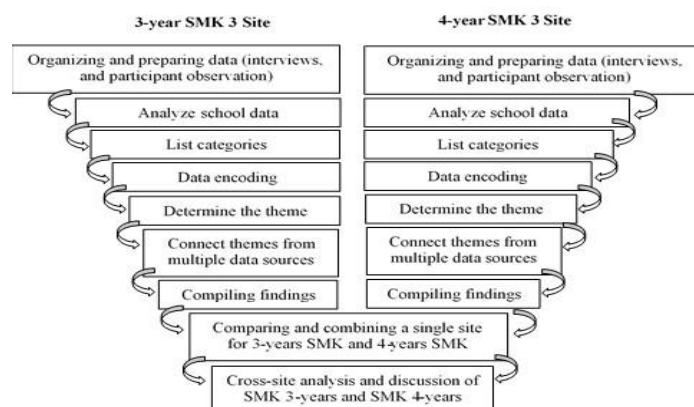


Figure 1. Within-case Data Analysis Framework Adapted from Morrell & Carroll, 2010 & Creswell, 2009

2. Cross-Case Analysis

A cross-case analysis can produce an integrated description of all cases that emerged to determine the similarities and differences of the research sites in building a substantive theory by offering an integrated framework (Merriam & Tisdell, 2015; Taylor et al., 2015). The cross-site data analysis scheme under the constant comparative analysis is shown in Figure 2.

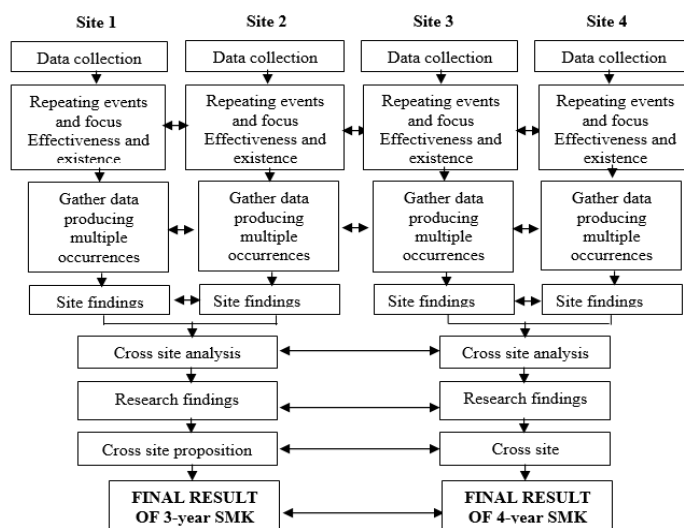


Figure 2. Cross Data Analysis Framework

Findings and Discussion

1. Research Findings

a. Data Exposure and Site Findings I

The data obtained through interviews was reduced in scripts shown below:

“four-year vocational high school has higher skills in the field it is engaged in, especially theoretical and practical knowledge, it only loses time because it does not recognize this in college and is not equal. (01.065.W.AX1.14092022.#00:33:42-7#)”

“There are pros and cons the way I see it ... if you really want to be skilled, it will take four-years, but now let's ask ... more than 60% want to continue their study, so they want three-years since it is much quicker to graduate, ... if it is four-yearsthen they are missing again 1 year behind to three-year VHS. (01.032.W.AX2.27092022.#00:23:04-7#)”

“four-year- VHS is more skilled because they have 1 year in industrial practice and three-years in theory, whereas three-year VHS consisted of only 3-6 months of industrial practice.... depending on the curriculum therefore, the four-year VHS is mature enough in basic theory and skills in school and continued in industry. (01.001.W.AX3.17022022.#00:01:00-5#) and four-year vocational school produces skilled workers.... three-year vocational school leads to curriculum concept... focuses more on college readiness. (01.004.W.AX3.17022022.#00:03:32-9#)”

If the four-year program is well managed according to its vision, the level of mastery of the theory and practice will be better because the learning period is quite adequate. (01.001.W.AX4.08032022.#00:00:41-0#)

“It seems that the four-year VHS is better, the better the work... if the VHS is three-years, with at least 3 months of practice, that automatically reduces the experience and hours of work in the industry. (01.001.W.AX5.07032022.#00:00:29-3#)”

The reduced data can be summarized into factors and dimensions on site findings I on the table below.

