

Industry and Vocational School Collaboration: Preparing an Excellent and Industry-Needed Workforce

Abstract

Mismatch still occurs between vocational schools and industry, where vocational high schools/Sekolah Menengah Kejuruan (SMK) contribute to the highest unemployment rate compared to elementary school/Sekolah Dasar (SD), Junior High School/ Sekolah Menengah Pertama (SMP), Senior High School/Sekolah Menengah Atas (SMA) and University in Indonesia. This remains a challenging phenomenon, amidst national regulations mandating SMK to be educational institutions that prepare graduates for employment. This article aims to examine the appropriate learning patterns that synchronize the needs of industry with the implementation of learning in schools. The method used in writing this article is Systematic Literature Review (SLR), limiting sources to the past 10 years from nationally and internationally indexed journals. Industrial education with collaboration between industry and SMK is the solution in preparing graduates as a competitive and industry-relevant workforce. This pattern can be used to map industry needs by employing a realistic learning approach aligned with industry practices, considering the rapid and massive changes and shifts in the industry.

Keywords: Excellent Workforce, Industry, Vocational School

1 Introduction

In recent years, there has been growing recognition of the importance of collaboration between industry and vocational schools in preparing a skilled workforce that meets the needs of the job market (Suharno et al. 2020). Vocational schools, also known as technical or trade schools, play a crucial role in providing students with practical skills and knowledge relevant to specific industries (Dimian et al. 2017; Engelbrecht et al. 2017). However, the mismatch between the skills taught in vocational schools and the demands of industry has been a persistent challenge in many countries, including Indonesia. This mismatch often results in high unemployment rates among vocational school graduates despite the increasing demand for skilled workers in various sectors (Marr 2022; Bag et al. 2018; Wong et al. 2014).

To address this issue, collaboration between industries and vocational schools has become imperative (Carayannis et al. 2022; Triyono et al. 2019). By working together, industries can provide valuable insights into current and future skill requirements, while vocational schools can tailor their curriculum to better align with industry needs (Kovács & Pató 2014; Thai 2012; Chen & Li 2016). This collaboration can take various forms, including internships, apprenticeships, guest lectures, and joint curriculum development initiatives. Research in this

area aims to explore the effectiveness of industry-vocational school collaboration in preparing students for the workforce. It seeks to identify best practices and strategies that can enhance the relevance and quality of vocational education, ultimately leading to better employment outcomes for graduates (Ayonmika 2015; Ahmed et al. 2020).

By understanding the dynamics of industry-vocational school collaboration and its impact on workforce preparation, policymakers, educators, and industry stakeholders can develop informed strategies to address skill gaps, reduce unemployment rates, and promote economic growth.

2 Study Focus and Methodology

The focus of this study is to examine the collaboration between vocational high schools/Sekolah Menengah Kejuruan (SMK) and industries in preparing an excellent workforce. The method used is a Systematic Literature Review (SLR) using data from Google Scholar sourced from national and international journals over the last ten years. Data search was conducted using keywords such as learning and teaching, curriculum, skills, industry 4.0, and industry demand. The information on the stages of data collection can be seen in Figure 1.

