



The Impact of Trends in the Opening of Automotive Engineering Study Program (Light Vehicle and Motorcycle) in Vocational High Schools

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Abstract. The aim of this study was to identify the impact that occurred from the trend of opening the Automotive Engineering Study Program, with the Light Vehicle Engineering and the Motorcycle Engineering in Vocational High Schools (SMK). The trend of opening the Automotive Engineering Study Program is not only in newly established or opened SMK, but also in several old SMK which were not originally from the Technology and Industry group. The method used in this research is descriptive quantitative method, the data used in the research consists of: primary data and secondary data. Primary data was obtained through interviews and observations at several SMK, while secondary data regarding the number of automotive engineering study program SMK and the number of existing teachers was obtained from the Education Office of West Sumatra Province. The results showed that there were 83 SMK in the Automotive Engineering Study Program in West Sumatra Province, with details of 43 Public Vocational High Schools and 40 Private Vocational High Schools. The city of Padang has the largest number of Automotive Engineering Study Program Vocational Schools, namely 15 Vocational High Schools (18.07%), with details: 4 State Vocational High Schools (26.67%) and 11 Private Vocational High Schools (73.33%). The impacts arising from the tendency to open the Automotive Engineering Study Program at SMK, namely: (1) a shortage of teachers for automotive engineering expertise programs at several SMK; (2) Workshops and practicum equipment at several SMK are incomplete and inadequate; (3) The practicum ability of automotive engineering teachers is still lacking and the technology is not updated; (4) Less and limited number of automotive industries or companies that are suitable as places of apprenticeship (Industrial Field Practice) for Automotive engineering study program students.

Keywords: Automotive Engineering Program Study · Light Vehicle Engineering Expertise Program · Motorcycle Engineering Expertise Program · Vocational High School

1 Introduction

Vocational education has several terms abroad, The ILO (International Labor Organization) together with UNESCO (United Nations Educational, Scientific, and Cultural

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Ambiyar et al. (Eds.): ICTVET 2022, ASSEHR 747, pp. 215–223, 2023.

https://doi.org/10.2991/978-2-38476-050-3_24

Organization) in the second international congress in Korea in 1999 established the concept of technical and vocational education and training under the name Technical and Vocational Education and Training (TVET) for the first time [1].

Developed countries such as America, Germany and Japan carry out their vocational education very well so that their economies develop rapidly. This is because they are very aware that the importance of vocational education provision in work for economic development [2]. Countries in Southeast Asia are even currently making the development of vocational education the key to dealing with problems in the form of economic and social growth and development in the future [3].

Vocational education is secondary education that prepares students especially to work in certain fields. SMK is an educational institution that requires students to have more hard skills. In relation to science, students or students are required to master practical learning activities [4].

Vocational High School has two competencies, namely productive competence and adaptive competence. Productive competence is a special ability that is given to students according to the program of expertise they choose. This competency prioritizes aspects of practice in schools, so that the benchmark for achievement is closely related to the characteristics needed by the industrial world. Adaptive competence is given to students as a support for productive abilities [5].

The establishment of a new SMK is intended to open up more opportunities for junior high school students who wish to continue their education to vocational education [6]. The ideal establishment of a SMK is a SMK that is really good according to 8 National Education Standards (SNP) and 16 prosper theories [7]. However, what happened was that many Vocational High Schools did not meet the standards. Every time a new Vocational School is established, an automotive engineering department is always opened, be it Light Vehicle Engineering or Motorcycle Engineering. The opening of automotive engineering majors is not only for newly established SMK, but there are several SMK that have been established for a long time that have also opened automotive engineering majors. This makes the number of automotive engineering majors in SMK, this is a trend in the city of Padang, and in the province of West Sumatra, as well as other regions in Indonesia in general [8].

Data from the Birol Statistics Agency (BPS) for 2022, the number of public and private vocational high schools (SMK) in Indonesia in 2020/2021 is 14,078 schools, the number of SMKs in West Sumatra is 213 schools, and the number of SMKs in cities Padang is a total of 43 schools [9]. The Central Statistics Agency (BPS) reported that the total open unemployment rate (TPT) as of February 2022 was 8.40 million people. Of this number, SMK graduates are the largest compared to graduates of other educational levels. Based on existing data, unemployment for SMK graduates is recorded at 10.38%. The high unemployment rate of SMK graduates is the impact of the policy of establishing more and more SMKs, one of the contributors is SMK graduates majoring in automotive engineering. A solution must be found for this, so that graduates from Vocational High Schools do not become unemployed, which is generally caused by not having the competencies relevant to their study program [9].