Table 2. Site Theme Findings I

Findings
<p>Factors and Dimensions</p> <p>(Three-year and four-year vocational high school programmes in producing academic, technical, and employability skills)</p>
<p>Four-year vocational high school programme graduates have higher skills in the fields they are engaged in, especially in theoretical knowledge (academic skills) and practice (technical skills).</p> <p>If skills (technical skills) are imperative, then students need to take the four-year vocational high school programme.</p> <p>Four-year vocational high school programme graduates are more skilled because they spent one year on practical learning in the industry (technical and employability skills) and three years on theoretical learning (academic skills) at school. Meanwhile, three-year vocational high school programme graduates only spent three to six 6 months on practical learning in the industry (technical and employability skills). Thus, four-year vocational high school graduates achieve sufficient maturity in theory (academic skills) and basic technical skills (basic technical skills) at school and are ready to proceed into the industry (employability skills). Four-year vocational high schools produce and create skilled personnel (technical and employability skills), while three-year vocational high schools focus more on preparing graduates to continue to a higher level (academic skills).</p> <p>If the four-year vocational high school programme is properly managed according to the vision, then the graduates have better levels of conceptual (academic skills) and practical (technical skills) mastery because the learning period is sufficient.</p> <p>Four-year vocational high school programme graduates demonstrate better work/skills (employability skills), while three-year vocational high school programme graduates still lack experience in the industry (low employability skills).</p>

b. Data Exposure and Site Findings II

The data obtained through interviews was reduced in scripts shown below:

“four-years is definitely much more competent... the curriculum which has been the content of creating a ready-to-use workforce. (02.001.W.BX1.15032022.#00:00:25-7#)”

“four-years should be far more competent because 1 year is full of all the practices. (02.013-015.W.BX2.15092022.#00:16:19-2#)”

“If the industry really wants well prepared workers, four-years is more effective... no longer holding training... but if it is three-years, they still need training... but the learning must be varied so that there is no burnout.... (02.032.W.BX3.15102022. #00:32:56-9#)”

“for me ... it's just different in terms of apprenticeship experience ... I believe three-years is enough... because in terms of its compressed learning, while those for four-years have too many outside practices. (02.011-012.W.BX4.12112022. #00:08:43-6#)”

“it means that in terms of skills, ... four-years is good because this is a longer industry practice experience. (02.024-026.W.BX5.12092022.#00:16:53-9#)”

“four-years and three-years must keep going, in addition to being able to go to college. ... The four-year program no longer have to aspire to continue, indeed direct preparation in the industry must be characterized. (02.047.W.BX3.15102022. #00:55:03-9#)”

“from a skilled perspective, the more experience the better, which is four-years. (02.027-029.W.BX5.12092022.#00:18:09-4#)”

The reduced data can be summarized into factors and dimensions on site findings II on the table below.

Table 3. Site Findings II

Findings
Factors and Dimensions
(Three-year and four-year vocational high school programmes in producing academic, technical, and employability skills)
Four-year vocational high school programme graduates are definitely much more competent because the the four-year vocational high school programme curriculum is more devoted to producing workers who are ready to work (technical and employability skills) with one year of practical learning (technical skills).
If the industry as user truly demands graduates who are ready to work (employability skills), then employing graduates of the four-year vocational high school programme is more effective, keeping in mind that three-year vocational high school programme graduates still need training to meet the demands of the industry (low employability skills).
The difference between the two different programmes lies in the aspect of internship/ industrial practice experience (technical and employability skills). The three-year vocational high school programme is more effective because of the dense learning pattern (academic skills), while the four-year vocational high school programme takes too long for outside/industrial practical learning (technical and employability skills).
Four-year vocational high school programme graduates have better skills (technical skills) than three-year vocational high school programme graduates because the industrial practice in the former is longer than that in the latter (technical and employability skills).
Graduates who have skills (academic, technical, and employability skills) are sure to have more experience in learning.

c. Data Exposure and Site Findings III

The data obtained through interviews was reduced in scripts shown below:

“four-years is better ... for admission to industry career, the four-year VHS and three-year VHS have a differentiator from career paths and equivalent to Diploma 1. And including regulations that will be issued in the Ministry of Labor because yesterday we had an MoU with the Ministry of Labor, the Ministry of Finance and the Ministry of Education, there are 5 under the auspices of the Ministry of PMK. We have MoU all, I represent four-years of Vocational High School and I represent Polytechnic, we collaborate for that, and now my alumni have entered Polytechnic directly in semester 3. (03.014.W.CX1.19092022.#00:13:07-5#)”