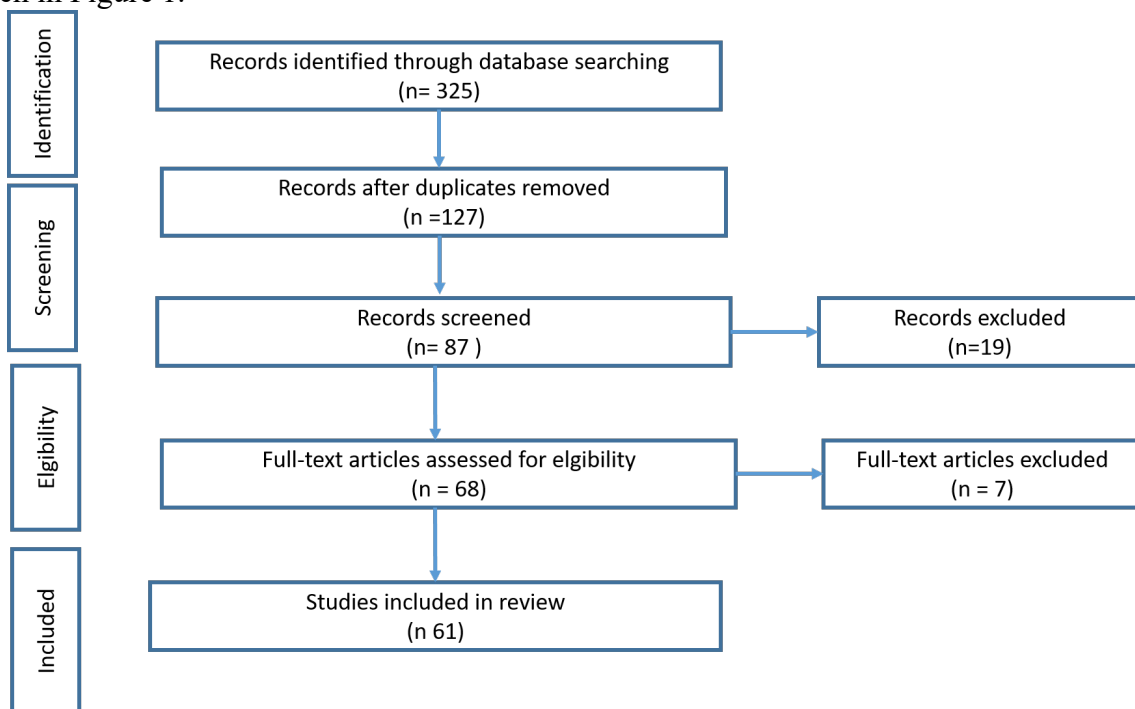


Figure 1: SLR Stages

The total number of articles used as references in compiling this article is 61 articles. The information obtained serves as material for further analysis in finding an overview of the

collaboration between vocational high schools (SMK) and industry as an effort to prepare an excellent workforce.

3 Result

The result generated from keywords by using 10-year resources from scientific articles can be seen in Table 1.

Table 1: List of keywords and articles used in the study

No	Keywords	Description	Related articles
1	Learning & Teaching	This keyword includes articles on learning and teaching in vocational education	Chen & Li 2016; Ozment & Keller 2011, Uckat & Woodruff 2019, Abele et al. 2015; Bekri et al. 2015
2	Curriculum	This keyword includes articles on curricula in vocational education	Marinov & Fraszczyk 2014; Pasek & Pawlewski 2019; Niino & Koppel 2015; Mouzakitis 2010; Albashiry et al. 2015; Reeve 2016; Engelbrecht et al. 2017; Ritter et al. 2018
3	Skills	This keyword includes articles that discuss technical and vocational skills, including TVET skills, worker skills, soft skills, technical skills, administration skills, managerial skills, professional skills, communication skills and technology-related skills.	Reeve 2016; Raihan 2014; Boateng 2012; Khaled et al. 2014; Lorincz et al. 2020; Ahmed et al. 2020; Uckat & Woodruff 2019; Alipour & Newton 2019; Khaled et al. 2012; Wu et al. 2016; Hurrell 2016; Chen & Li 2016; Long et al. 2010; Lu 2016; Karia 2019; Parlamis & Monnot 2019; Suen et al. 2019; Moldovan 2020; Ehlers 2020; Rodríguez Martínez et al. 2021; Dwiyanti et al. 2021; Marr 2022
4	Industrial 4.0	This keyword includes articles that discuss industry 4.0	Jones & Pimdee 2017; Wilson et al. 2017; Ghufron 2018; Müller et al. 2018; Mullan & Wajcman 2019; Zeike et al. 2019; Carayanis et al. 2022
5	Industry Demand	This keyword includes articles that discuss industry demand	Zhang & Grossmann 2016; Deming 2017; Dimian et al. 2017; Jandric & Randelovic 2018; World Bank 2018; Poláková et al. 2023; World Economic Forum 2020; ILO 2021; Gügerçin 2021; Adolph et al. 2014

The results described in several topics are vocational high school learning, industry-required workforces, and collaboration between vocational high school and industry, as below:

3.1 Vocational High School Learning

SMK offer practical, hands-on training in specific trades or careers, providing students with the skills and knowledge needed to enter the workforce directly after completion (Abele et al. 2015; Rodriguez Martinez et al. 2021). These schools focus on preparing students for careers in fields such as automotive technology, cosmetology, culinary arts, healthcare, information technology, construction trades, logistics and many others. There are characteristics of vocational school learning:

- a. **Specialized Training:** Vocational schools provide specialized training tailored to specific industries or occupations. This often includes both theoretical instruction and practical, hands-on experience (Chen & Li 2016; Mouzakitis 2010).
- b. **Industry-Relevant Curriculum:** The curriculum is designed to align with industry standards and practices, ensuring that students are equipped with the most current skills and knowledge needed for their chosen field (Albashiry et al. 2015; Ritter et al. 2018; Alipour & Newton 2019).
- c. **Hands-On Experience:** Unlike traditional academic programs, vocational schools prioritize hands-on learning experiences. Students spend significant time gaining practical skills in workshops, laboratories, and real-world settings (Deming 2017; Digital Europe 2021).
- d. **Certifications and Licenses:** Depending on the program, vocational school graduates may earn industry-recognized certifications or licenses that are essential for employment in certain fields. These credentials can enhance job prospects and earning potential (Dwiyanti et al. 2021; Engelbrecht et al. 2017).
- e. **Job Placement Assistance:** Many vocational schools offer job placement assistance to help graduates secure employment after completing their training. This may include resume assistance, interview preparation, and networking opportunities with potential employers (Khaled et al. 2014).
- f. **Flexibility:** Vocational programs often offer flexible scheduling options, including evening classes or part-time study, to accommodate students who may be working or have other commitments (Lorincz et al. 2020; Lu 2016).
- g. **Career Advancement Opportunities:** Vocational education is not necessarily a dead-end; many programs offer pathways for further education and career advancement. For example, graduates may choose to pursue additional certifications or degrees to advance in their chosen field (Jandric & Randelovic 2018; Marimuthu 2017).

Overall, vocational school learning provides a practical and efficient pathway to gain the skills and credentials needed for success in various industries, offering an alternative to traditional four-year college degrees.

3.2 Industry-Relevant Workforce

The industrial sector requires a diverse workforce with a range of skills and expertise to meet the demands of manufacturing, construction, and other industrial activities. Here are some key areas where the industrial sector often needs skilled workers:

- a. **Skilled Trades** (McKinnon et al. 2017; Poláková et al. 2023; Moldovan 2020): Industrial sectors such as manufacturing, construction, and utilities rely heavily on skilled tradespeople such as electricians, plumbers, welders, machinists, carpenters, and HVAC technicians. These workers are essential for building, maintaining, and repairing infrastructure and machinery.
- b. **Manufacturing Technicians**: With advancements in automation and technology, there is a growing demand for manufacturing technicians who can operate, maintain, and troubleshoot complex machinery and equipment in manufacturing plants.
- c. **Engineers and Technologists**: Industrial engineers, mechanical engineers, electrical engineers, and other engineering professionals play critical roles in designing, optimizing, and improving industrial processes, systems, and products (Niino & Koppel 2015; Gani 2017).
- d. **Supply Chain and Logistics Professionals** (Niino & Koppel 2015; Ozment & Keller 2011; Wu et al. 2016; Karia 2019): The efficient movement of goods and materials is essential for industrial operations. Supply chain managers, logistics coordinators, warehouse managers, and transportation specialists ensure that materials are sourced, produced, and delivered efficiently.
- e. **Quality Control and Assurance Specialists** (Pasek & Pawlewski 2019; Raihan 2014): Ensuring the quality and safety of products is paramount in the industrial sector. Quality control inspectors, quality assurance engineers, and compliance specialists monitor processes and products to maintain high standards and regulatory compliance.
- f. **Health and Safety Professionals** (Reeve 2016; Zhang & Grossmann 2016): Occupational health and safety specialists play a vital role in industrial workplaces by implementing safety protocols, conducting risk assessments, and promoting a culture of safety to prevent accidents and injuries.
- g. **Maintenance and Facilities Management** (Hurrell 2016): Industrial facilities require ongoing maintenance to keep operations running smoothly. Maintenance technicians, facility managers, and building maintenance workers are responsible for repairing equipment, maintaining facilities, and managing infrastructure.
- h. **Environmental and Sustainability Experts** (World Economic Forum 2020; World Bank 2018): With increasing emphasis on environmental responsibility and sustainability, industrial companies need professionals who can develop and implement strategies to reduce waste, conserve resources, and minimize environmental impact.
- i. **Skilled Labourers** (World Bank 2018; Winkelhaus & Grosse 2020): In addition to specialized trades, industrial sectors also rely on skilled labourers such as construction

workers, machine operators, assembly line workers, and production workers to perform various tasks in manufacturing and construction settings.