The purpose of this study was to identify the impact that occurred from the trend of opening the Automotive Engineering Study Program, with the Light Vehicle Engineering

Expertise Program and the Motorcycle Engineering Expertise Program in Vocational High Schools. The trend of opening the Automotive Engineering Study Program is not only in newly established or opened SMKs, but also in several old SMKs which were not originally from the Technology and Industry group.

1.1 Vocational High School

Vocational High School a formal educational institution at the high school level. This SMK organizes vocational education at the secondary level as a continuation of junior high school or its equivalent. In contrast to SMA, SMK learns the material and practices it a lot. SMK is a type of secondary education that specifically prepares its graduates to become skilled workers and ready to enter the wider community [10].

Vocational education as part of the education system that prepares a person to be more capable of working in a group of jobs or one field of work than other fields of work [11].

1.1.1 Automotive Engineering Study Program

The Department of Automotive Engineering equips students with a range of graduate competencies, including: knowledge of automotive engineering (mastering the history and development of automotive engineering, basic automotive engineering, and an overview of the automotive world), automotive maintenance, automotive maintenance (mastering the automotive engine, chassis, body, and electrical maintenance techniques), Automotive technology (mastering techniques for manufacturing automotive components), and entrepreneurs (mastering the basics of management and service to consumers and being able to become entrepreneurs in the automotive sector) [12].

1.1.2 Light Vehicle Engineering

For Light Vehicle Engineering expertise, we will be taught about the engines in the car, the components of the frame (chassis), car electricity and others. In the end, it prepares students to become reliable car mechanics who can later work in car repair shops. Light Vehicle Engineering is the study of land transportation equipment that uses machines, especially cars, which began to develop as a branch of science along with the creation of car engines. Therefore, Light Vehicle Engineering has developed into a broad science and covers all systems and sub-systems [12].

Light Vehicle Engineering Competencies, consisting of: carry out welding, desoldering, overhaul the cooling system and its components; maintenance engine and its components; repairing the clutch unit and operating system components; repairing damage to the electrical system, maintain/service gasoline fuel system; improve the diesel fuel injection system; maintain transmission; maintain the final drive/axle unit; fix the drive axle; repair wheels and tires; repair the brake system; improve the steering system; fix the suspension system; maintain battery; repair the ignition system; the starter and charging system; service the AC system (Air Conditioner) [12].

1.1.3 Motorcycle Engineering

Motorcycle Engineering is a skill competency in the Automotive Engineering Expertise Study Program which emphasizes the skills of two-wheeled motorcycle mechanic services. Motorcycle Engineering Skills Competence prepares students to work in fields of work managed by agencies, agencies or private companies (entrepreneurs) [12].

Motorcycle Engineering Competence specifically is to equip students with the skills, knowledge, and attitudes to be competent in the following matters: Motorcycle engine maintenance and repair; Maintenance and repair of motorcycle power transfer systems; Maintenance and repair of motorcycle chassis and suspension; Maintenance and repair of motorcycle electrical systems; Able to provide maintenance and repair services in the field of motorcycle repair shops; Able to identify the type of damage of the entire automotive system of motorcycles and their components; Able to disassemble, repair and replace all motorcycle automotive systems and their components [12].