“four-year VHS because it has a 1-year advantage to develop in terms of skills.... if the three-year VHS skills development is still lacking due to adaptive and normative lessons which have a large enough volume of hours, so practice time is miniscule. (03.001.W.CX2.12042022. #00:02:02-5#)”

“in three-year VHS, there are certain subjects whose time is sacrificed... while four-year VHS, all subjects run according to the curriculum. (03.039.W.CX2.12042022.#00:45:02-4#)”

“Actually, there has always been a difference ... four-year VHS graduates have a higher level than three-year graduates because they are respected for 1 year of education. (03.010.W.CX4.21032022.#00:05:58-2#)”

“it is better for four-years of VHS... three-years of studying in school and 1 year of studying in industry. (03.001-003.W.CX5.07032022. #00:01:58-7#)”

“Now that's a government program, 200 VHSs will be made into four-years.... VHS has a duty to provide a ready-to-use intermediate professional workforce..... and the maturity level of VHS students with four-year programme is better than students in VHS with three-year VHS. (03.012.W.CX1.19092022.#00:10:24-4#)”

“For those focusing in engineering technology VHS it must be four-years, but business, management, and tourism VHS should be three-years, because skills development in schools is sufficient as a provision to develop oneself to work in industry. (03.015.W.CX1.19092022. #00:14:23-5#)”

“there are certain areas of expertise that take four-years, there are certain areas of expertise that only take three-years. Engineering Vocational Schools are better at four-years, meaning that they are more mature than those of three-years. (03.005.W.CX2.12042022. #00:05:48-2#)”

“as long as the conditions of the facilities and infrastructure and their support can be maximized, the four-year VHS is better than the three-year VHS, especially the Engineering Technology VHS. (03.002.W.CX3.16092022. #00:11:48-7#)”

The reduced data can be summarized into factors and dimensions on site findings III on the table below.

Table 4. Findings of Site III

Findings
<p>Factors and Dimensions</p> <p>(Three-year and four-year vocational high school programmes in producing academic, technical, and employability skills)</p>
<p>Four-year vocational high school programme graduates are better because there is already a difference between four-year and three-year vocational high school programme graduates in terms of career ladder in the entrance into the industry. Additionally, the four-year vocational high school programme is equivalent to Diploma 1 programmes.</p> <p>The four-year vocational high school programme includes one additional year for skills development (technical and employability skills) in the industry in contrast to the three-year vocational high school programme. Meanwhile, the skills development (technical skills) under the three-year vocational high school programme is still lacking because the number of hours for adaptive and normative lessons is far higher than that for practical subjects (technical skills).</p> <p>The three-year vocational high school programme sacrifices some time of theoretical and practical subjects at school (academic skills and technical skills) for industrial practice (technical and employability skills). Meanwhile, the four-year vocational high school programme meets theoretical and practical subjects' needs in terms of time at school (academic skills and technical skills) according to the curriculum.</p> <p>Four-year vocational high school programme graduates have a higher level of skills than three-year vocational high school programme graduates because the former spend one full year on industrial practice to deepen their skills in the occupational world (technical and employability skills) while the latter only do three to four months.</p>

Findings

Factors and Dimensions

(Three-year and four-year vocational high school programmes in producing academic, technical, and employability skills)

Four-year vocational high school programme graduates are better than three-year vocational high school programme graduates because they learn at school for three years (academic and technical skills) and learn in the industry for one year (technical and employability skills).

Vocational high schools have a mission to provide a ready-to-use intermediate professional workforce (employability skills). Therefore, four-year vocational high school programme graduates are more mature (technical and employability skills) than three-year vocational high school graduates in terms of academic and technical skills. That is where the difference lies.