Meeting the industrial sector's workforce needs requires collaboration between employers, educational institutions, and government agencies to provide training, education, and support for individuals pursuing careers in these fields. Vocational schools, apprenticeship programs, community colleges, and universities all play important roles in preparing workers for industrial careers and addressing the ongoing demand for skilled labour.

3.3 Collaboration between Vocational School and Industry

Collaboration between vocational schools and industry is essential to ensure that students receive relevant training and acquire the skills needed to succeed in the workforce (Uckat & Woodruff 2019; Ehlers 2020). Collaboration is used on curriculum development: Industry input is crucial in developing vocational school curricula that align with current industry standards, practices, and technological advancements (Marinov & Fraszczyk 2014; Mullan & Wajcman 2019). Employers and industry experts may serve on advisory boards or committees to provide feedback on curriculum design, ensuring that programs meet the needs of the labour market. **Work-Based Learning Opportunities:** Vocational schools often partner with industry employers to provide students with hands-on learning experiences such as internships, co-op programs, and apprenticeships (Gügerçin 2021; Zeike et al. 2019). These opportunities allow students to apply classroom knowledge in real-world settings, gain practical skills, and develop industry connections (Mouzakitis 2010). **Guest Lectures and Workshops:** Industry professionals may be invited to vocational schools to deliver guest lectures, lead workshops, or participate in panel discussions. These interactions expose students to current industry trends, best practices, and career pathways, enriching their learning experience and providing valuable insights into the field. **Equipment and Facilities:** Industry partners may donate or provide access to equipment, tools, and facilities for vocational school programs (ILO 2021; Håkanson et al. 2020). This ensures that students have access to state-of-the-art resources and technology that reflect industry standards and practices.

Professional Development for Instructors: Vocational school instructors benefit from ongoing professional development opportunities facilitated by industry partners (Jones & Pimdee 2017; Müller et al. 2018; Parlamis & Monnot 2019). Training workshops, seminars, and industry certifications help instructors stay abreast of industry developments and best practices, enhancing the quality of instruction. **Job Placement and Recruitment:** Industry partnerships facilitate job placement assistance for vocational school graduates (Suen et al. 2019; Wilson et al. 2017). Employers may participate in job fairs, recruitment events, and networking opportunities hosted by vocational schools, connecting students with employment opportunities upon graduation. **Industry Certification and Credentials:** Vocational schools may collaborate with industry partners to offer certification programs or prepare students for industry-recognized credentials (Boateng 2012; Bekri et al. 2015). This enhances students' employability and demonstrates to employers that graduates possess the skills and

competencies required for specific roles. Feedback and Continuous Improvement: Industry partners provide valuable feedback on the performance of vocational school graduates in the workplace (Bag et al. 2020; Bag et al. 2018). This feedback loop helps vocational schools continuously improve their programs, address skill gaps, and adapt to evolving industry needs. Collaboration between vocational schools and industry is a mutually beneficial partnership that enhances the relevance and effectiveness of vocational education, prepares students for successful careers, and supports the talent pipeline for industries in need of skilled workers.

4 Conclusion

In conclusion, the research on preparing an excellent and industry-needed workforce from vocational high schools underscores the importance of collaboration between industry and educational institutions. Throughout this study, it became evident that vocational schools play a crucial role in equipping students with the practical skills and knowledge required by industry. The collaboration between industry and vocational schools is essential for addressing the persistent challenge of skills mismatch and high unemployment rates among vocational school graduates. By working together, industry can provide valuable insights into current and future skill requirements, while vocational schools can tailor their curriculum to better align with industry needs. The findings of this research highlight the effectiveness of various collaboration initiatives, including internships, apprenticeships, guest lectures, and joint curriculum development efforts. These initiatives not only enhance the relevance and quality of vocational education but also improve employment outcomes for graduates. Moving forward, it is imperative for policymakers, educators, and industry stakeholders to continue fostering collaboration between industries and vocational schools. By implementing best practices and strategies identified in this research, we can bridge the gap between education and industry, promote economic growth, and ensure a skilled workforce that meets the demands of the job market.

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