1.1.4 Problems Faced in Vocational High Schools

There are several issues and problems faced in Vocational Schools that need to find solutions, including [10]: (1) the mapping of the latest SMK development is not yet stable; (2) developing SMKs by adding SMKs only adds to the number of: unemployment, state financial expenditure, productive teachers, and workshop/laboratory facilities; (3) the highest educated unemployment is SMK; (4) the business/industry world prefers to accept SMA graduates rather than SMK graduates; (5) SMK graduates are only job seekers, not job creators; (6) for what time did you study at Vocational High School three years after graduation, you only received one skills certificate; (7) the competencies of SMK graduates are not in accordance with the competencies required by the business/industry world; (8) link and match between Vocational Schools and the business/industry world has not been effective since then until now it is only a discourse; (9) SMK has difficulty finding apprenticeship/internship places that meet the requirements; (10) the business/industry world feels that the SMK partnership with them is just a hassle, fearing that machines/equipment will break down and practice materials will be wasted; (11) the business/industry world complains that the discipline and work culture of apprenticeship participants is relatively low; (12) the business/industry world complains about what students get if the apprenticeship/internship is only three months, especially in building projects that take a relatively long time to complete (cases of apprenticeship/apprenticeship in large projects, where the foundation has just been laid, the apprenticeship/internship has been completed); (13) schools are less proactive in seeking partners with the business/industry world; (14) there is no legal basis obliging the business/industry world to partner with SMKs; (15) More than 50% of SMKs have not been accredited A; (16) Private SMKs prefer to accept non-LPTK graduates rather than LPTK graduates; (17) SMK lacks productive teachers so students are trained by teachers who are not experts; (18) the majority of vocational school teachers are not yet productive teacher certified, while students who graduate are required to have expertise certificates [13].

One of the problems faced by SMK is the low quality of graduates. Various attempts have been made by the government to improve the quality of graduates. For example, making national education standards; changing the 2006 Curriculum into the 2013 Curriculum; carry out the S1 program; to guide/train teachers [14].

2 Method

The method used in this research is descriptive quantitative method, the data used in the research consists of: primary data and secondary data. The data obtained is then entered into the research data table, then the data is analyzed and studied. Primary data was obtained through interviews and observations at several SMK in West Sumatra Province, while secondary regarding the number of automotive engineering study program SMK and the number of existing teachers, data was obtained from the Education Office of West Sumatra Province.

3 Results and Discussion

3.1 Description of Research Data Results

3.1.1 Number of SMK Automotive Engineering Study Programs in West Sumatra Province

Based on the results of the recapitulation of the number of Vocational High Schools with Automotive Engineering Study Programs, data from the West Sumatra Province Education Office is shown in Table 1.

3.1.2 Number of Automotive Engineering Vocational Schools in Padang City

See Table 2.

The results of interviews with the principal of a vocational school in the city of Padang. Year 2022

The results of interviews with the principal of a vocational school in the city of Padang. 2022

3.2 Discussion

Based on Table 1, the results of the analysis of research data calculations show that the number of SMKs in the Automotive Engineering Study Program in West Sumatra Province is 83 SMKs, with details of 43 Public Vocational Schools (51,81%) and 40 Private Vocational Schools (48,19%). Referring to Table 1, of all regencies and cities in West Sumatra province, the city of Padang has the largest number of Automotive Engineering Study Program Vocational High Schools, namely 15 Vocational Schools (18.07%), with details: 4 State Vocational Schools (26.67%)) and 11 private vocational schools (73.33%).

Based on Table 3, especially in the city of Padang, there has been a shortage of automotive engineering teachers in vocational high schools as many as 13 teachers, with

Table 1. Data on the Number of Vocational High Schools with Automotive Engineering Study Programs in West Sumatra Province

No	Districts/City	State Vocational High School	Private Vocational High School	Total
1	Padang City	4	11	15
2	Bukit Tinggi City	1	2	3
3	Pariaman City	2	0	2
4	Solok City	1	1	2
5	Sawahlunto City	1	0	1
6	Payakumbuh City	1	3	4
7	Padang Panjang City	1	1	2
8	Padang Pariaman	1	1	2
9	Solok District	3	2	5
10	Solok Selatan District	2	2	4
11	Pesisir Selatan District	6	2	8
12	Sijunjung District	1	1	2
13	Dharmasraya District	1	1	2
14	Agam District	4	4	8
15	Tanah Datar District	3	2	5
16	Limapuluh Kota District	4	2	6
17	Pasaman District	2	2	4
18	Pasaman Barat District	3	3	6
19	Mentawai District	2	0	2
Total		43	40	83

Source: Office of Education of West Sumatra Province. 2022

details of the shortage of automotive teachers at state vocational schools as many as 3 teachers, and a shortage of automotive teachers in private vocational schools as many as 10 teachers. This also happened in several other areas, such as the city of Bekasi, West Java, the city of Pekanbaru, and several other cities in the provinces of Riau and Jambi. This can be seen by the large number of requests for automotive engineering teachers to the automotive engineering department, Faculty of Engineering, Padang State University. The condition of many vocational high schools lacking automotive teachers is caused by the opening of automotive engineering majors at newly established vocational schools and old vocational schools that open automotive engineering study programs.