Engineering vocational high schools must be run under the four-year programme because the four-year programme allows for sufficient skills development at school to prepare individuals to work in the industry (employability skills). In addition, four-year vocational high school programme graduates are more mature than three-year vocational high school programme graduates.

d. Data Exposure and Site Findings IV

The data obtained through interviews was reduced in scripts shown below:

“In Principle, the ideal choice is a four-year VHS ... one side is to produce skilled workers, it is enforced in three-year VHSs, that is very unlikely four-year VHS is more eligible because of the timeframe for industrial work practice can be up to 1 year.... more skilled than those who are three-years, essentially the VHS does not continue to tertiary institutions, but must work. (04.001.W.DX1.06042022.#00:00:50-5#)”

“If the pattern is like now, perhaps the four-year VHS only won in the apprenticeship, studying in the industry for 6 to 10 months which makes students more mature in thinking and vocational maturity.... We used to apply three-years, but the industry wants us to go back four-years because there are more skilled four-year VHS graduates. (04.015.W. DX3.11012022.#00:21:20-9#)”

“First, in terms of graduation, there are four-years of VHS difference here, automatically from practical facilities or vocational activities there are more four-years of VHS. (04.002.W.DX5.11012022.#00:01:21-4#)”

“If we compare it, the curriculum for four-years of Vocational High Schools compared to three-years of Vocational High Schools must be better... first, four-years of VHS learning theory is more, in terms of practice it uses 60% practice and 40% theory. Second, in the 4th year means the VII and VIII semesters, students study in industry. (04.002.W.DX4. 11012022. #00:04:14-6#)”

“If we talk about the ideal, the four-year VHS has long been ... there is no problem here, the four-year VHS is a lot of enthusiasts, so the most important thing is that the four-year VHS output must be completely absorbed in the industry, by increasing industrial cooperation ... three-year VHS can still be maintained but there must be special treatment. (04.004.W.DX1.06042022.#00:08:02-7#)”

“The four-year VHS should be evaluated, the four-year VHS with what conditions have been running, then be developed in the future.... From the industry perspective, the advantages of four-year VHS graduates have a better maturity level than three-year VHS graduates. (04.001.W.DX2.03102022.#00:08:27-8#)”

The reduced data can be summarized into factors and dimensions on site findings IV on the table below.

Table 5. Findings of Site IV

Findings

Factors and Dimensions

(Three-year and four-year vocational high school programmes in producing academic, technical, and employability skills)

The four-year vocational high school programme is ideal and more qualified to produce skilled (technical skills) and ready-to-use (technical and employability skills) workers because one year of industrial practice is sufficient to produce skilled workers (technical and employability skills). In comparison, the three-year vocational high school programme is very unlikely to produce skilled personnel (technical skills) with only three to four months of industrial practice.

Four-year vocational high school programme graduates excel at industrial apprenticeship/work practice (technical and employability skills) because studying in the industry for six to ten months makes them more mature in thinking (academic skills) and vocational matters.

Four-year vocational high school programme students carry out 40% theoretical learning (academic skills) and 60% practical learning (technical skills) at school and study in the industry (technical and employability skills) in the fourth year.

Four-year vocational high school programme graduates must be completely absorbed in the industry (employability skills), and this can be achieved by increasing industrial cooperation. The three-year vocational high school programme still needs to be maintained, but there must be special treatments.

The industry as graduate user suggests that four-year vocational high school programme graduates have better employability skills than three-year vocational high school programme graduates.

e. Cross Site Findings at three-year VHS

The result on 5 sites will be compared throughout cross site findings. The comparison between site I and II is shown on table below.

Table 6. Cross Site Findings of three-year VHS

Findings	
Factors and Dimensions	
(Both vocational high schools running the three-year and four-year programmes produce academic, technical, and employability skills)	
Site I	Site II
Four-year vocational high school programme graduates have higher levels of skills (technical skills) in the fields they are engaged in because they spent one year on practical learning in the industry (technical and employability skills) and three years on theoretical learning (academic skills) at school. Meanwhile, three-year vocational high school graduates spent only three to six months on practical learning in the industry (technical and employability skills). Thus, four-year vocational high school programme graduates reach maturity in theory (academic skills) and basic technical skills at school and gain work	Four-year vocational high school programme graduates are more competent because the four-year vocational high school programme curriculum is specifically designed to produce a ready-to-use workforce (technical and employability skills), with one year of practical learning in the industry (technical and employability skills). If the industry as user truly demands graduates who are ready to work (employability skills), then the four-year vocational high school programme is more effective than the three-year vocational high school programme, which still needs training to meet the demands for job skills (low employability skills). There are differences in vocational high school graduates in terms of basic skills

Findings	
Factors and Dimensions	
(Both vocational high schools running the three-year and four-year programmes produce academic, technical, and employability skills)	
Site I	Site II
experience in the industry (employability skills).	(technical skills) learning at school and internship/industrial practice (technical and employability skills) duration. Graduates who have skills (academic, technical, and employability skills) definitely have more learning experience.
If the four-year vocational high school programme is well-managed in accordance with its vision, the graduates will have a better level of theoretical (academic skills) and practical (technical skills) mastery because the learning period is sufficient and the work skills are more relevant to the industry (low employability skills).	

f. Cross Site Findings at four-year VHS

The comparison between site III and IV is shown on table below.

Table 7. Cross Site Findings at four-year VHS

Findings	
Factors and Dimensions	
(Both vocational high schools running the three-year and four-year programmes produce academic, technical, and employability skills)	
Site III	Site IV
Four-year vocational high school programme graduates are more competent because they master basic theoretical and practical subjects at school from three years' learning (academic and technical skills) and spend one year on studying in the industry to develop and deepen their skills (technical and employability skills). Currently, there are differences in career paths in the industry. Additionally, the four-year vocational high school programme is equivalent to Diploma 1 programmes. The three-year vocational high school programme is still lacking in technical skills development because some of the theoretical and practical subjects taught at school (academic skills and technical skills) are sacrificed in duration for running industrial practice activities (technical and employability skills) which take three to four months.	The four-year vocational high school programme is ideal and more qualified to produce skilled (technical skills) and ready-to-use workers (technical and employability skills) because it has an advantage in one year of industrial practice, making students more mature in thinking (academic skills) and vocational matters than graduates of the three-year vocational high school programme, which is very unlikely to be forced to produce technically skilled graduates with only three to four months of industrial practice.
Vocational high schools have a mission to provide ready-to-use intermediate professional workforce (employability skills). Four-year vocational high school programme graduates are	Four-year vocational high schools administer 40% theoretical learning (academic skills) and 60% practical learning (technical skills) at school. In addition, the students learn in the industry (technical and employability skills) in the fourth year of schooling. In order for four-year vocational high school programme graduates to be completely absorbed in the industry (employability skills), industrial cooperation should be increased. The maturity level

Findings

Factors and Dimensions

(Both vocational high schools running the three-year and four-year programmes produce academic, technical, and employability skills)

Site III

Site IV

more mature in terms of skills (technical and employability skills) than three-year vocational high school graduates in academic and technical skills. That is where the difference lies.

(employability skills) of four-year vocational high school programme graduates is higher than that of three-year vocational high school programme graduates. There is a need to maintain the three-year vocational high school programme, but there must be special treatments.

g. Comparison of Cross Site Findings of the Two Programmes

After comparing the results between sites, we will compare the two programmes. The comparison between three-year and four-year programme is shown on the table below.

Table 8. Findings Comparison between 3 year programme and four-year programme

Findings	
Factors and Dimensions	
(Three-year and four-year vocational high school programmes in producing academic, technical, and employability skills)	
Three-Year Programme	Four-Year Programme
<p>Four-year vocational high school programme graduates are more skilled (technical skills) and more competent in their respective fields because the four-year vocational high school programme curriculum is specifically designed to include one year of practical learning (technical and employability skills) in the industry and three years of theoretical learning (academic skills) at school to produce ready-to-use labor (technical and employability skills). Therefore, four-year vocational high school programme graduates reach maturity in theory (academic skills) and basic technical skills at school and gain work experience in the industry (employability skills). If the four-year vocational high school programme is well-managed in accordance with its vision, then graduates will have a better theoretical (academic skills) and basic practical (technical skills) mastery because the learning period is sufficient. In addition, they are more skilled at work (employability skills).</p> <p>Three-year vocational high schools only carries out three to six months of practical learning in the industry (technical and employability skills), leading to a lack of experience in the industry. In addition, training is still needed to meet the demands for industrial skills (low employability</p>	<p>Four-year vocational high school programme graduates are more competent. The four-year vocational high school programme is ideal and more qualified to produce skilled (technical skills) and ready-to-use (technical and employability skills) workers because it administers 40% theoretical learning (academic skills) and 60% basic practice learning (technical skills) at school for three years. It also adds one year for industrial practice. Therefore, the programme graduates are more mature in thinking (academic skills) and vocational matters. It is important to make the graduates completely absorbed in the industry (employability skills). In addition, four-year vocational high school graduates are distinguished in terms of career paths in the industry, being equivalent to Diploma 1 holders.</p> <p>The three-year vocational high school programme is still lacking in technical skills development. It is impossible for the three-year programme to produce skilled workers (technical skills) with industrial practice of only three to four months, with the time for theoretical and practical subjects at school (academic skills and technical skills) being compromised to implement the industrial practice. Vocational high schools have a mission to provide a ready-to-use intermediate professional workforce (employability skills). The level of skills maturity (technical and employability skills) of four-year vocational high school programme graduates is higher</p>