The impacts arising from the tendency to open the Automotive Engineering Study Program at SMKs, namely: (1) a shortage of teachers for automotive engineering expertise programs at several SMKs; (2) Workshops and practicum equipment at several SMKs are incomplete and inadequate; (3) The practicum ability of automotive engineering

Table 2. Vocational High School data and data on the shortage of Automotive Engineering Study Program Teachers at Padang City Vocational Schools

No	School Name	Status	Automotive Teacher Shortage Data (People)
1	SMKN 1 Padang	State	—
2	SMKN 1 Sumatera Barat	State	1
3	SMKN 5 Padang	State	—
4	SMKN 8 Padang	State	2
5	SMKS Adzкия Padang	Private	—
6	SMKS Citra Utama Padang	Private	—
7	SMKS Dhuafa Padang	Private	1
8	SMKS Kartika 1.1 Padang	Private	2
9	SMKS Labor Padang	Private	—
10	SMKS Muhammadiyah 1 Padang	Private	—
11	SMKS Profesional Padang	Private	2
12	SMKS Taman Siswa Padang	Private	1
13	SMKS Taruna Padang	Private	1
14	SMKS TD Kosgoro Padang	Private	—
15	SMKS Teknologi Plus Padang	Private	3

Source: Office of Education of West Sumatra Province. 2022

Table 3. Number of Teacher Shortages for State Vocational High Schools and Private Vocational Schools for Automotive Engineering Study Programs in Padang City

No	School	Total (People)
1	SMK State	3
2	SMK Private	10
Total		13

Source: Office of Education of West Sumatra Province. 2022

teachers is still lacking and the technology is not updated; (4) Less and limited number of automotive industries or companies that are suitable as places of apprenticeship (Industrial Field Practice) for Automotive engineering study program students.

The efforts to follow up on the problems of newly established SMKs are suggestions or recommendations that the author offers so that problems that occur can be resolved with minimal risk, namely [7]: 1. Before establishing a new SMK, local government should conduct a needs analysis study and feasibility study first. 2. The government must also pay attention to the potential of the region in choosing what competency skills will be opened in SMKs. 3. The central and regional governments must also meet minimum

school facilities in accordance with the minimum standard of infrastructure. 4. Educators must be available and in accordance with predetermined qualifications, educators are graduates of the best universities and already have accreditation. 5. Vocational Schools improve their existing Human Resources.

The need for guidelines and agreements should ensure students' rights to supervise work-life practices, create structures for contact between teachers and vocational instructors, and establish principles for integrating learning in schools with learning in the workplace. This is necessary to counteract traditional differences and create a realistic for vocational education that is holistic, coherent and relevant [15].

The German education system is characterized by a large sector of dual vocational training, which facilitates integration into the labor market. This system creates a market for specialized training for school leavers, which is characterized by strong regional disparities. This results in a well-interpretable classification of the vocational education market, which is widely useful in labor market research and policy [16].

4 Conclusion

Results of the research that has been done, it can be concluded that the number of SMKs in the Automotive Engineering Study Program in West Sumatra Province is 83 SMKs, with details of 43 Public Vocational Schools and 40 Private Vocational Schools. In Padang, Automotive Engineering Study Program Vocational High Schools was the most, namely 15 Vocational Schools (18.07%), with details: 4 State Vocational Schools (26.67%) and 11 Private Vocational Schools (73.33%). The impacts arising from the tendency to open the Automotive Engineering Study Program at SMKs, namely: (1) a shortage of teachers for automotive engineering expertise programs at several SMKs; (2) Workshops and practicum equipment at several SMKs are incomplete and inadequate; (3) The practicum ability of automotive engineering teachers is still lacking and the technology is not updated; (4) Less and limited number of automotive industries or companies that are suitable as places of apprenticeship (Industrial Field Practice) for Automotive engineering study program students.