skills). The difference between three-year and four-year vocational high school programme graduates lies in the aspects of basic skills (technical skills) at school and internship/industrial practice experience (technical and employability skills). Thus, graduates who have certain skills (academic, technical and employability skills) have more experience in learning.

than that of three-year vocational high school programme graduates because of the academic skills and technical skills. It is where the difference between the two programmes lies.

h. Proposition of three-year and four-year Indonesian Vocational Schools

1. Four-year vocational high school programme graduates are ideal, reach higher maturity in theory and basic skills at school, and gain work experience from the industry. The four-year vocational high school programme is more qualified to produce technically skilled, competent, and ready-to-use workers in the fields where they are engaged because the four-year vocational high school programme curriculum is specifically designed to include 40% theoretical learning (academic skills) and 60% basic practical learning (basic technical skills) at school for three years as well as industrial practical learning (technical and employability skills) for one year to produce ready-to-use workers who have vocational maturity (employability skills) (four-year vocational high school programme proposition).
2. Three-year vocational high school programme graduates are still lacking in skills development (low technical skills), experience, and vocational maturity in the industry. The three-year vocational high school programme has yet to maximally produce skilled workers (no technical and employability skills) because the learning process for industrial work practice lasts for only three to six months and the theoretical learning (academic skills) and basic practical learning processes (basic technical skills) at school do for only two and a half years, with a tentative schedule set by the industry. Therefore, further training is needed to meet the demands for work skills of the industry (three-year vocational high school programme proposition).
3. Vocational high schools have a mission to provide employability skills. The three-year and four-year vocational high school programmes differ in terms of basic skills learning (technical skills) at school and apprenticeship/industrial practice (technical and employability skills). Four-year vocational high school programme graduates who have a lot of experience in learning (academic, technical, and employability skills) are given qualifications to fill up three-year operator positions and are equivalent to Diploma 1 holders (three-year and four-year vocational high school programme propositions).

Discussion

This section discusses the themes and propositions from four research sites, two sites running the three-year vocational high school programme and another two running the four-year programme, by conducting empirical and theoretical analyses. Both three-year and four-year vocational high schools are vocational education institutions in Indonesia that carry out the function of preparing skilled and work-ready graduates. In general, four-year vocational high school programme graduates have more competencies and vocational maturity than three-year vocational high school programme graduates, both in terms of the theoretical learning process (academic skills) as well as the basic practical learning process (basic technical skills) at school and the learning process and experience in industrial work practice (technical and employability skills). These findings answer the doubts of Bennett (2006), who stated that the biggest challenge in vocational education today is to produce vocational high school graduates who have interrelated skills that consist of academic, technical, and employability skills (Figure 2).



Figure 3. The Biggest Challenges of Vocational Education (Bennett, 2006)

The realization of academic, technical, and employability skills, especially in four-year vocational high school programme graduates, shows that the current revitalization of vocational education in Indonesia has rendered vocational high schools ready to take on the challenges from the occupational and industrial world to provide skilled workforce. The three skills every vocational high school graduate should possess are described as follows:

a. Academic skills of three-year VHS and four-year of VHS

Three-year and four-year vocational high school programme graduates must possess the competencies necessary to work in the Industrial Revolution 4.0 Era. Both of the three-year and four-year vocational high school programmes must integrate academic, technical, and job skills to prepare students in pursuing productive careers because the industry values academic skills but it is in desperate need for job skills. The biggest contribution to human resources development that can be made by vocational high schools is to create a strong foundation in academic skills and in applying those academic skills (Bennett, 2006; Herschbach, 2009). Academic skills are employed in any job. Besides, academic skills are important because they are needed for one to learn what really matters in a modern technological job (Pucel, 1995; Gray K. & Bae S. H., 2009).

The four-year vocational high school programme curriculum is specifically designed to carry out the theoretical learning process (academic skills) and the basic practical learning process (basic technical skills) at school for three years, while the three-year programme curriculum is only for two and a half years. Therefore, four-year vocational high schools are more capable of developing academic skills than three-year vocational high schools because in addition to social skills, personal growth and development, and educational/work aspirations, the most important aspect to be developed at school is academic skills (Reynolds D. & Teddlie C., 2002).

b. Technical Skills of three-year VHS and four-year VHS

Three-year and four-year vocational high schools in Indonesia provide students with an option in determining the direction in which their skills and competencies are to be developed. These two types of vocational high schools do not polarize the implementation of the curriculum based on the socio-economic status of the people in Indonesia. This means that the duality of the vocational high school education system is not to be construed as a division of curriculum implementation in low socio-economic-status schools, which is rather focused on basic skills, and in secondary socio-economic-status schools, which is highly focused on a variety of academic skills (Teddlie C., Stringfield S., & Reynolds D., 2002).

Both types of vocational high schools are still focused on allocating more time on basic technical skills learning at school. This is in line with the focus of education in 2030, namely, to develop technical and vocational skills, where technical skills enable graduates to obtain jobs and basic skills and give them value and a means to improve their careers (Bedwell et al., 2014; United Nations Educational, Scientific

and Cultural Organization, 2016). Technical skills must be acquired through the process of learning and developing knowledge, practice, and work experience appropriate with each area of expertise and skills to help students perform better work, acquire higher levels of proficiency, and understand team collaboration and to guide the placement of more-skilled as opposed to less-skilled graduates (Aggarwal & Darzi, 2006; Bedwell et al., 2014; Messum et al., 2015).

c. Work Skills of three-year VHS and four-year VHS

The development of work skills through industrial practice takes three to six months for the three-year vocational high school programme and 12 months for the four-year programme. Currently, the Indonesian government is designing curriculum alignment involving the employment of graduates. The purpose is to align the supply and the demand. This involves the development of a four-year vocational high school programme that produces graduates who possess different standard competencies than those of graduates of the three-year programme. Figure 2 shows the alignment of fields, programmes, and skills that takes place in vocational high schools.

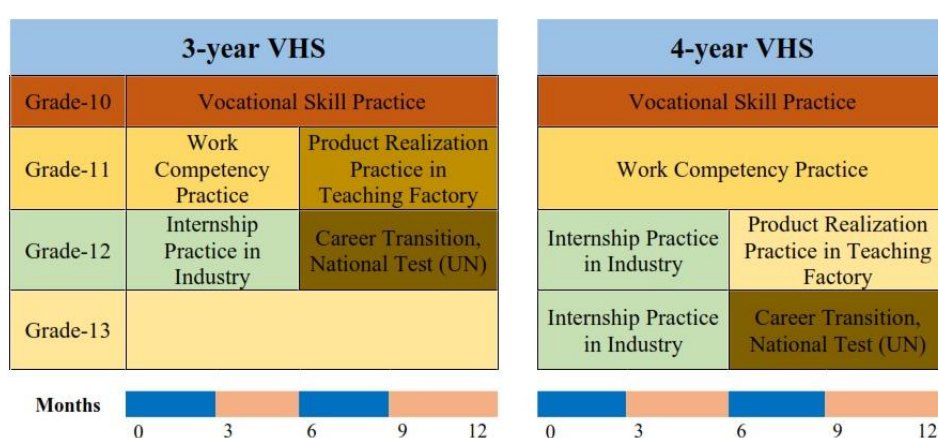


Figure 4. Alignment of the Vocational High School Curriculum. (Source: Vocational Education Revitalization: Ministry of Education and Culture of the Republic of Indonesia)

The apprenticeship system is an effective system that helps students deepen and master more complex skills, provides them with direct work experience in real jobs, and develops them into skilled, ready-to-use workers (employability skills). In response to the ever dramatically changing job world, the education system aims to develop graduates employability skills that are required to enter and keep jobs (Yorke M. & Knight P., 2006; Pendidikan K., & Indonesia K. R., 2016). Employability skills consist of work ethics, academic abilities, and specific job or technical skills. Employability skills are the main element that increases individuals' confidence in certain jobs and gives them an advantage over others in competing for jobs and exerting further positive impacts on organizational performance (Gray K. & Bae S. H., 2009; Little B. M., 2011).