References

1. P. M. P. Sudira, "TVET Abad XXI filosofi, konsep, dan strategi pembelajaran vokasional," *UNY Press*, vol. 53, no. 9, pp. 1689–1699, 2016.
2. D. Nurhadi and N.-M. Lyau, "Cultivating Responsibilities of Vocational Teachers: A Framework for Preparing Education to Work," *J. Pendidik. Teknol. dan Kejur.*, vol. 24, no. 2, pp. 295–302, 2018, <https://doi.org/10.21831/jptk.v24i2.19347>.
3. M. Grosch, "Developing A Competency Standard For TVET Teacher Education in ASEAN Countries," *J. Pendidik. Teknol. dan Kejur.*, vol. 23, no. 3, pp. 279–287, 2017.
4. Kemensekneg, "Peraturan Pemerintah Republik Indonesia No 19 ,2017 Tentang Guru," *Peraturan Pemerintah Republik Indones. Nomor 19 Tahun 2017*, vol. Volume 09, no. Nomor 03, p. Hal 270, 2017.
5. Joko. M, "Motivasi Mahasiswa Pendidikan Teknik Otomotif 2017 dalam Memasuki Dunia Kerja Sebagai Tenaga Kependidikan," Universitas Negeri Padang, 2022.

6. “Bakti, Asmara. (2017). Analisis Kebijakan Pendirian Satuan Pendidikan Dasar dan Menengah.pdf.”
7. E. D. Kurniawan, “Seminar Nasional Pendidikan Teknik Mesin FKIP Unsri , Sabtu , 21 November 2015 ISBN : 978-602-73579-0-7 Permasalahan SMK Yang Baru Didirikan Dalam Menghadapi Masyarakat Ekonomi Asean FKIP Unsri , Sabtu , 21 November 2015 ISBN : 978-602-73579-0-7,” no. November, pp. 81–88, 2015.
8. D. A. Kurniady, L. Setiawati, and S. Nurlatifah, “Manajemen Pembiayaan Pendidikan Terhadap Mutu Sekolah Menengah Kejuruan,” *J. Penelit. Pendidik.*, vol. 17, no. 3, pp. 263–269, 2018, <https://doi.org/10.17509/jpp.v17i3.9620>.
9. B. Pendidikan, J. Sekolah, S. Menengah, K. Smk, K. Pendidikan, and M. Kabupaten, “Indonesia | English Media Sosial Tentang Kami Layanan BPS Umum BPS Visi dan Misi Berita BPS Data BPS Hak Cipta © 2022 Badan Pusat Statistik Kabupaten/Kota Pendataan Awal Registrasi Sosial Ekonomi (Regsosek) 2022 dilaksanakan pada 15 Oktober-14 Novemb,” 2021.
10. H. & D. Usman, *Pendidikan Kejuruan*. 2014.
11. Evans, Rupert. N., & Edwin, Lewis. H, *Found a tions of vocational education*. 1978.
12. E. Cristyani, “Cristyani_Eva_2021_ Jurusan Teknik Otomotif_Program Keahlian dan Kompetensi.pdf.” PT. Educa Sisfomedia Indonesia., 2021. [Online]. Available: <https://www.gamelab.id/news/634-jurusan-smk-jurusan-teknik-otomotif>
13. S. Arif Sugianto, “Pengaruh Kegiatan Praktek Kerja Industri Terhadap Kesiapan Kerja Di Sekolah Menengah Kejuruan Negeri 8 Purworejo,” *J. Pendidik. Tek. Otomotif_Universitas Muhammadiyah Purworejo*, vol. 12, no. 01, pp. 12–16, 2018.
14. Widiatna Alexius Dwi, “Widiatna Alexius Dwi (2019) Teaching Factory, Arah Baru Manajemen SMK.pdf.” Pustaka Kaji. Universitas Negeri Jakarta, 2019.
15. H. Hiim, “How Can Collaboration between Schools and Workplaces Contribute to Relevant Vocational Education?: Results of an Action Research Project in the School-based Part of Norwegian Vocational Education and Training,” *Vocat. Learn.*, 2022, <https://doi.org/10.1007/s12186-022-09300-z>.
16. C. Kleinert, A. Vosseler, and U. Blien, “Classifying vocational training markets,” *Ann. Reg. Sci.*, vol. 61, no. 1, pp. 31–48, 2018, <https://doi.org/10.1007/s00168-017-0856-z>.

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