Findings revealed that three-year and four-year vocational high school programme graduates are to a variety of degrees ready to work in terms of academic skills, basic technical skills, employability skills, and vocational maturity. This result is in line with a previous finding on the quality of institutional governance and learning in four-year vocational high schools, which revealed that the competencies of four-year vocational high school programme graduates ranged from "good" to "very good". The four-year vocational high school programme has paid attention to the changes and paradigm shifts of the 21st century education into more demand-driven for future and market-driven. Moreover, four-year vocational high schools meet the level 3 qualifications (operator position qualification 3) of the KKNI (Indonesian National Qualifications Framework) that are equivalent to Diploma 1 qualifications, as shown in Figure 4 (Soenarto et al., 2017).

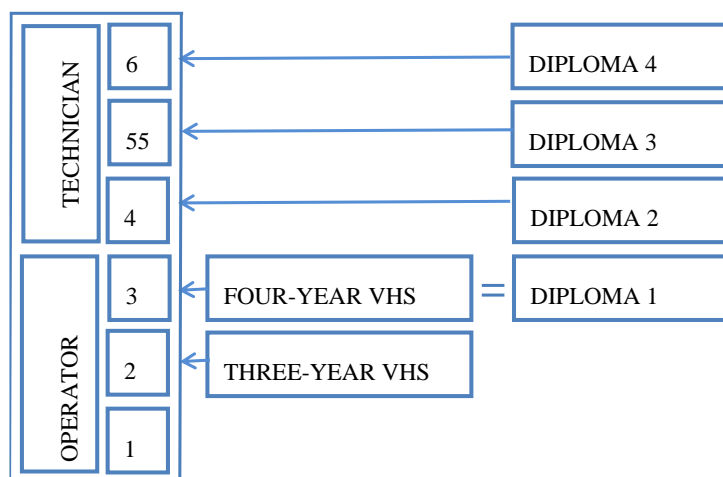


Figure 5. The Indonesian National Qualifications Framework (Directorate General of Primary and Secondary Education, Republic of Indonesia)

Table 9. Level Descriptors in the KKN for All National Qualifications

Qualification Level	Description
5	Be able to perform a specific task using ordinary tools, information, and working procedures, as well as demonstrate performance with measurable quality, under the direct supervision of his/her superior.
2	<p>Have basic operational knowledge and factual knowledge in a specific field of work, and thus be able to choose from available solutions to commonly occurring problems.</p> <p>Be responsible for his/her own work, and be able to assume the responsibility for guiding another person.</p> <p>Be able to perform a series of specific tasks by translating information and using tools based on a number of available working procedure options, and be able to demonstrate performance with measurable quality and quantity, in which case the performance is the result of his/her own work under indirect supervision.</p>
3	<p>Have thorough operational knowledge and understanding of principles as well as general concepts related to the facts in a particular field of expertise, and thus be able to solve various typical problems using suitable methods.</p> <p>Be able to cooperate and communicate in the scope of his/her work.</p> <p>Be responsible for his/her own work, and be able to assume the responsibility for ensuring the quantity and quality of the results of other person's work.</p>

Therefore, based on the findings and the Indonesian National Qualification Framework, the three-year and four-year vocational high school programmes that differ in terms of basic skills (technical skills) learning at school and internship/industrial practice experience (technical and employability skills) provide graduates who have a lot of experience in learning (academic, technical, and employability skills) as professionals in their fields.

Conclusions

The conclusions from the empirical and theoretical analyses' results derived from the selected three-year and four-year vocational high schools are as follows:

Four-year vocational high school programme graduates have higher levels of competencies and vocational maturity than three-year vocational high school programme graduates in terms of theoretical learning (academic skills) and basic practical learning (basic technical skills) at school as well as industrial practice experience (technical and employability skills).

Both of the three-year and four-year vocational high school programmes produce graduates who to a variety of degrees are ready to work in terms of academic skills, basic technical skills, and employability skills, but findings suggest that the latter are more qualified to fill up operator positions and are equivalent to Diploma 1 holders.

3 Authors' contribution

All authors contributed to each stage of the research process. All authors read and approved the final manuscript.

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